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Commercial Real Estate Market Partners Program Savings Persistence Analysis

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Executive Summary

NEEA sought to determine the persistence of implemented activities and electricity savings for the Commercial Real Estate (CRE) Market Partners Program (MPP) cohort. The MPP encourages adoption of Strategic Energy Management (SEM) practices to reduce energy use. SEM is a holistic approach to managing energy that involves efficient equipment and behavioral activities and requires engagement from building staff at all levels. NEEA provides technical advice and training to ensure that building managers have the knowledge and tools they need to track and measure energy consumption.

To assess the persistence of implemented activities, Cadmus surveyed MPP firm executives. To quantify electricity savings, Cadmus collected billing data from participating buildings, billing data from a control group of similar commercial nonparticipating buildings, and weather data, and then incorporated these data into a regression model.

Persistence of implemented SEM activities was high. Respondents confirmed that 71% of activities were continued. Though respondents were unsure about 23% of activities, all but one were capital equipment measures so a high probability exists that these also remain in place.

Cadmus did not find a correlation between electric savings and implementation timing or SEM activity persistence. The implementation timeline shows 55% of activities were implemented during the first participation year, 27% during the second year, 13% during the third year, and 4% during the remaining years. This suggests incremental annual energy savings should be highest during the first year and gradually decrease in subsequent years. The incremental annual savings trend indicated savings during the first year of participation, near zero savings during the second year, and savings again increasing during the remaining participation years. The savings trend contradicts the implementation timing, however, the regression model resulted in imprecise savings estimates.

Cadmus recommends improving the precision of the savings estimates to support future in-depth analysis of savings trends. Precision could be improved by collecting additional data:

- Participants' building occupancy data can help explain trends in energy consumption. [1]
- Monthly billing and occupancy data from a representative control group can help explain changes in energy consumption. These data may support in-depth analysis of savings trends compared to market baseline trends.[2]
- The year that each firm expands SEM to its different buildings could be used to test the hypothesis that annual energy savings are correlated with the year of building participation more so than the year of firm participation.

[1] NEEA is working with participants to collect occupancy data more frequently.
[2] Control group data are difficult to obtain. For this study, Cadmus collected control group data, however, it was not sufficient for various reasons explained in the Electricity Savings Results section.

- The estimated magnitude of cost savings of individual activities, which corresponds to their energy savings, could provide more insights into annual energy savings trends rather than the quantity of implemented activities.[3]

[3] NEEA's measure database includes a column with cost savings ranked for each activity as substantial, significant, minor or a minor increase, but information was missing for 47% (65 of 144) of all implemented activities (and 45% of the sampled activities).

Introduction

Since 2007, the Northwest Energy Efficiency Alliance (NEEA) has offered the Commercial Real Estate (CRE) initiative to encourage adoption of Strategic Energy Management (SEM) practices to reduce energy use.[4] SEM is a holistic approach to managing energy that involves efficient equipment and behavioral activities and requires engagement from building staff at all levels. NEEA provides technical advice and training to ensure that building managers have the knowledge and tools they need to track and measure energy consumption. For the CRE Initiative, NEEA defines SEM as:

1. Adoption of a management-approved energy performance improvement goal at the firm, portfolio, and/or building level;
2. Documented planned activities to achieve the goal;
3. Allocation of resources (staff and training, capital, or both) toward the goal;
4. Implementation of planned activities;
5. Regular management review of progress achieved toward energy performance goal and effectiveness of SEM practices.

NEEA's CRE SEM initiative offers two paths of participation: the Market Partners Program (MPP), which employs an organizational coaching process to integrate SEM into a company's business practices, and office energy efficiency competitions that engage the target market to adopt SEM practices.

For this study, NEEA sought to determine the persistence of implemented activities and electricity savings for the MPP cohort. To assess the persistence of implemented activities, Cadmus surveyed MPP firm executives. To quantify electricity savings, Cadmus collected billing data from participating buildings, billing data from a control group of similar commercial nonparticipating buildings, and weather data, and then incorporated these data into a regression model.

[4] The geographic footprint encompassed by the NEEA region includes the States of Idaho, Montana, Oregon, and Washington.

