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# Building Commission – 2021 Long Term Monitoring and Tracking Report

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## Executive Summary

The Northwest Energy Efficiency Alliance (NEEA) Commercial Building Commissioning Initiative promoted commissioning in the Northwest from 1999 to 2004. Starting in 2005, NEEA began tracking the market activities and trends of commercial building commissioning via its long-term monitoring and tracking (LTMT) efforts. The 2021 report covers the final cycle of the LTMT, as NEEA is sunsetting the Building Commissioning Initiative after this study.

In preparing this report of the 2021 findings, Cadmus collected data to meet three main objectives: estimate the total floor area of commissioned commercial space, determine the total market size of commercial buildings, and calculate the market penetration of commercial commissioning in the Northwest in 2021.

### *Summary of Key Findings*

Cadmus surveyed 97 commissioning professionals and received data from 30 firms about their 2021 activities. Table 1 contains the study results for the Northwest region (Idaho, Montana, Oregon, and Washington) for 2021 and compares the market penetration with 2020.

**Table 1. 2021 Regionwide Commissioning Activity and Market Penetration**

Commissioning Type	New Construction/ Existing Floor Area (sq. ft.)	Commissioned Space (sq. ft)	Market Penetration (2021)	Market Penetration (2020)
New construction commissioning	78,846,475	35,581,928	45%	79%
Retro-commissioning <sup>1</sup>	3,400,516,607	21,330,889	0.63%	0.55%
Recommissioning <sup>2</sup>	3,400,516,607	10,444,490	0.31%	0.22%
Ongoing commissioning <sup>3</sup>	3,400,516,607	10,753,600	0.32%	0.34%

<sup>1</sup> Commissioning of existing buildings that have never been commissioned.

<sup>2</sup> Commissioning of existing buildings that were commissioned during the construction phase.

<sup>3</sup> Fine-tuning commissioned buildings repeatedly over time.

Sources: NEEA 2014 (CBSA); Cadmus analysis of 2020 and 2021 survey data.

# Key 2021 Commercial Building Commissioning Findings

## *Introduction*

This Long-Term Monitoring and Tracking (LTMT) report, prepared by Cadmus, presents the 2021 findings for the Northwest Energy Efficiency Alliance (NEEA) Commercial Building Commissioning Initiative, which promoted commissioning in the Northwest<sup>1</sup> from 1999 to 2004 and began long-term monitoring and tracking (LTMT) efforts in 2005. The 2021 report covers the final cycle of the LTMT, as NEEA is sunsetting the Building Commissioning Initiative after this study.

The 2021 LTMT study had three objectives:

- Estimate the total floor area of commissioned commercial space (square footage) for new and existing buildings by state and by each of four commissioning types
- Determine the total market size of new and existing commercial buildings
- Calculate the market penetration of commercial commissioning and track changes in penetration over time

This 2021 study meets these objectives and also provides findings on the types of buildings and systems being commissioned, costs of commissioning, barriers to existing building commissioning, trends in system commissioning, and insights on impacts of COVID-19.

This LTMT report contains key findings and recommendations, followed by five appendices with further detail on the research methodology, references, historical data, survey recruitment, and the survey instrument.

## *Summary of Research Approach*

For the 2021 study, Cadmus used the most recently updated sample frame from 2019, which lists 97 commissioning firms active in the Northwest. Cadmus emailed an online survey to the full population and received responses from 30 commissioning professionals who represented 30 firms, a response rate of 31%. Cadmus also analyzed data from Dodge Data and Analytics and from NEEA's 2014 *Commercial Building Stock Assessment* (CBSA) to estimate market size in square footage of floor area for both new and existing construction buildings. Appendix A provides a detailed description of the research methodology.

Cadmus received survey data on four types of commissioning activity from commissioning providers:

- Commissioning (Cx)—Commissioning of new buildings during the construction phase
- Retro-commissioning (RCx)—Commissioning of existing buildings that have never been commissioned

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<sup>1</sup> The Northwest comprises Idaho, Montana, Oregon, and Washington.

- Recommissioning (ReCx)—Commissioning of existing buildings that were commissioned during the construction phase
- Ongoing/continuous commissioning (OCx)—Fine-tuning commissioned buildings repeatedly over time

## Key Takeaways

The two key takeaways from the 2021 study are as follows:

- Market penetration for new building commissioning dropped steeply for the region in 2021, primarily driven by Washington state. Contributing factors include a change in the new construction market combined with less commissioning activity overall.
- COVID-19 continued to impede commissioning activity in the region in 2021, mainly due to delayed projects. Providers reported that project delays were often caused by supply-chain issues or were initiated by customers. Almost three-quarters of commissioning providers expect COVID-19 to continue to impact commissioning activity in the region into 2022.

## Results for New Building Commissioning (Cx)

From 2020 to 2021, for the Northwest as a whole, commercial new construction increased by 10%. Despite the growth in new construction, total floor area of commissioned new buildings decreased by 39%, resulting in a Cx market penetration of just 45% in 2021. Table 2 lists findings for new building commissioning in 2021 compared with 2020.

**Table 2. 2021 Estimates for Commercial New Building Commissioning**

State	New Construction Floor Area (sq. ft.)	Commissioned Space (sq. ft.)	Market Penetration (2021)	Market Penetration (2020)
Idaho	9,696,025	1,349,578	14%	23%
Montana	3,652,625	2,299,867	63%	93% <sup>1</sup>
Oregon	20,695,625	14,742,567	71%	61%
Washington	44,802,200	17,189,916	38%	99%
<b>Total</b>	<b>78,846,475</b>	<b>35,581,928</b>	<b>45%</b>	<b>79%</b>

<sup>1</sup> Montana’s 2020 Cx activity reported in the survey resulted in a calculated market penetration rate that exceeded 100%. For that reason, Cadmus used the 2017 market penetration rate of 93% and calculated square footage accordingly.

Sources: Dodge 2020 and 2021 data; Cadmus analysis of 2020 and 2021 survey data.

Oregon was the only state in which market penetration of new building commissioning increased from 2020 to 2021. Oregon's 2021 market penetration of 71% is the highest since 2015 and 2016 (both 75%) and is likely due in part to the 2021 Oregon Efficiency Specialty Code adopted in April 2021.<sup>2</sup>

Decreases in market penetration in Idaho, Montana, and Washington in 2021 were unexpected given that building codes in all three states require mandatory commissioning of major systems.

Washington's low market penetration was a particularly surprising 2021 finding as the state has been a leader in energy codes with a mature commissioning market and, due to the market size, the state has a large impact on the region's totals.

In 2021, new building commissioning market penetration for Washington dipped to 38%, a record low for the study. Two factors contributed to the drop:

- **Market size.** Market penetration is an outcome of the total square footage of commissioned space divided by the size of the market. As in previous years of the study, Cadmus used Dodge Data and Analytics to estimate market size for each state. The data showed an anomaly. In 2021, new construction of warehouses grew by 393% in Washington state alone, nearly a quarter of all new construction in Washington and a significantly larger percentage than any previous year. However, because warehouses are often built as unconditioned spaces, it is likely much of this sector was not commissioned.
- **Commissioning activity.** The other part of the market penetration equation is the total square footage of commissioned space. In 2021, all commissioning providers reported less new building commissioning compared to 2020. On average, Washington firms reported 39% less. The survey did not explore factors that might have caused this decrease.

## *Results for Existing Building Commissioning (RCx, ReCx, OCx)*

For the Northwest as a whole, total floor area increased slightly for all types of existing building commissioning activity combined. At a regional level, the only existing building commissioning type that saw a decline was ongoing commissioning (OCx), due to steep declines in both Idaho and Oregon. There was no reported OCx activity in Idaho in 2021. In Oregon, despite a 2% increase in existing construction floor area, the study found a 79% decrease for OCx in 2021.

Table 3 summarizes 2021 findings for existing building commissioning activities.

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<sup>2</sup> The Oregon Efficiency Specialty Code is based on ASHRAE Standard 90-1 2019, which includes updated mandatory commissioning requirements in a new section of the standard.  
<https://www.oregon.gov/bcd/codes-stand/Documents/90.1-2019-Envelope-training.pdf>  
and <https://www.csemag.com/articles/video-ashrae-90-1-cx-requirement-changes-and-comparison-to-the-intl-energy-efficiency-code/>



**Table 3. 2021 Estimates for Existing Building Commissioning**

Type	State	Existing Floor Area (sq. ft.)	Commissioned Space (sq. ft)	Market Penetration (2021)	Market Penetration (2020)
RCx	Idaho	327,122,557	642,625	0.20%	0.12%
	Montana	259,868,382	1,098,045	0.42%	0.68%
	Oregon	1,008,668,991	1,672,315	0.17%	0.56%
	Washington	1,804,856,677	17,917,904	0.99%	0.61%
	<b>Total*</b>	3,400,516,607	21,330,889	0.63%	0.55%
ReCx	Idaho	327,122,557	59,220	0.02%	0.00%
	Montana	259,868,382	160,051	0.06%	0.21%
	Oregon	1,008,668,991	3,116,313	0.31%	0.08%
	Washington	1,804,856,677	7,108,907	0.39%	0.33%
	<b>Total</b>	3,400,516,607	10,444,490	0.31%	0.22%
OCx	Idaho	327,122,557	-	0.00%	0.24%
	Montana	259,868,382	3,368,333	1.30%	0.59%
	Oregon	1,008,668,991	736,333	0.07%	0.35%
	Washington	1,804,856,677	6,648,933	0.37%	0.32%
	<b>Total</b>	3,400,516,607	10,753,600	0.32%	0.34%
<b>Total (All)</b> <sup>1</sup>		3,400,516,607	42,528,979	1.25%	1.11%