Methodology

NEEA provided Cadmus with data for nine firms that participated in the MPP. For each firm and year of participation, the team used quantitative and qualitative methods to assess energy savings persistence. The team used a regression model to estimate annual energy savings. This analysis presented a limitation, in that savings could not be assigned to individual projects or distinguish between savings generated by new or past projects. Consequently, the team asked MPP firm executives which activities remained in place from previous years. Through an assessment of survey responses and a documentation review, the study sought to explain annual trends in energy savings.

The study used the following analysis steps:

1. Meet with the implementation team to inform the sample design.
2. Design the sample of SEM activities to confirm which remained in place.
3. Survey MPP firm executives about the sample of SEM activities.
4. Estimate energy savings using a regression analysis.
5. Analyze measure lists and survey responses to explain energy savings results.

Meet with Implementation Team

Before designing the survey to collect information about buildings in the cohort, Cadmus met with the implementation team to determine reasons to exclude firms or buildings from the sample frame, and to learn about the SEM activities the implementation team considered successful or unsuccessful (and their reasons for this). The implementation team, NEEA, and Cadmus also discussed the best timing and method for contacting MPP executives, deciding to send a list of sample activities implemented by each firm to each executive via e-mail and asking the executive to confirm whether each activity remained in place.

Sample Design

Cadmus selected a sample of activities by firm and year of implementation. The sample frame consisted of 144 activities implemented by 40 buildings across nine firms since 2009. The 144 activities included a mix of capital equipment measures and operational and behavioral activities. Cadmus selected a sample of 52 activities that represented activities implemented at 26 buildings across all nine firms. Even though the study limited the energy savings analysis to years 2011 through 2013, the sample included all activities implemented throughout participation, back to 2009. The sample frame included activities implemented prior to 2011 to provide additional data for assessing those activities' persistence. Table 1 shows the sample by participation year and activity type.

Table 1. Sample by Participation Year and Activity Type

Activity Type	Total Implemented Activities from 2009–2013	Number of Sampled Activities Per Participation Year						
		1st	2nd	3rd	4th	5th	6th	Total Sample
Capital	58	7	9	3	1	3	2	25
Operational or Behavioral	86	7	9	5	4	2	0	27
Total	**144**	**14**	**18**	**8**	**5**	**5**	**2**	**52**

Survey MPP Firm Executives

The implementation contractor e-mailed the list of sampled activities to firm executives, asking them to confirm whether activities remained in place at the time of contact. The e-mail contained a table that listed sampled activities, along with additional context (such as the building name and the year that activity was implemented). Firm executives responded with a "yes," "no," or "don't know" regarding whether each activity remained in place. For activities no longer in place, the study asked respondents to provide any details regarding reasons for discontinuing the activity.

Collecting and Preparing Data for Regression Analysis

In 2014, NEEA provided Cadmus with billing data for 40 MPP buildings representing eight firms: 10 buildings in the Seattle area, three in the Portland area, nine in the Boise area, and 18 in the Spokane area. Cadmus collected control group data from Seattle and Portland utilities for commercial office buildings. As the team could not collect control group data for commercial office buildings in the Boise or Spokane areas, the analysis did not include Boise and Spokane MPP participants. Table 2 shows the number of buildings included in the analysis, for both the MPP cohort and the control group.

Table 2. Number of Buildings Included in the Analysis

	Portland Region	Seattle Region	Boise Region	Spokane Region	Total
Total MPP Buildings	3	10	9	18	40
MPP Buildings in Analysis	3	10	8	15	36
Control Group Buildings	111	466	0	0	577

Cadmus downloaded weather data corresponding to each building's location. The team calculated base 65 heating degree days (HDDs) and cooling degree days (CDDs) for each calendar month, then merged the weather data with the electric and gas consumption data.

Control Group Data

As discussed, Cadmus worked with NEEA and the regional utilities to collect data from a control group of commercial buildings. The team collected anonymized data from Portland and Seattle utilities. As the utility in the Boise and Spokane region required written consent for each individual building to release billing data, Cadmus determined this would not prove cost-effective.

Cadmus received monthly electricity consumption data for Portland control buildings and annual energy use intensity (EUI) data for Seattle control buildings. The team first assessed the completeness of data

available during the baseline and evaluation periods for each electric meter and for each building across each dataset.

Cadmus determined the billing data for buildings in the Portland region contained sufficient data during the 2010 baseline year and subsequent years, but found the data contained duplicated periods and mislabeled meters. The team, however, identified and removed those errors.

Cadmus found the annual EUI data for buildings in the Seattle region did not incorporate the 2010 baseline period and confirmed that these data could not be procured from the Seattle utility. The Seattle data did not present other problems.

MPP Buildings Data

To prepare the MPP billing data, Cadmus first assessed the completeness of data available during the baseline and evaluation periods for each electric meter for each building. The team determined that billing data was missing for some months in the evaluation period, and it worked with NEEA and its implementer to obtain the missing data.

Cadmus reviewed billing meter types to determine which meters to include in the analysis. Some buildings had separately metered photovoltaic (PV) systems, not installed as part of the building's participation in NEEA's program. Consequently, Cadmus calculated total building electricity use by adding electricity produced by the PV system to electric billing data.

Cadmus then reviewed each building's energy consumption data for outliers or other suspect readings. The team adjusted billing periods to calendar months to have comparable data across buildings and for different meters of the same building.

Estimating Energy Savings with the Control Group

The regression analysis for the 2014 persistence study used the same approach as that used to quantify 2014 and 2013 energy savings. The analysis included billing data from October 2009 through September 2014.[5] The baseline period ran from October 2009 through September 2010, and the evaluation period ran from October 2010 through September 2014.

Cadmus specified an EUI fixed-effects model to estimate savings associated with buildings represented by the Market Partners Program (MPP). In a fixed-effects model, each building in each month is taken to have specific characteristics unique to that building, which are estimated separately from other explanatory variables. This controls for any characteristics of a particular building (e.g., size, occupancy, insulation). The specified model took the following form:

[5] Due to NEEA's need to report energy savings in April of each year, the energy savings in previous program years have relied on data from January through September. Starting with the 2014 program year, the savings validation period runs from October through September so that an entire year of test period data can be included in the model to more accurately reflect savings for weather-sensitive activities.

$$kWh_{it} = \beta_1 HDD_{it} + \beta_2 CDD_{it} + \Sigma\gamma Post(1)_{it} + \mu_{im} + \varepsilon_{it}$$

Where:

kWh_{it}	=	Electricity use per square foot of floor space in building 'i' in month 't'
HDD_{it}	=	Heating degree days for building 'i' in month 't'.
CDD_{it}	=	Cooling degree days for building 'i' in month 't'.
γ	=	Electricity savings per square foot of floor space per month.
$Post(1)_{it}$	=	An indicator for building 'i' that month 't' is in each program year.
μ_{im}	=	Building month fixed effect, where m=1, 2, …, 11,12. This is the energy use for building 'i' specific to a particular month after controlling for HDDs and CDDs. These unobservable effects are analogous to building fixed effects, except they are specific to a building and month rather than just a building.
ε_{it}	=	Random error term for building 'i' in month 't'.

The current EUI is:

$$kWh_{it} = \beta_1 HDD_{it} + \beta_2 CDD_{it} + \gamma Post(1)_{it} + \mu_{im} + \varepsilon_{it}$$

The baseline EUI is:

$$kWh_{i(t-12)} = \beta_1 HDD_{i(t-12)} + \beta_2 CDD_{i(t-12)} + \gamma Post(1)_{i(t-12)} + \mu_{im} + \varepsilon_{i(t-12)}$$

The following equation determines the difference between current energy use and the baseline:

$$kWh_{it} - kWh_{i(t-12)} = (\beta_1 HDD_{it} + \beta_2 CDD_{it} + \gamma Post(1)_{it} + \mu_{im} + \varepsilon_{it}) - (\beta_1 HDD_{i(t-12)} + \beta_2 CDD_{i(t-12)} + \gamma Post(1)_{i(t-12)} + \mu_{im} + \varepsilon_{i(t-12)})$$

Expressing the differences using deltas (Δ) results in the following equation:

$$\Delta kWh_{it,t-12} = \beta_1 \Delta HDD_{it,t-12} + \beta_2 \Delta CDD_{it,t-12} + \gamma \Delta Post(1)_{it,t-12} + \Delta\varepsilon_{it,t-12}$$

In the difference model, building-month specific effects drop out. If limiting the analysis sample to the 2014 evaluation period and 12 months of post period, the $\Delta Post(1)_{it,t-12} = 1$ for all periods in the evaluation year and becomes the model intercept. The coefficient γ equals average savings per square foot per month.