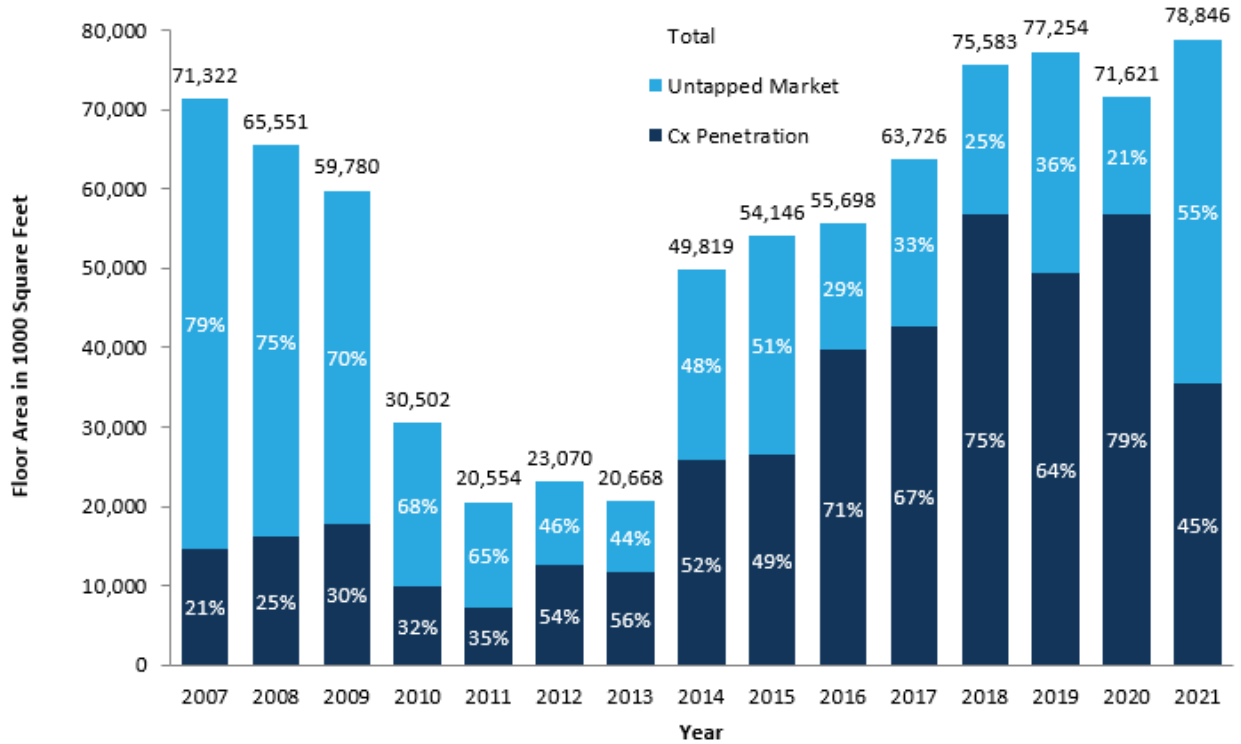
<sup>1</sup> Totals may not equal the sum of column due to rounding.

Sources: NEEA 2014 (CBSA); Cadmus analysis of 2020 and 2021 survey data.

## Historical Data and Trends

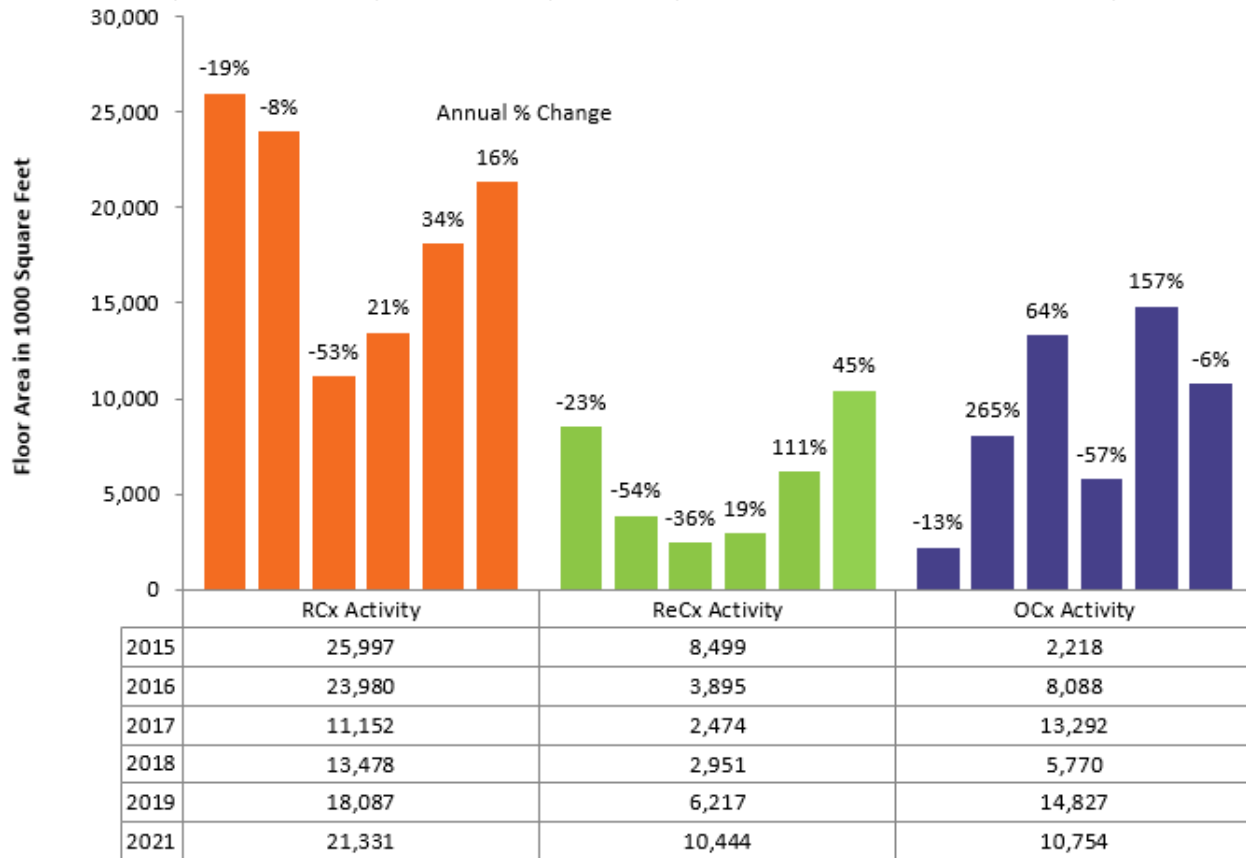
The following charts illustrate historical regionwide commissioning activity and market penetration for Cx (Figure 1) and for RCx, ReCx, and OCx (Figure 2). Appendix C provides historical data on a state-by-state basis.

**Figure 1. Historical Estimates for New Building Commissioning Market Penetration: Northwest Region**



Sources: Summit Blue Consulting 2006–2008; Navigant 2010–2012; Cadmus 2014–2020; Cadmus analysis of 2021 survey data.

Figure 2. Historical Estimates for Existing Building Commissioning Activity: Northwest Region



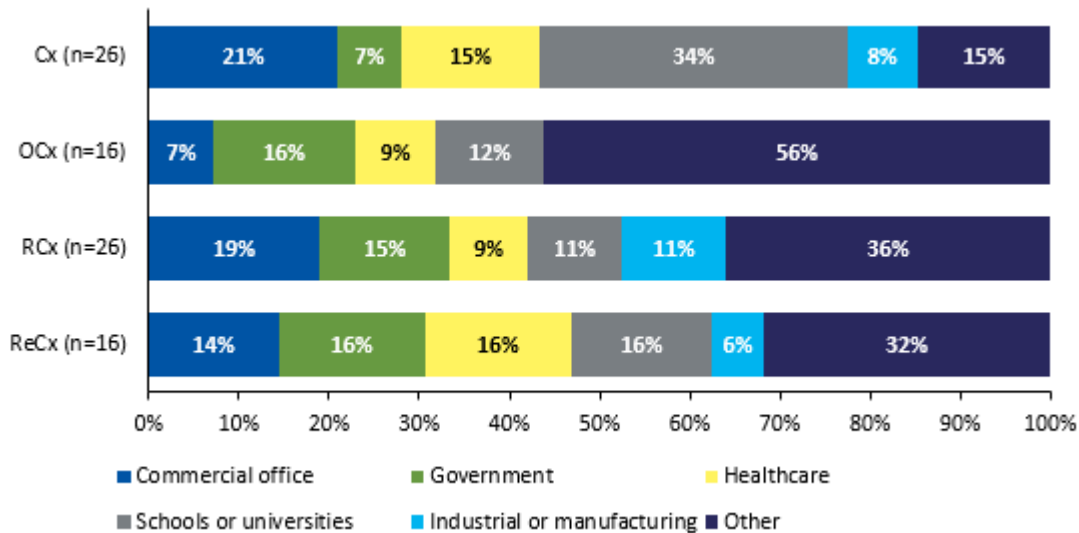
Sources: Cadmus 2015–2020; Cadmus analysis of 2021 survey data.