Cadmus estimated the model by Ordinary Least Squares; standard errors are Huber-White robust standard errors, clustered on buildings.

Estimating a difference model offers a particular advantage in that it controls for unobservable effects, specific to a building and month (e.g., July consumption of building A is large every year for reasons that were not observed). The difference model should result in a more precise estimate of savings than a levels model with reduced bias.[6]

The regression model does not include occupancy data as such data are unavailable at monthly intervals. The fixed-effects model captures variations specific to each building and estimates a fixed (time independent) effect specific to the building. Including occupancy for a single point in time would prove redundant as the fixed-effects coefficient estimate captures the relative difference in occupancy between buildings. Incorporating data on occupancy that varied over time would be useful in the model, provided NEEA can collect these data in the future.

Cadmus used the model to estimate average monthly energy savings per square foot. The team calculated annual energy savings per square foot by multiplying average monthly savings by 12 months. The team then calculated total savings for the buildings included in the analysis by multiplying annual energy savings per square foot by total square feet corresponding to those buildings.

Analyze Measure List Data, Survey Data, and Energy Savings Results

Cadmus analyzed the measure lists and survey responses for trends that could explain the energy savings results. The team examined measure lists for each firm showing implemented activities during each participation year and determined if those activities indicated minor, significant, or substantial cost savings.[7] The team also examined survey responses to determine the percentage of activities remaining in place and whether discontinued activities could have influenced the annual energy savings results.

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6 Bias in the γ estimate would arise in the levels (but not the difference) model if $Post(1)_{it}$ and μ_{im} were correlated. The unavailability of energy use data for a building during certain program period months could generate such correlation (and thus bias). For example, if energy use during months with the highest consumption could not be obtained, the missing data would confound the savings estimate (i.e., the low average consumption during the program would reflect the unavailability of data for certain months instead of reflecting savings), and would result in the γ estimate biased downward (reflecting higher estimated savings than true savings).

7 As savings are difficult to quantify for individual measures, these categories provide an approximation of an activity's impact. Cost savings for individual activities are expected to be less than 5% of total energy costs.

Findings

Cadmus reviewed the persistence of SEM activities, estimated energy savings achieved by the MPP firms by participation year, and looked for trends between activity persistence and annual energy savings.

Activities Implemented by Year of Participation

Figure 1 shows the number of activities implemented during each participation year and by the level of cost savings. MPP documentation provided an estimate of savings levels for some activities, distinguished as minor, significant, or substantial cost savings.[8] Two commissioning activities were anticipated to result in negative, minor cost savings (indicating a small increase in energy consumption): one implemented by a firm during its first year of participation; and the second by a different firm during its third year of participation. Many activities were not assigned a cost savings level and are assigned to the "Unknown" category in Figure 1.

Figure 1 also shows that firms implemented the majority of the 144 activities (55%) during the first year of participation, 27% of activities during the second year, 13% during the third year, and 4% during the remaining years. The analysis did not reveal trends that indicated when firms were more likely to implement substantial cost saving activities.

Figure 1. Activities Implemented During and After 2009 by Participation Year and Level of Cost Savings