# Market Insights

## Commissioned Building Types

Cadmus asked commissioning firms about the share of commissioned floor area by building type. Figure 3 displays these data. The building types that saw the largest share of commissioning activity by category were schools and universities for Cx, government buildings for OCx, and commercial offices for RCx. Firms performed ReCx in government, healthcare, and schools and university buildings at approximately equal proportions. Though respondents were not asked to specify the building types for which they selected “Other,” this category was a particularly large proportion of commissioning activity for the existing building types. It’s likely that this category encompasses a mix of building types such as grocery stores, restaurants, and retail.

**Figure 3. Distribution of New and Existing Building Commissioning by Building Type**



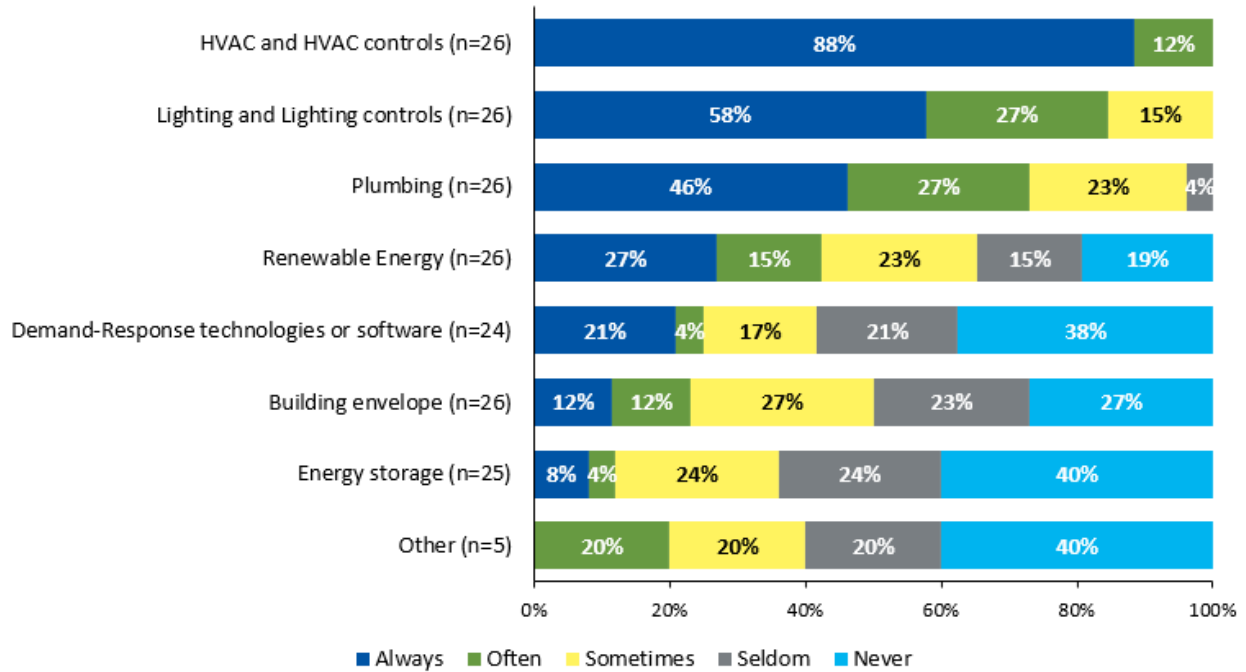
Source: Cadmus survey questions D4, D9, D12, and D15. “For the new/existing space your firm commissioned in 2020, what was the approximate percentage breakdown of square footage by the building types below?” Percentages may not total to 100% due to rounding. n = the number of firms who offered the specific commissioning services and responded to the question. Respondents who answered “other” were not asked a follow up question asking for clarification.

Cadmus asked how frequently providers commission certain pieces of equipment and systems in new and existing building commissioning projects. As shown in Figure 4, most firms said that during new building commissioning projects they *always* commission HVAC and HVAC controls (88%; n=26), and over half said they *always* commission lighting and lighting controls (58%; n=26). Conversely, 40% of firms *never* commission energy storage (n=25), and 38% *never* commission demand response technologies or software (n=24).

During existing building commissioning (RCx, ReCx, and OCx) projects, 81% of firms said they *always* commission HVAC and HVAC controls (n=26), while fewer reported that they *always* commission lighting and lighting controls (46%; n=26). This is consistent with findings from 2020. Also similar to Cx, building

envelope and energy storage systems were the least frequently commissioned during existing building commissioning.

**Figure 4. Frequency of Commissioning by Equipment/System Type during New Building Commissioning (Cx)**



Source: Cadmus survey question D5. “How frequently does your firm commission the following systems in new building commissioning projects?” Percentages may not total to 100% due to rounding.

### Commissioning Project Costs

Cadmus asked firms that commission new and existing buildings about their typical project cost range. Each respondent supplied lower- and upper-bound costs for typical projects. Cadmus calculated the average of reported lower and higher bounds per square foot. Costs ranged from \$0.95 to \$2.63 for a new building (n=17) and \$0.87 to \$2.03 for an existing building (n=14).

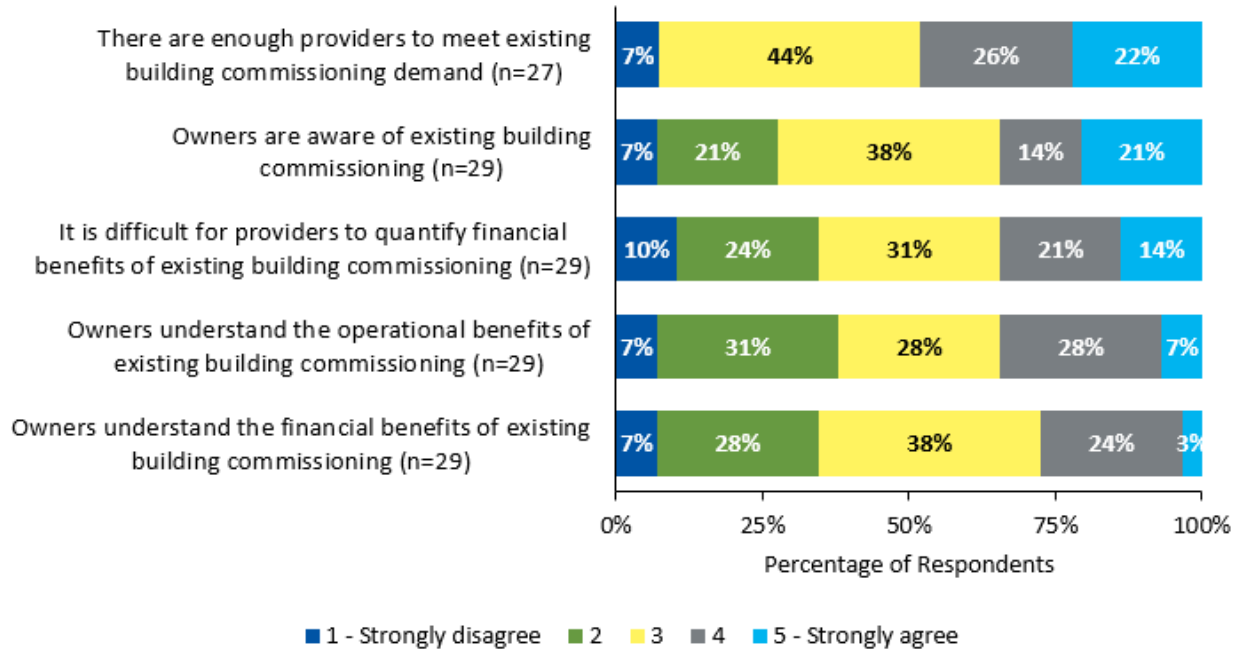
Average costs in 2021 rose for both new and existing buildings. The average cost for new buildings was \$0.97 in 2020, rising to \$1.79 in 2021. For existing buildings, the average cost was \$0.69 in 2020, rising to \$1.45 in 2021.

### Barriers to Existing Building Commissioning

Cadmus asked respondents to rate their level of agreement with several statements about existing building commissioning. As shown in Figure 5, almost three-quarters of respondents did not agree that *owners understand the financial benefits of existing building commissioning* (73%, n=29); a similar number disagreed with the statement that *building owners understand the operational benefits of existing building commissioning* (66%, n=29), indicating that these are key barriers.

In 2020, respondents were also most likely to disagree that *building owners understand the financial benefits of existing building commissioning* (47%, n=35). However, in 2020, awareness of existing building commissioning was the second largest barrier (42%, n=36).

**Figure 5. Respondent Agreement with Statements about Existing Building Commissioning**



Source: Cadmus survey question E4. “Using a scale from 1 to 5 where 1 means *strongly disagree* and 5 means *strongly agree*, please rate whether you agree with the following statements about existing building commissioning.” Percentages may not total to 100% due to rounding.

## System Commissioning Trends

Cadmus asked respondents whether they had heard of Luminaire Level Lighting Controls (LLLC). Close to two-thirds of respondents (63%, n=30) said they had. This is consistent with 2020, where 69% (n=36) of respondents were aware of LLLCs. Respondents were subsequently asked if they had ever commissioned an LLLC system in a project; approximately two-thirds (68%, n=19) said they had. This is a slight decrease from 2020, where 58% (n=36) of respondents said they had commissioned an LLLC system. When asked to describe an LLLC system, all respondents that had previously heard of LLLCs knew LLLCs are independent lighting controls that are networked in a system.