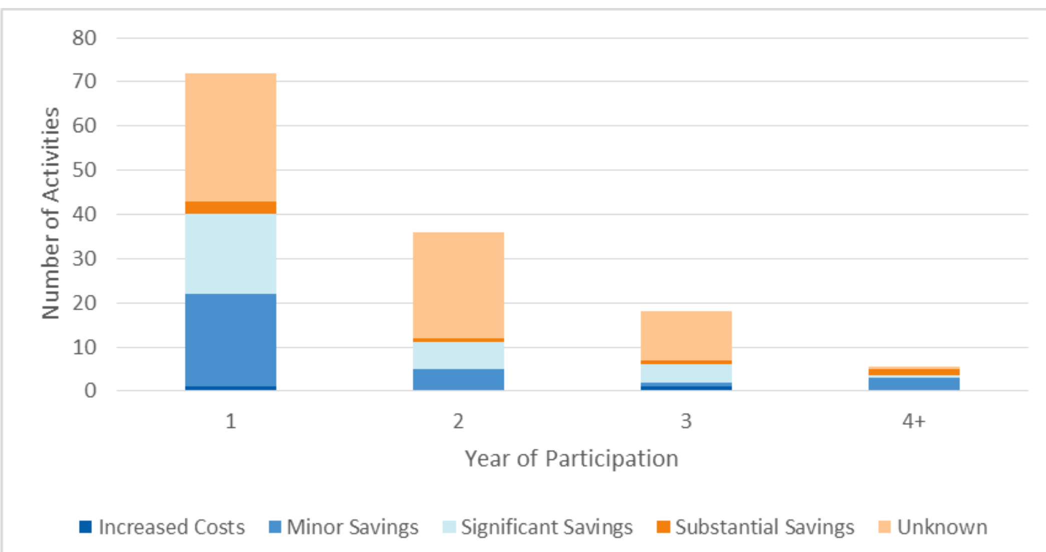
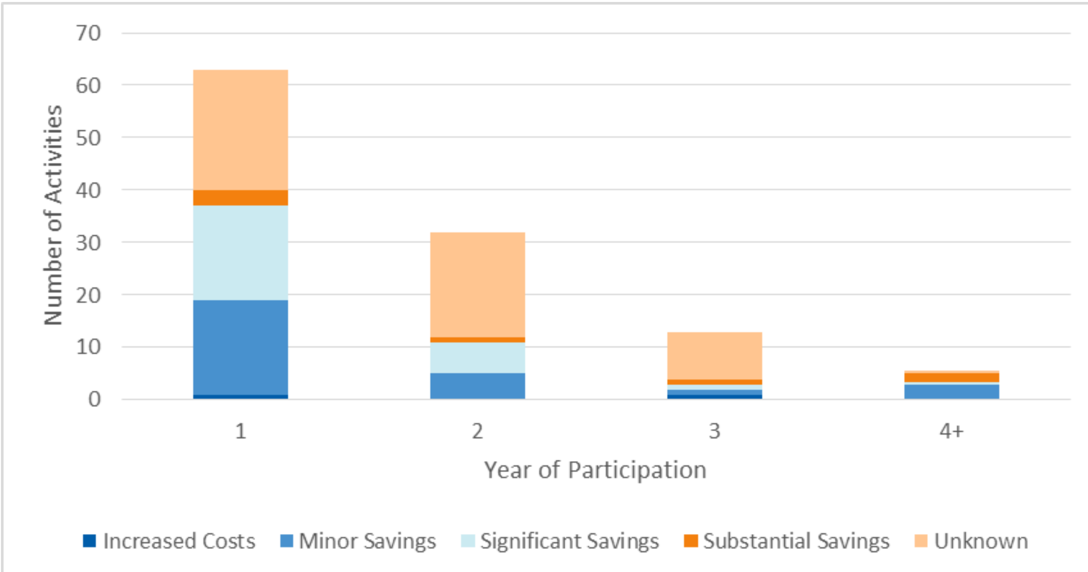


Figure 2 shows the same trend when limiting analysis to the 119 activities implemented during and after 2011, corresponding to years included in the energy savings analysis.

8 Ibid.

Figure 2. Activities Implemented During and After 2011 by Participation Year and by Level of Cost Savings



Measure Persistence

Cadmus analyzed survey responses for the number of activities still in place. Table 3 shows respondents confirmed 71% of the activities remained in place. Respondents reported that three activities no longer remained active and were unsure about 12 others. The three activities no longer active were implemented during participation years one and two. As 11 of the 12 activities that respondents were unsure about were capital equipment measures, a high probability exists that they remain in place.

Table 3. Number of Activities Still in Place by Year of Participation for Activity Implementation

Year of Participation that Activity Was Implemented	Activity Still in Place?			% of Activities Confirmed
	Yes	No	Don't Know	
1	11	1	2	79%
2	12	2	4	67%
3	6	0	2	75%
4	4	0	1	80%
5	2	0	3	40%
6	2	0	0	100%
Total	**37**	**3**	**12**	**71%**

Cadmus reviewed whether persistence depended on the activity type implemented (e.g., capital or O&M). Table 4 shows the results. As the review indicated the majority of activities remained in place, Cadmus found it difficult to draw conclusions as whether persistence depended on activity type. Respondents, however, proved less likely to know whether a capital equipment upgrade remained in place than an O&M or behavioral activity.