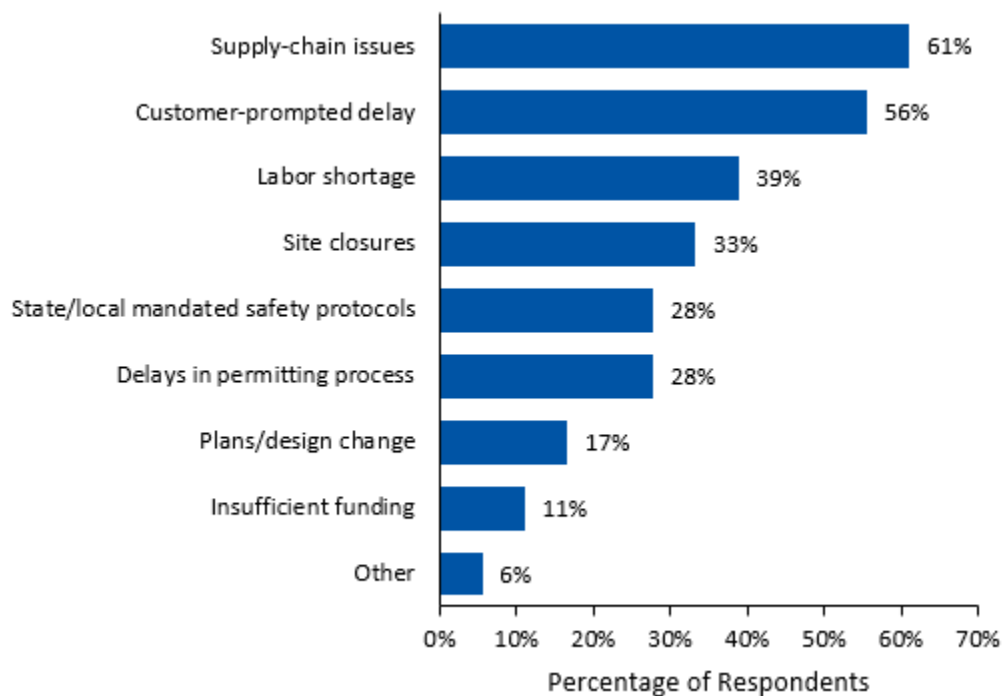
The 13 respondents who said they had commissioned an LLLC system were asked to rate the difficulty of commissioning an LLLC system compared with a typical code-compliant lighting system. Six respondents said commissioning an LLLC system was *more difficult*, six said it was *about the same difficulty*, and one found it *less difficult*. Some respondents who said LLLC systems were *more difficult* said this is because these systems have more components that require testing connectivity and functionality, so the systems are more complex than traditional lighting systems. These findings are relatively consistent with 2020, where five of the 11 respondents said commissioning an LLLC system was *more difficult*, six said it was *about the same difficulty*, and none found it *less difficult*.

## COVID-19

Seventy percent of respondents (n=30) said COVID-19 had impacted their firm in 2021, which is consistent with 2020 findings. A majority of respondents (86%, n=21) said the pandemic *delayed projects*, while 48% reported a *reduced ability to do commissioning due to social distancing requirements*. Twenty-nine percent of respondents reported *lower demand for commissioning services*, and 14% listed *other* impacts.

The 18 respondents who reported delayed projects were asked to elaborate about how COVID-19 caused delays. As shown in Figure 6, the majority listed *supply chain issues* (61%) and *customer-prompted delays* (56%).

**Figure 6. COVID-19–Related Causes for Commissioning Project Delays**



Source: Cadmus survey question E4. “How did COVID-19 cause your firm's commissioning projects to be delayed? Select all that apply.” Percentages may not total to 100% due to rounding. n=18

Cadmus also asked respondents how they believed COVID-19 would impact commissioning in the Northwest in 2022. Of 18 respondents, the majority anticipated a COVID-19-related impact (72%), while the remainder did not or were unsure. Twenty-two percent believed supply chain issues will persist into 2022; respondents equally predicted future state or locally mandated safety protocols and additional site closures (17%). Eleven percent believed additional labor shortages will reduce their firm’s ability to do commissioning, and 11% predicted delays in the permitting process. Lastly, 6% of respondents predicted budget reductions.

## Discussion and Recommendations

**New building commissioning market penetration dropped steeply for the region, primarily driven by changes in Washington state. Factors contributing to this include a change in the new construction market combined with less commissioning activity overall.**

Commissioning market penetration decreased in Idaho, Montana, and Washington. Market penetration was particularly low in Washington, a state with historically steady levels of high market penetration and a mature commissioning industry.

Data on commercial new construction for 2021 showed that warehouse new construction grew significantly in all three states, which raises questions about the actual floor area of new construction that was required to be commissioned by code. That is, because warehouses are often unconditioned, it stands to reason that these spaces would not be commissioned and therefore may be arbitrarily contributing to a lower market penetration rate. Data about market size do not distinguish conditioned and unconditioned square footage for warehouses, so it is unclear how much warehouse space required commissioning. Because of this, Cadmus and NEEA have historically included warehouses in the market size and did in the 2021 study as well. The survey also found that, overall, firms reported decreased commissioning in 2021 compared with 2020.

These factors—more warehouse new construction and fewer commissioning projects overall—are likely the causes of a steep drop in market penetration for Idaho, Montana, and Washington.

On the other hand, a boost in commissioning in Oregon was likely the result of the adoption of a new commercial building code based on ASHRAE Standard 90.1 2019, which clarifies and strengthens commissioning requirements. Interestingly, Oregon also had a much smaller proportion of new warehouses constructed in the state, compared to the other three states.

**COVID-19 continued to impede commissioning activity in the region in 2021, mainly through project delays. Commissioning providers said project delays were often caused by supply-chain issues or were initiated by customers. Almost three-quarters of commissioning providers expect COVID-19 to continue to impact commissioning activity in the region into 2022.**

Seventy percent of respondents (n=30) said COVID-19 had impacted their firm in 2021. The majority of respondents (86%, n=21) said the pandemic delayed projects; of these respondents, the majority listed *supply chain issues* (61%, n=18) and *customer-prompted delays* (56%, n=18) as the driving causes. The majority of respondents anticipated a continued impact by COVID-19 on commissioning in the Northwest in 2022 (72%, n=18), with supply chain issues as the most commonly anticipated factor.



## Appendix A. Methodology

This is the ninth year that Cadmus has conducted this study of building commissioning in the Northwest. Each year, the methods have remained consistent to provide a reliable measure of market change, although NEEA and Cadmus have made refinements based on the study’s findings, NEEA’s priorities, and the best available information.

### *Data Collection Methodology*

NEEA had four major objectives for the 2021 study:

- Update the total floor area of commissioned space (square footage) by state and by each commissioning type
- Determine the total market size of new and existing commercial buildings
- Calculate market penetration and determine how market penetration has changed over time
- Update the number of certified and uncertified commissioning professionals by state

Table A-1 summarizes the methodology and sources used for meeting each of these objectives. The next section describes the methodology for the online survey. In later sections of this appendix, Cadmus discusses in detail the steps taken to develop the 2021 estimates.

**Table A-1. Data Collection Methodology**

Objectives	Method	Population <sup>1</sup>	Target Sample Size	Achieved Sample Size	Data Source for Task
Floor area of commissioned building space	Online survey of professionals	97 firms	35 firms	30 firms	Sample frame constructed from public data from Internet search and certification bodies <sup>1</sup>
Market size (floor area of new and existing buildings)	Secondary sources	N/A	N/A	N/A	Dodge data and 2014 CBSA data provided by NEEA
Number of certified and uncertified commissioning professionals by state	Online survey of professionals	271 professionals	35 respondents	30 respondents	Number of certified professionals from public data per internet search and certification bodies <sup>1</sup> ; number of uncertified professionals obtained from survey

<sup>1</sup> Population is based on number of professionals certified with one or more of the following: BCxA, AABC Commissioning Group, American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Association of Energy Engineers, and the National Environmental Balancing Bureau.

Cadmus calculated precision for floor area at 80% confidence with  $\pm 17\%$  precision for new building commissioning (Cx) and 80% confidence with  $\pm 14\%$  precision for existing building commissioning (RCx, ReCx, and OCx).<sup>3</sup>

## *Online Survey*

Cadmus used an online survey platform, designed and administered through Qualtrics, to collect square footage for commissioning activities. Appendix E provides the online survey instrument. Cadmus contacted all commissioning professionals from the commissioning firm population, targeting 35 responses.

## Survey Sample

In 2021, Cadmus used the list of commissioning firms that was developed in 2019. The list included some California-based engineering firms and professionals that might have serviced the Northwest in 2019. In 2020, three firms reported they had serviced the Northwest, and they were counted in the final population. Altogether, 30 commissioning professionals completed the survey, representing 30 firms.

## Survey Recruitment

During the survey fielding period, from mid-November of 2021 to mid-January of 2022, Cadmus sent three reminder emails to all commissioning professionals and made at least 25 reminder phone calls. Cadmus also worked with NEEA and the BCxA to create a post for its December 2021 e-newsletter to advertise the study and to invite commissioning professionals to complete the survey (see Appendix D).

Thirty commissioning firms participated in the 2021 study. 13 firms that had participated in the 2020 study did not participate again. Cadmus recruited six firms that had not participated before the 2020 study. 11 firms who had participated in the study in 2020 returned to participate again in 2021.

## *Determination of Market Size*

NEEA measures market penetration of new and existing building commissioning activity using the total new and existing commercial building floor area by state. New commercial building floor area in square feet serves as the metric for Cx market size, and existing commercial building floor area in square feet serves as the metric for RCx, ReCx, and OCx market size.

NEEA provided Cadmus with new construction floor area from Dodge Data and Analytics for 2020 and 2021. Data from both years were necessary to arrive at the most accurate 2021 market size for commissioning because Cadmus lagged the construction start data by nine months to account for the long duration between construction starts and completions. The 2021 new building floor area estimate consisted of 75% of the floor area for 2020 new construction starts and 25% from 2021. Cadmus also

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<sup>3</sup> Cadmus calculated one measurement of confidence and precision for all combined types of existing building commissioning. Sample sizes were too small to provide separate and meaningful precision results for RCx, ReCx, and OCx.

removed the floor area of parking garages from this estimate as these structures typically do not undergo commissioning.

To determine the 2021 existing commercial building floor area in each state, Cadmus used NEEA’s CBSA building stock floor area estimates from 2014 and added 2015, 2016, 2017, 2018, 2019, 2020, and 2021 new construction floor area.<sup>4</sup> Appendix C shows new and existing building stock by state and by year.

## Floor Area of Demolitions

NEEA’s cost-effectiveness model requires estimates of demolished building floor area. To calculate the demolished building floor area in the 2018 study, Cadmus applied the 2013 study’s established demolition rate of 0.63% to the existing building floor area calculated for each state for 2018.

For the 2019 study, Cadmus conducted additional secondary data research and updated each state’s demolition rate based on the commercial building square footage forecast in the Northwest Power and Conservation Council’s *Seventh Northwest Power Plan*, published in 2016. This approach did not change in 2020 and 2021.

Table A-2 reports the square footage of demolished building floor area for 2021.

**Table A-2. 2021 Demolished Square Footage**

State	2021 Existing Floor Area (sq. ft.)	Demolition Rate	Demolished Floor Area (sq. ft.)
Idaho	327,122,557	0.45%	1,472,359
Montana	259,868,382	0.44%	1,139,758
Oregon	1,008,668,991	0.46%	4,652,012
Washington	1,804,856,677	0.41%	7,419,351

Source: Council (2016); Cadmus analysis.

## Market Penetration

Cadmus determined commissioning market penetration by collecting commissioning firms’ estimates of floor area (in square feet) commissioned in 2021, by state and commissioning type.

Cadmus’ market penetration methodology involved the following steps:

1. Collect data on commissioned floor area from professionals through the online survey
2. Estimate the population of commissioning firms by state and commissioning type
3. Adjust for commissioning in manufacturing and industrial facilities
4. Extrapolate the sample data collected to the firm population to arrive at total commissioned floor area
5. Calculate market penetration by state and commissioning type

<sup>4</sup> The estimates for floor area lagged by nine months.

Table A-3 contains the final estimated population of firms by state and commissioning type. In this case, “service population” means the number of firms that Cadmus estimated serviced customers in that state for each specific commissioning type. The study used these population estimates as a multiplier to generate total floor area for the Alliance Cost-Effectiveness model.

**Table A-3. Total Estimated Population of Commissioning Firms by State and Commissioning Type**

State	Cx Service Population	RCx Service Population	ReCx Service Population	OCx Service Population
Idaho	3	2	1	0
Montana	3	3	2	2
Oregon	10	6	5	3
Washington	17	12	6	3

Source: Cadmus analysis of 2021 survey data.

## Adjustments

NEEA’s commissioning initiative focused on the commercial building market. The survey also asked respondents to provide data on commissioning industrial and manufacturing (I&M) buildings. To measure responses about I&M commissioning, the survey asked questions about square footage of commissioned floor area from I&M buildings for each of the four commissioning types, then adjusted the final commercial square footage to remove floor area for I&M buildings, as presented in this report.<sup>5</sup> The I&M buildings comprised 4% of reported Cx square footage, 10% of reported RCx square footage, 2% of reported ReCx square footage, and no OCx square footage.<sup>6</sup>

## Extrapolation of Sample Data to Population

To extrapolate sample square footage to the population of firms in each state and commissioning type, Cadmus applied the following formula:

$$NCxSqFt_{s,t} = \frac{\sum_{f=1}^n CxSqFt_{s,t}}{n_{s,t}} \times N_{s,t}$$

Where

- s = State (ID, MT, OR, or WA);
- t = Commissioning type (Cx, RCx, ReCx, or OCx);
- f = Commissioning firm;
- N<sub>s,t</sub> = Number of firms in the population in state (s) and commissioning type (t) (from Table A-3);

<sup>5</sup> NEEA also captures savings from industrial and manufacturing (I&M) commissioning but uses a different savings rate.

<sup>6</sup> See questions D4, D9, D12, and D15 in Appendix E.

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- $n_{s,t}$  = Number of firms in the sample in state ( $s$ ) and commissioning type ( $t$ ) (Cadmus analysis of 2018 survey data);
- $CxSqFt_{s,t}$  = Adjusted commissioning square feet reported by firm ( $f$ ) for state ( $s$ ) and commissioning type ( $t$ ) (Cadmus analysis of 2018 survey data); and
- $NCxSqFt_{s,t}$  = Total commissioning square feet for state ( $s$ ) and commissioning type ( $t$ ) (in Table 2 and Table 3 in the main report).

## Appendix B. References

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## Appendix C. Historical Data

**Table 4. New Building Commissioning 2013–2020 Market Size, Activity, and Penetration Estimates**

State	Year	New Building Market Size (sq. ft.)	Cx Activity (sq. ft.)	Market Penetration
<b>Idaho</b>	<b>2021</b>	<b>9,696,025</b>	<b>1,349,578</b>	<b>14%</b>
Idaho	2020	7,946,575	1,866,971	23%
Idaho	2019	9,969,082	457,357	5%
Idaho	2018	7,093,869	1,355,241	19%
Idaho	2017	8,101,275	1,620,375	20%
Idaho	2016	8,654,525	1,241,321	14%
Idaho	2015	5,626,275	1,971,336	35%
Idaho	2014	3,756,200	856,308	23%
Idaho	2013	2,659,925	376,000	14%
<b>Montana</b>	<b>2021</b>	<b>3,652,625</b>	<b>2,299,867</b>	<b>63%</b>
Montana	2020	2,774,850	2,580,611	93%
Montana	2019	3,032,119	2,829,509	93%
Montana	2018	2,401,198	787,315	33%
Montana	2017	2,801,875	2,614,650	93%
Montana	2016	2,935,250	1,038,165	35%
Montana	2015	2,556,625	768,214	30%
Montana	2014	2,060,825	794,779	39%
Montana	2013	1,401,725	499,021	36%
<b>Oregon</b>	<b>2021</b>	<b>20,695,625</b>	<b>14,742,567</b>	<b>71%</b>
Oregon	2020	20,738,950	12,714,363	61%
Oregon	2019	19,841,759	9,861,966	50%
Oregon	2018	20,047,811	10,697,247	53%
Oregon	2017	15,927,975	5,576,794	35%
Oregon	2016	13,003,750	9,740,592	75%
Oregon	2015	12,600,125	9,421,714	75%
Oregon	2014	13,959,850	7,199,634	52%
Oregon	2013	5,842,325	3,192,334	55%
<b>Washington</b>	<b>2021</b>	<b>44,802,200</b>	<b>17,189,916</b>	<b>38%</b>
Washington	2020	40,160,750	39,684,732	99%
Washington	2019	44,410,612	36,330,884	82%
Washington	2018	46,040,446	43,988,029	96%
Washington	2017	36,895,250	32,748,574	89%
Washington	2016	31,103,975	27,608,184	89%
Washington	2015	33,363,025	14,344,043	43%
Washington	2014	30,041,975	16,950,747	56%
Washington	2013	10,763,625	7,562,522	70%
<b>Total</b>	<b>2021</b>	<b>78,846,475</b>	<b>35,581,928</b>	<b>45%</b>
Total	2020	71,621,125	56,846,677	79%
Total	2019	77,253,572	49,479,716	64%
Total	2018	75,583,324	56,827,831	75%



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State	Year	New Building Market Size (sq. ft.)	Cx Activity (sq. ft.)	Market Penetration
Total	2017	63,726,375	42,560,393	67%
Total	2016	55,697,500	39,628,261	71%
Total	2015	54,146,050	26,505,308	49%
Total	2014	49,818,850	25,801,468	52%
Total	2013	20,667,600	11,629,876	56%

Sources: Dodge; Cadmus 2014-2019; Cadmus analysis of 2020 data.