Table 4. Number of Activities Still in Place by Activity Type

Year of Participation that Activity Was Implemented	Activity Still in Place?			% of Activities Confirmed
	Yes	No	Don't Know	
Capital Equipment	12	2	11	23%
O&M or Behavioral Activities	25	1	1	48%
Total	**37**	**3**	**12**	**71%**

Cadmus also examined whether the cost savings level affected an activity remaining in place, with results shown in Table 5. The savings level did not appear to affect whether an activity continued, though cost savings remained unknown for 45% of sampled activities.

Table 5. Number of Activities Still in Place by Level of Cost Savings

Level of Cost Savings	Activity Still in Place?			% of Activities Confirmed
	Yes	No	Don't Know	
Minor	9	1	2	75%
Significant	9	0	1	90%
Substantial	7	0	3	70%
Unknown	12	2	6	60%
Total	**37**	**3**	**12**	**71%**

Electricity Savings Results

Though Cadmus attempted to include the control group in the analysis to refine the energy savings results, the team found several problems with control group data, leading to the conclusion that modeling savings using available control data did not provide a viable strategy. This report discusses these issues below, followed by savings results.

Unavailability of Data Outside of Portland and Seattle

Data for non-program control buildings could not be obtained in Boise and Spokane as the region's utility required written permission from individual customers before releasing billing data, precluding this method's cost-effectiveness in obtaining control group data. The team attempted to model savings by program year using just Portland and Seattle buildings, but this limited the sample to 13 MPP buildings—a sample too small to accurately capture savings.

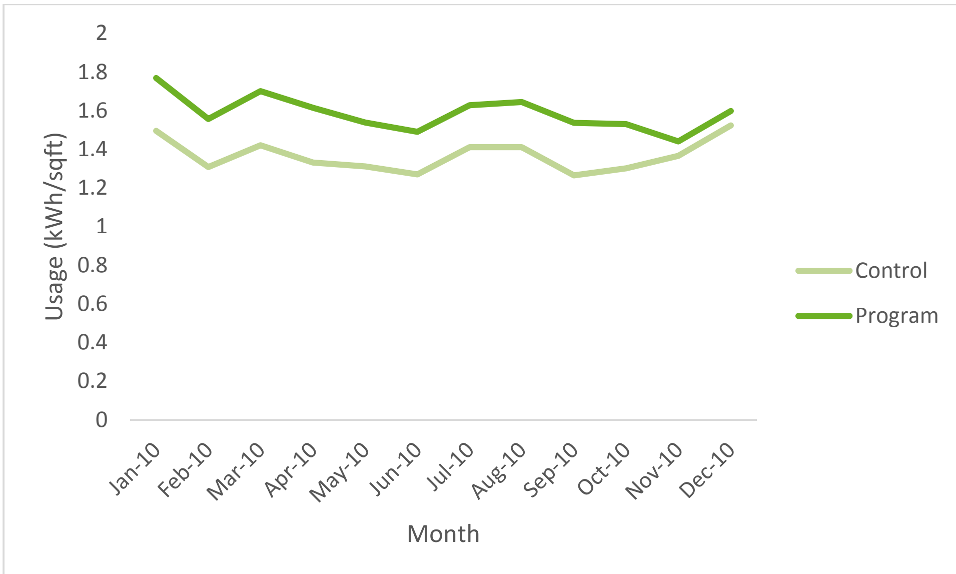
Seattle Control Group Data Are Annual

The control group data for Seattle buildings consisted of annual EUI values from 2011 to 2014, rather than monthly data. Incorporating these data into the model required converting monthly consumption for MPP buildings to annual consumption. Additionally, the Seattle control group data did not include 2010; so the baseline shifted to 2011. The analysis contained only four time periods, limiting the model's explanatory power and presenting difficulties in detecting differences between the control group and the MPP buildings.

Control Group Data had Significantly Different Usage During the Baseline

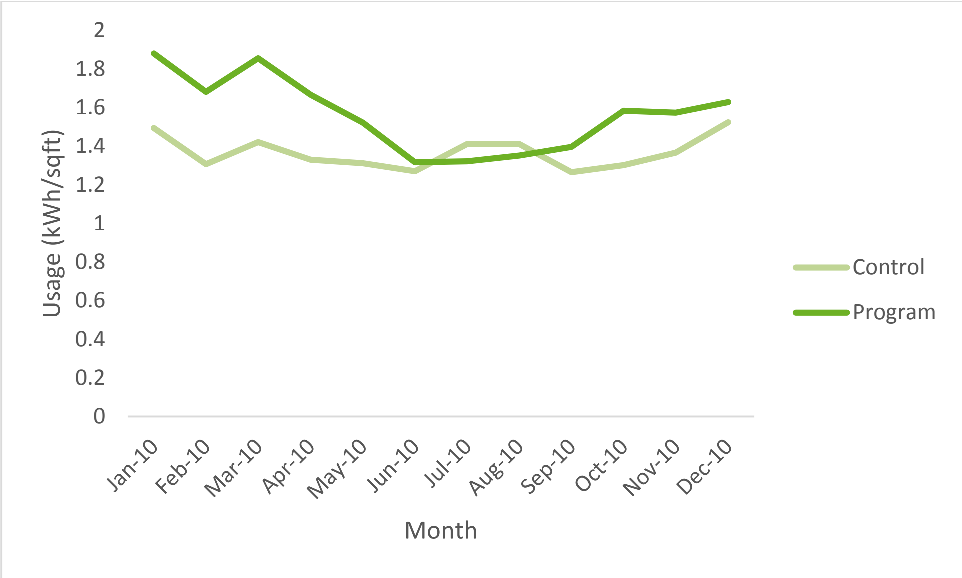
In the 2010 baseline period, electric usage per square foot for the MPP buildings averaged about 20% higher than average electric usage for the control group (consisting of Portland buildings). Figure 3 shows the results. This, combined with the inappropriateness of comparing Portland control buildings to program buildings in Spokane and Boise, indicated buildings in the control group may not provide an appropriate baseline comparison group for the MPP buildings.

Figure 3: Average Electricity Use per Square Foot During the Baseline Period for All MPP Buildings and for the Portland Control Group Buildings



When solely comparing Portland MPP buildings to Portland control group buildings, electric use again exhibited very different baseline behavior, as shown in Figure 4. Cadmus conducted a t-test comparing the baseline data of the Portland MPP and control group buildings and the result showed they were statistically different. Therefore, Cadmus determined the control group did not prove representative of MPP buildings.

Figure 4: Average Electricity Use per Square Foot During the Baseline Period for Portland MPP Buildings and the Portland Control Group Buildings



Electric Savings Persistence Results Without a Control Group

Table 6 shows electric savings for MPP buildings in 2012 through 2014. MPP buildings achieved higher savings in 2014 than in 2013 (Cadmus 2015), and achieved similar savings to 2012 (Itron 2014). Note that the analysis included different buildings during different years.

Table 6. Electric Savings for the MPP Cohort from 2012 Through 2014

Program Year	Number of MPP Buildings in Analysis	Electric Savings Without Control Group (% of Consumption)	Significance Level (Confidence/Precision)
2012	27	5.2%	90/10
2013	47	3.8%	90/10
2014	40	5.5%	80/20

The 2013 savings could be lower due to the absence of data for October, November, and December 2013 at the time of analysis. As these months exhibit high energy use for heating, they present high savings potential for buildings with electric heating if implementing HVAC measures or actions. Beginning with the 2014 program year, NEEA adjusted the savings validation period to run from October through September; so 12 months of post-program data could be included in the model to reflect savings more accurately for weather-sensitive activities. Both the 2012 and 2014 analyses included 12 months of data, while the 2013 analysis only included nine months of data.

Table 7 shows incremental savings by length of program participation. To estimate results at this level, Cadmus had to remove four buildings with incomplete baseline data. Savings were incremental, only representing savings that occurred during that participation year (i.e., savings were not cumulative). The 90% confidence interval for all years contained zero and the interval was large, indicating imprecise savings estimates. The trend, however, indicated savings during the first year of participation, near zero savings during the second year, and savings again increasing during the remaining participation years. The near-zero savings for second-year participants indicated additional savings were not achieved in year two, though participants sustained the year one savings. Year three and year four results indicated savings ramped up over time. The result for five years or more showed the most uncertainty, with the largest confidence interval, probably due to the small sample size.