**Table 5. Retro-Commissioning 2013–2020 Market Size, Activity, and Penetration Estimates**

State	Year	Existing Building Market Size (sq. ft.)	RCx Activity (sq. ft.)	Market Penetration
<b>Idaho</b>	<b>2021</b>	<b>327,122,557</b>	<b>642,625</b>	<b>0.20%</b>
Idaho	2020	319,280,087	398,778	0.12%
Idaho	2019	309,313,486	1,425,346	0.46%
Idaho	2018	302,222,597	612,459	0.20%
Idaho	2017	294,267,364	21,250	0.01%
Idaho	2016	285,616,121	111,268	0.04%
Idaho	2015	279,993,579	449,365	0.16%
Idaho	2014	277,520,204	1,310,676	0.47%
Idaho	2013	251,819,745	231,000	0.09%
<b>Montana</b>	<b>2021</b>	<b>259,868,382</b>	<b>1,098,045</b>	<b>0.42%</b>
Montana	2020	256,497,291	1,748,021	0.68%
Montana	2019	253,466,056	2,743,714	1.08%
Montana	2018	251,065,572	699,176	0.28%
Montana	2017	248,264,039	1,300,500	0.52%
Montana	2016	245,330,092	620,702	0.25%
Montana	2015	242,774,686	1,922,118	0.79%
Montana	2014	241,278,586	2,895,373	1.20%
Montana	2013	73,404,096	1,256,700	1.71%
<b>Oregon</b>	<b>2021</b>	<b>1,008,668,991</b>	<b>1,672,315</b>	<b>0.17%</b>
Oregon	2020	991,966,460	5,564,028	0.56%
Oregon	2019	972,126,746	3,687,386	0.38%
Oregon	2018	952,086,039	2,174,322	0.23%
Oregon	2017	936,163,951	5,299,538	0.57%
Oregon	2016	923,165,449	15,537,577	1.68%
Oregon	2015	910,569,540	14,787,244	1.62%
Oregon	2014	902,390,465	8,041,145	0.89%
Oregon	2013	700,587,203	5,490,747	0.78%
<b>Washington</b>	<b>2021</b>	<b>1,804,856,677</b>	<b>17,917,904</b>	<b>0.99%</b>
Washington	2020	1,767,417,707	10,734,798	0.61%
Washington	2019	1,723,026,775	10,230,729	0.59%
Washington	2018	1,677,004,284	9,992,108	0.60%

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Washington	2017	1,640,126,291	4,531,116	0.28%
Washington	2016	1,609,038,937	7,710,523	0.48%
Washington	2015	1,575,691,205	8,838,009	0.56%
Washington	2014	1,558,742,105	19,810,255	1.27%
Washington	2013	1,175,723,736	12,494,182	1.06%
<b>Total</b>	<b>2021</b>	<b>3,400,516,607</b>	<b>21,330,889</b>	<b>0.63%</b>
Total	2020	3,335,161,546	18,445,624	0.55%
Total*	2019	3,257,933,063	18,087,174	0.56%
Total	2018	3,182,378,491	13,478,066	0.42%
Total	2017	3,118,821,645	11,152,404	0.36%
Total	2016	3,063,150,599	23,980,068	0.78%
Total	2015	3,009,029,010	25,996,736	0.86%
Total	2014	2,979,931,360	32,057,449	1.08%
Total	2013	2,201,534,780	19,472,629	0.88%

\*Totals may not equal the sum of column due to rounding.

Sources: Dodge; NEEA 2014 (CBSA); Cadmus 2014-2019; Cadmus analysis of 2020 data.

**Table 6. Recommissioning 2013–2020 Market Size, Activity, and Penetration Estimates**

State	Year	Existing Building Market Size (sq. ft.)	ReCx Activity (sq. ft.)	Market Penetration
<b>Idaho</b>	<b>2021</b>	<b>327,122,557</b>	<b>59,220</b>	<b>0.02%</b>
Idaho	2020	319,280,087	0	0.00%
Idaho	2019	309,313,486	27,714	0.01%
Idaho	2018	302,222,597	74,118	0.02%
Idaho	2017	294,267,364	-	0.00%
Idaho	2016	285,616,121	276,159	0.10%
Idaho	2015	279,993,579	0	0.00%
Idaho	2014	277,520,204	523,243	0.19%
Idaho	2013	251,819,745	-	0.00%
<b>Montana</b>	<b>2021</b>	<b>259,868,382</b>	<b>160,051</b>	<b>0.06%</b>
Montana	2020	256,497,291	538,889	0.21%
Montana	2019	253,466,056	554,286	0.22%
Montana	2018	251,065,572	-	0.00%
Montana	2017	248,264,039	-	0.00%
Montana	2016	245,330,092	21,429	0.01%
Montana	2015	242,774,686	313,820	0.13%
Montana	2014	241,278,586	350,071	0.15%
Montana	2013	73,404,096	-	0.00%
<b>Oregon</b>	<b>2021</b>	<b>1,008,668,991</b>	<b>3,116,313</b>	<b>0.31%</b>
Oregon	2020	991,966,460	808,333	0.08%
Oregon	2019	972,126,746	69,286	0.01%
Oregon	2018	952,086,039	787,871	0.08%

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State	Year	Existing Building Market Size (sq. ft.)	ReCx Activity (sq. ft.)	Market Penetration
Oregon	2017	936,163,951	1,609,900	0.17%
Oregon	2016	923,165,449	1,934,324	0.21%
Oregon	2015	910,569,540	6,025,351	0.66%
Oregon	2014	902,390,465	3,897,020	0.43%
Oregon	2013	700,587,203	1,046,318	0.15%
<b>Washington</b>	<b>2021</b>	<b>1,804,856,677</b>	<b>7,108,907</b>	<b>0.39%</b>
Washington	2020	1,767,417,707	5,849,639	0.33%
Washington	2019	1,723,026,775	5,565,882	0.32%
Washington	2018	1,677,004,284	2,088,961	0.12%
Washington	2017	1,640,126,291	864,167	0.05%
Washington	2016	1,609,038,937	1,663,518	0.10%
Washington	2015	1,575,691,205	2,160,289	0.14%
Washington	2014	1,558,742,105	6,314,294	0.41%
Washington	2013	1,175,723,736	3,825,000	0.33%
<b>Total</b>	<b>2021</b>	<b>3,400,516,607</b>	<b>10,444,490</b>	<b>0.31%</b>
Total	2020	3,335,161,546	7,196,861	0.22%
Total	2019	3,257,933,063	6,217,168	0.19%
Total	2018	3,182,378,491	2,950,950	0.09%
Total	2017	3,118,821,645	2,474,067	0.08%
Total	2016	3,063,150,599	3,895,430	0.13%
Total	2015	3,009,029,010	8,499,461	0.28%
Total	2014	2,979,931,360	11,084,628	0.37%
Total	2013	2,201,534,780	4,871,318	0.22%

Sources: Dodge; NEEA 2014 (CBSA); Cadmus 2014-2019; Cadmus analysis of 2020 data.

**Table 7. Ongoing/Continuous Commissioning 2013–2020 Market Size, Activity, and Penetration Estimates**

State	Year	Existing Building Market Size (sq. ft.)	OCx Activity (sq. ft.)	Market Penetration
<b>Idaho</b>	<b>2021</b>	<b>327,122,557</b>	-	<b>0.00%</b>
Idaho	2020	319,280,087	753,741	0.24%
Idaho	2019	309,313,486	185,686	0.06%
Idaho	2018	302,222,597	221,426	0.07%
Idaho	2017	294,267,364	-	0.00%
Idaho	2016	285,616,121	246,377	0.09%
Idaho	2015	279,993,579	10,714	0.00%
Idaho	2014	277,520,204	246,947	0.09%
Idaho	2013	251,819,745	-	0.00%
<b>Montana</b>	<b>2021</b>	<b>259,868,382</b>	<b>3,368,333</b>	<b>1.30%</b>
Montana	2020	256,497,291	1,519,667	0.59%

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State	Year	Existing Building Market Size (sq. ft.)	OCx Activity (sq. ft.)	Market Penetration
Montana	2019	253,466,056	415,714	0.16%
Montana	2018	251,065,572	225,132	0.09%
Montana	2017	248,264,039	-	0.00%
Montana	2016	245,330,092	30,612	0.01%
Montana	2015	242,774,686	321,429	0.13%
Montana	2014	241,278,586	86,171	0.04%
Montana	2013	73,404,096	-	0.00%
<b>Oregon</b>	<b>2021</b>	<b>1,008,668,991</b>	<b>736,333</b>	<b>0.07%</b>
Oregon	2020	991,966,460	3,448,889	0.35%
Oregon	2019	972,126,746	2,405,600	0.25%
Oregon	2018	952,086,039	2,332,976	0.25%
Oregon	2017	936,163,951	6,853,125	0.73%
Oregon	2016	923,165,449	5,909,100	0.64%
Oregon	2015	910,569,540	1,114,286	0.12%
Oregon	2014	902,390,465	1,766,511	0.20%
Oregon	2013	700,587,203	1,806,000	0.26%
<b>Washington</b>	<b>2021</b>	<b>1,804,856,677</b>	<b>6,648,933</b>	<b>0.37%</b>
Washington	2020	1,767,417,707	5,724,347	0.32%
Washington	2019	1,723,026,775	12,235,857	0.71%
Washington	2018	1,677,004,284	2,990,647	0.18%
Washington	2017	1,640,126,291	6,438,750	0.39%
Washington	2016	1,609,038,937	1,901,991	0.12%
Washington	2015	1,575,691,205	771,429	0.05%
Washington	2014	1,558,742,105	458,271	0.03%
Washington	2013	1,175,723,736	2,345,000	0.20%
<b>Total</b>	<b>2021</b>	<b>3,400,516,607</b>	<b>10,753,600</b>	<b>0.32%</b>
Total	2020	3,335,161,546	11,446,644	0.34%
Total	2019	3,257,933,063	15,242,857	0.47%
Total	2018	3,182,378,491	5,770,182	0.18%
Total	2017	3,118,821,645	13,291,875	0.43%
Total	2016	3,063,150,599	8,088,080	0.26%
Total	2015	3,009,029,010	2,217,857	0.07%
Total	2014	2,979,931,360	2,557,901	0.09%
Total	2013	2,201,534,780	4,151,000	0.19%

Sources: Dodge; NEEA 2014 (CBSA); Cadmus 2014-2019; Cadmus analysis of 2020 data.

## Appendix D. Survey Invitation

### Cadmus Email Invitation

To: [EMAIL ADDRESS]

From: NEEA and Cadmus

Subject: Annual Paid Survey Opportunity - NEEA Commissioning Study

Dear [FIRST NAME]:

Greetings! The non-profit Northwest Energy Efficiency Alliance (NEEA) is conducting its study on new building and existing building commissioning in the Northwest. According to our research, your firm provides commissioning services in our region and so we'd like to invite you to participate in this paid research opportunity. If you had participated in this study in the past, thank you for your continued support!

This survey will take you about 20 minutes and will ask you to share your firm's square footage of whole-building, energy-focused commissioning projects completed in 2021 in Idaho, Montana, Oregon, and Washington, and a few other questions. As always, individual results remain anonymous, but firms participating in the research could indicate in the survey if they wish to publish their firm name as a contributor to the report.

If your firm participates this year, we are offering a **\$150** Visa gift card as a thank you for completing the survey.

**When you are ready to complete the survey, follow this link to the survey:** [SURVEY LINK]

**Or copy and paste this URL into your internet browser:** [SURVEY LINK]

Your responses are saved automatically. You can return to the survey at any time by clicking on the survey link provided above. Please access the survey from the same device and complete survey by **December 31st, 2021.**

If you have any questions about this research, please feel free to contact me or Jennifer Stout, the project manager for this study at NEEA. She may be reached at 503-516-7370 or [jstout@neea.org](mailto:jstout@neea.org).

Sincerely,  
Louis Lustenberger

Cadmus  
720 SW Washington St  
Portland, OR 97205  
303-389-2530

### BCxA Newsletter Invitation

Available online at: <https://www.bcxa.org/blog/neea-annual-regional-cx-study.html>

## Appendix E. Survey Instrument

### A. *Survey Start Screen*



[DISPLAY NEEA LOGO]

- A0. In 2021, did your firm provide commissioning services in the Northwest (Washington, Oregon, Idaho, or Montana)? [FORCED RESPONSE]
1. Yes [continue]
  2. No [terminate]
  3. Don't know [terminate]

[Termination message: "Only commissioning providers who have worked in the Northwest in 2021 are eligible for this study. Thank you for your interest. To learn more about NEEA, please visit [www.neea.org](http://www.neea.org)"]

- A1. Did you (or your firm) sign the three-year survey participation Agreement with NEEA in 2018?
1. Yes
  2. No
  3. Don't know

[IF A1 NOT YES]

Welcome! The Northwest Energy Efficiency Alliance (NEEA) is conducting its study on new building and existing building commissioning markets. Your responses are very important to us and we will keep them confidential. Complete the survey by **December 31, 2021** to receive a **\$150 Visa gift card**. The survey will take you about 20 minutes.

This survey saves your responses automatically and responses will be submitted when you complete the survey. You can return to the survey at any time by clicking on the survey link provided to you in the email. Please access the survey from the same device.

**More about this study:** This survey will ask you to share your firm's square footage of whole-building, energy-focused commissioning projects completed in 2021 in Washington, Oregon, Idaho and Montana, and a few other questions. As always, individual results remain anonymous, but you may request that your company's name be included as a contributor to the study. The purpose of the research is to help NEEA understand more about the building commissioning industry and market trends.

[IF A1 = YES]

Welcome! The Northwest Energy Efficiency Alliance (NEEA) is conducting its study on new building and existing building commissioning markets. Your responses are very important to us and we will keep them confidential. To thank you again for the last three years of participating in the survey, if you complete the survey by **December 31, 2021** you will receive a **\$200 Visa gift card**.

The survey will take you about 20 minutes. This survey saves your responses automatically and responses will be submitted when you complete the survey. You can return to the survey at any time by clicking on the survey link provided to you in the email. Please access the survey from the same device.

**More about this study:** This survey will ask you to share your firm’s square footage of whole-building, energy-focused commissioning projects completed in 2021 in Washington, Oregon, Idaho and Montana, and a few other questions. As always, individual results remain anonymous, but you may request that your company’s name be included as a contributor to the study. The purpose of the research is to help NEEA understand more about the building commissioning industry and market trends.

[DISPLAY BEGIN SURVEY BUTTON]

## B. *Introduction*

B1. Name:   
Firm Name:   
Job Title:   
Phone Number:   
Email:

B2. From which of the following do you hold a current commissioning certification? (Select all that apply)

1. ACG (AABC Commissioning Group)
2. AEE (Associations of Energy Engineers)
3. ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers)
4. BCA (Building Commissioning Association)
5. NEBB (National Environmental Balancing Bureau)
6. TABB (Testing, Adjusting and Balancing Bureau)
7. UWM (University of Wisconsin-Madison)
8. Other, please specify
9. None
98. Don't know

## c. *About Your Firm*

For this study, the term “commissioning” is defined as **whole-building energy-focused commissioning** (as opposed to commissioning focusing only on selected systems such as lighting or water.)

In this section, we will ask you about the types of **whole-building energy-focused commissioning** your firm provides, as well as about other services.

[DISPLAY COMMISSIONING DEFINITION GRAPHIC WITH THE FOLLOWING DEFINITIONS]

**Definition of Commissioning Types**

- **New building commissioning** (Cx) is the process of commissioning new buildings or major renovations during construction
- **Retro-commissioning** (RCx) is the commissioning of existing buildings that have not previously been commissioned.
- **Re-commissioning** (ReCx) is the commissioning of existing buildings that have previously been commissioned.
- **Ongoing/continuous commissioning** (OCx), sometimes referred to as continuous commissioning, is the process of monitoring and fine-tuning commissioned buildings repeatedly over time.

C1. What types of commissioning services does your firm provide? For the purposes of this study, please note the definitions of the various commissioning types above. (Select all that apply)

1. New building commissioning
2. Retro-commissioning
3. Re-commissioning
4. Ongoing/continuous commissioning
5. Other, please specify
98. Don't know

C2. Which best describes your firm?

1. My firm specializes in commissioning and that is the main service we offer.
2. My firm provides commissioning as one of many services.
98. Don't know

C3. About how many employees does your firm have?

C4. How many people does your firm employ who work a significant amount of time on commissioning projects? Only count employees who spend at least 25% of their time on commissioning projects.

C5. Of this group, how many people hold individual professional commissioning certifications? Use your best guess.



- C6. Does your firm hold any firm-level commissioning certifications?
1. Yes
  2. No
  98. Don't know

[ASK IF C6=1]

- C7. Which **firm-level** commissioning certifications does your firm hold? (Select all that apply)
1. BCA's Certified Commissioning Firm
  2. AEE's Certified Building Commissioning Firm
  3. NEBB's Building Systems Commissioning Firm
  4. Other, please specify
  98. Don't know

#### D. *Project Square Footage and Characteristics*

In this section, we will ask you to enter square footage data for **whole-building energy-focused** commissioning projects your firm completed in 2021 for the Northwest states of Washington, Oregon, Idaho, and Montana. We are seeking data by state and by commissioning type. If you do not have square footage data available now, please collect the information at your convenience and come back to this survey. Clicking on the survey link provided to you in the email will resume this survey.

[ASK IF C1=1]

- D1. Please enter the total square footage of **new building commissioning\*** projects your firm completed in 2021 for each state. Use whole numbers. Enter "0" if you did not complete projects in that state.
- \*New building commissioning is the process of commissioning new buildings or major renovations during construction.

<input type="text"/>	Washington
<input type="text"/>	Oregon
<input type="text"/>	Idaho
<input type="text"/>	Montana

[ASK IF C1=1]

- D2. If any of the square footage you just entered for **new building commissioning** are estimates, please use the dropdown menu(s) to indicate how accurate you think your estimates are. **[DROP DOWN SELECTION MENU WITH RESPONSE CHOICES: 0-100%, in 5% increments, plus DK]** [Note: If respondent enters "zero" in one of the states above, the state will not show here.]

Washington	<input type="text"/>
Oregon	<input type="text"/>
Idaho	<input type="text"/>
Montana	<input type="text"/>

[ASK IF C1=1]

D3. About what percentage of the **new building commissioning** projects were major **renovations**?

Washington	<input type="text"/>
Oregon	<input type="text"/>
Idaho	<input type="text"/>
Montana	<input type="text"/>

[ASK IF C1=1]

D4. For the **new building** space (including major renovations) your firm commissioned in 2021, what was the approximate percentage breakdown in square footage by the building types below? (For industrial or manufacturing facilities, please only consider new **building space**, not **equipment**.)

[MANUAL % INPUT IN ORDER TO MAINTAIN VALIDATION; ADDITIONAL VALIDATION CODING TO ENSURE IT ADDS UP TO 100%]

Commercial office	<input type="text"/>
Government	<input type="text"/>
Healthcare	<input type="text"/>
Schools or universities	<input type="text"/>
Industrial or manufacturing	<input type="text"/>
Other	<input type="text"/>

[ASK IF C1=1]

D5. How frequently does your firm commission the following systems in **new building commissioning** projects? [ONLY ONE RESPONSE PER ROW; NOT FORCED]

Building Commissioning 2021 Long-Term Monitoring and Tracking Report

	Never (1)	Seldom (2)	Sometimes (3)	Often (4)	Always (5)	Don't know (98)
HVAC and HVAC controls						
Lighting and lighting controls						
Plumbing						
Building envelope						
Renewable energy						
Energy storage						
Demand-Response technologies or software						
Other (please specify): [TEXT ENTRY]						

[ASK IF C1=1]

D6. What is the typical project cost range (\$/sq. ft.) for your firm's **new building commissioning** projects? Please leave blank if you don't know. [ALLOW NUMERIC ENTRY, PLUS DK; NOT FORCED]

From \$ /sq. ft.