Table 7. MPP Electricity Savings and Savings Rates by Participation Year (No Control Group)

Participation Year	Number and Square Feet of Buildings Used in Analysis	Average Monthly Savings (kWh per sq. ft.)	90% Confidence Interval		Percentage Savings
			Lower Bound	Upper Bound	
One Year	22 2,207,064	0.0183	-0.147	0.184	1.47%
Two Years	22 2,207,064	-0.0010	-0.229	0.227	-0.06%
Three Years	28 2,336,077	0.0201	-0.191	0.209	1.51%
Four Years	32 4,727,687	0.0407	-0.148	0.229	3.14%
Five+ Years	14 3,157,950	0.3056	-0.677	1.288	17.60%

Electric Savings and Measure Persistence

The measure analysis or survey responses did not explain the electricity savings trend. Firms implemented the majority of activities (55%) during the first participation year, 27% during the second year, 13% during the third year, and 4% during the remaining years. The activity implementation timeline suggested incremental annual energy savings should be highest during the first year and gradually decrease in subsequent years. This contradicted the billing analysis result of near-zero energy savings during the second year, but annual savings results were imprecisely estimated.

Additionally, this analysis assumed all buildings associated with one firm began SEM in the same year, and firms typically begin implementing SEM at one or two buildings in the first year, then expand to other buildings in subsequent years. Cadmus binned activities by the year of firm participation, rather than by the year of building participation, and energy savings may correlate with the year of building participation. The year each building began implementing SEM was not available for this analysis.

Conclusions and Recommendations

Cadmus offers the following conclusions, based on the energy savings findings.

- **Persistence of implemented SEM activities appears high.** Respondents confirmed that 71% of activities remained in place. Though respondents were unsure about 23% of activities, all but one were capital equipment measures; so a high probability exists that these remain in place.
- **The activity implementation timeline suggests incremental annual energy savings should be highest during the first year and gradually decrease in subsequent years.** The majority of activities (55%) were implemented during the first participation year, 27% during the second year, 13% during the third year, and 4% during the remaining years.
- **The measure analysis or survey responses did not explain the electricity savings trend.** Firms implemented the majority of activities during their first two years of participation, which contradicts the billing analysis result of near-zero energy savings during the second year; however, annual savings results were imprecisely estimated.
- **Identifying factors influencing energy savings proved difficult, given too many variables.** The MPP targets firms that own and manage several buildings. As energy savings were calculated at the program level; many other explanations could account for the energy savings trend. For example, firms may implement SEM at different buildings during different years. Additionally, Cadmus could not include a control group in the billing analysis; so other market effects could influence the energy savings results.
- **Available control group data proved insufficient to refine the savings analysis.** Control group data are difficult to obtain. Though Cadmus collected control group data for buildings in Seattle and Portland, this did not prove sufficient. Seattle control group data could only be procured annually, which did not provide sufficient data points to develop a regression model with explanatory power. Though Portland control group data were monthly, the Portland sample included only 13 MPP buildings, a population too small to detect savings by participation year. Additionally, control group buildings may not be representative of MPP buildings, as MPP building consumption was approximately 20% higher per square foot than control group consumption. Due to cost constraints, control group data could not be obtained for Boise and Spokane.

Cadmus offers the following recommendations to provide greater insights into energy savings trends and persistence of SEM activities:

- Cadmus continues to recommend that NEEA collect occupancy data from participants and to explore other methods of collecting billing and occupancy data from a representative control group.[9] Such data could explain changes in energy consumption that currently available data cannot and may support in-depth analysis of savings trends.

9 NEEA is working with participants to collect occupancy data more frequently.

- Cadmus recommends NEEA collect information about the year that each firm expands SEM to its different buildings. The current analysis assumes all buildings associated with one firm began SEM in the same year, but firms typically begin implementing SEM at one or two buildings during the first year, then expand to other buildings in subsequent years. These data would allow testing the hypothesis that annual energy savings are correlated with the year of building participation more so than the year of firm participation.
- Cadmus also recommends NEEA provides more complete data in ranking estimated cost savings of activities implemented. Currently, NEEA’s measure database includes a column with cost savings ranked for each activity as substantial, significant, minor or a minor increase, but information was missing for 47% (65 of 144) of all implemented activities (and 45% of the sampled activities). As cost savings depend on energy savings, these data would provide insights into annual energy savings trends. For example, if more activities with high-cost savings are implemented in year one than in subsequent years, year one may produce higher incremental electric savings.

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