To \$ /sq. ft.

[ASK IF C1=2]

D7. Please enter the total square footage of **retro-commissioning\*** projects your firm completed in 2021 for each state. Use whole numbers. Enter "0" if you did not complete projects in that state.  
\*Retro-commissioning is the commissioning of existing buildings that have not previously been commissioned.

Washington

Oregon

Idaho

Montana

[ASK IF C1=2]

D8. If any of the square footage you just entered for **retro-commissioning** are estimates, please use the dropdown menu(s) to indicate how accurate you think your estimates are. [DROP DOWN SELECTION MENU WITH RESPONSE CHOICES: 0-100%, in 5% increments, plus DK] [Note: If respondent enters "zero" in one of the states above, it will not show here.]

Washington

Oregon

Idaho

Montana

[ASK IF C1=2]

D9. For the existing building space your firm **retro-commissioned** in 2021, what was the approximate percentage breakdown in square footage by the building types below? (For industrial or manufacturing facilities, please only consider **building space**, not **equipment**.) [MANUAL % INPUT IN ORDER TO MAINTAIN VALIDATION; ADDITIONAL CODING TO ENSURE IT ADDS UP TO 100%]

Commercial office	<input type="text"/>	<input type="checkbox"/>
Government	<input type="text"/>	<input type="checkbox"/>
Healthcare	<input type="text"/>	<input type="checkbox"/>
Schools or universities	<input type="text"/>	<input type="checkbox"/>
Industrial or manufacturing	<input type="text"/>	<input type="checkbox"/>
Other	<input type="text"/>	<input type="checkbox"/>

[ASK IF C1=3]

D10. Please enter the total square footage for **re-commissioning\*** projects your firm completed in 2021 for each state. Use whole numbers. Enter "0" if you did not complete projects in that state.  
\*Re-commissioning is the commissioning of existing buildings that have previously been commissioned.

<input type="text"/>	Washington
<input type="text"/>	Oregon
<input type="text"/>	Idaho
<input type="text"/>	Montana

[ASK IF C1=3]

D11. If any of the square footage you just entered for **re-commissioning** are estimates, please use the dropdown menu(s) to indicate how accurate you think your estimates are. [DROP DOWN SELECTION MENU WITH RESPONSE CHOICES: 0-100%, in 5% increments, plus DK] [Note: If respondent enters "zero" in one of the states above, it will not show here.]

Washington	<input type="text"/>	<input type="checkbox"/>
Oregon	<input type="text"/>	<input type="checkbox"/>
Idaho	<input type="text"/>	<input type="checkbox"/>
Montana	<input type="text"/>	<input type="checkbox"/>

[ASK IF C1=3]

D12. For the existing building space your firm **re-commissioned** in 2021, what was the approximate percentage breakdown in square footage by the building types below? (For industrial or manufacturing facilities, please only consider **building space**, not **equipment**.) [MANUAL % INPUT IN ORDER TO MAINTAIN VALIDATION; ADDITIONAL CODING TO ENSURE IT ADDS UP TO 100%]

Commercial office	<input type="text"/>	<input type="checkbox"/>
Government	<input type="text"/>	<input type="checkbox"/>
Healthcare	<input type="text"/>	<input type="checkbox"/>

Schools or universities	<input type="text"/>
Industrial or manufacturing	<input type="text"/>
Other	<input type="text"/>

[ASK IF C1=4]

D13. Please enter the total square footage for **ongoing/continuous commissioning\*** projects your firm completed in 2021 for each state. Use whole numbers. Enter “0” if you did not complete projects in that state.

\*Ongoing commissioning, sometimes referred to as continuous commissioning, is the process of monitoring and fine-tuning commissioned buildings repeatedly over time.

<input type="text"/>	Washington
<input type="text"/>	Oregon
<input type="text"/>	Idaho
<input type="text"/>	Montana

[ASK IF C1=4]

D14. If any of the square footage you just entered for **ongoing/continuous commissioning** are estimates, please use the dropdown menu(s) to indicate how accurate you think your estimates are. [DROP DOWN SELECTION MENU WITH RESPONSE CHOICES: 0-100%, in 5% increments, plus DK]  
 [Note: If respondent enters “zero” in one of the states above, it will not show here.]

Washington	<input type="text"/>
Oregon	<input type="text"/>
Idaho	<input type="text"/>
Montana	<input type="text"/>

[ASK IF C1=4]

D15. For the existing building space your firm conducted **ongoing/continuous commissioning** in 2021, what was the approximate percentage breakdown in square footage by the building types below? (For industrial or manufacturing facilities, please only consider **building space**, not **equipment**.)  
 [MANUAL % INPUT IN ORDER TO MAINTAIN VALIDATION; ADDITIONAL CODING TO ENSURE IT ADDS UP TO 100%]

Commercial office	<input type="text"/>
Government	<input type="text"/>
Healthcare	<input type="text"/>
Schools or universities	<input type="text"/>
Industrial or manufacturing	<input type="text"/>
Other	<input type="text"/>

[ASK IF C1=2, 3, OR 4]

D16. How frequently does your firm commission the following systems in **existing building commissioning** projects? These projects could include retro-commissioning, re-commissioning, or ongoing/continuous commissioning. **[ONLY ONE RESPONSE PER ROW; NOT FORCED]**

	Never	Seldom	Sometimes	Often	Always	Don't know
HVAC and HVAC controls						
Lighting and lighting controls						
Plumbing						
Building envelope						
Renewable energy						
Energy storage						
Demand-Response technologies or software						
Other (please specify): [TEXT ENTRY]						

**[ASK IF C1=2, 3, OR 4]**

D17. What is typically the project cost range (\$/sq. ft.) for your firm's **existing building commissioning** projects? These projects could include retro-commissioning, re-commissioning, or ongoing/continuous commissioning. Please leave blank if you don't know. **[ALLOW NUMERIC ENTRY, PLUS DK; NOT FORCED]**

From \$  /sq. ft. to \$  /sq. ft.

D18. Have you ever heard of a "Luminaire Level Lighting Controls" or LLLC systems?

1. Yes
2. No **[SKIP TO BLOCK E]**

**[ASK IF D18=1]**

D19. In one or two sentences, how would you describe an LLLC system? **[OPEN END; NOT FORCED]**

D20. Have you ever commissioned an LLLC system in any **commissioning** project?

1. Yes
2. No **[SKIP TO BLOCK E]**

D21. Compared to a typical code-compliant lighting system, was commissioning an LLLC system...

1. More difficult
2. About the same difficulty
3. Less difficult

D22. Why is that? **[OPEN-ENDED, NOT FORCED]**

E. *Market Trends and Opportunities*

E1. Using a scale from 1 to 5 where 1 means “strongly disagree” and 5 means “strongly agree,” please rate whether you agree with the following statements about **existing building commissioning**.

[RANDOMIZE ORDER] [DROP DOWN SELECTION MENU WITH RESPONSE CHOICES: 1-5, plus DK]

- A. Building owners in the Northwest are aware of existing building commissioning
- B. Building owners in the Northwest understand the financial benefits of existing building commissioning
- C. Building owners in the Northwest understand the operational benefits of existing building commissioning
- D. There are enough qualified commissioning providers to meet Northwest demand for existing building commissioning
- E. It is difficult for commissioning providers to quantify the financial benefits of existing building commissioning for customers

E2. Has COVID-19 impacted your firm’s commissioning practices this year?

- 1. Yes
- 2. No [SKIP TO BLOCK F]

E3. How so? Select all that apply.

- 1. Lower demand for commissioning services
- 2. Delayed projects
- 3. Reduced ability to do commissioning due to social distancing requirements
- 4. Some other way(s):
- 5. [EXCLUSIVE RESPONSE] COVID-19 has not impacted our firm’s commissioning practices this year.

[Page Break]

[IF E3=2]

E4. How did COVID-19 cause your firm’s commissioning projects to be delayed? Select all that apply.

[RANDOMIZE 1-8]

- 1. Supply-chain issues
- 2. Delays in permitting process
- 3. Plans/design change
- 4. Labor shortage
- 5. Customer-prompted delay
- 6. Insufficient funding
- 7. State/local mandated safety protocols
- 8. Site closures
- 9. Other (Please specify):

E5. Do you anticipate COVID-19 to impact commissioning in the Northwest into 2022? How so? [OPEN END; NOT FORCED]

F. *Thank You!*

F1. Thank you so much for participating in the survey. The data you have provided will be aggregated with data from other firms and reported anonymously in the study report. Does your firm wish to have its name published as a contributor to this study? The report is available to the public and posted on NEEA's website. [FORCED RESPONSE]

1. Yes
2. No

F2. Please provide your mailing address to receive your Visa gift card. [FORCED RESPONSE]

Name	<input type="text"/>
Street Address	<input type="text"/>
City	<input type="text"/>
State	<input type="text"/>
Zip Code	<input type="text"/>

[END OF SURVEY SCRIPT] Your responses have been submitted. Thank you for participating. Your gift card will be mailed out in a few weeks. Please be on the lookout for a business-size envelope from CADMUS. To learn more about NEEA, please visit [www.neea.org](http://www.neea.org)