The Impact of SEM Programs on Customer Participation

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Abstract

Strategic Energy Management (SEM) is designed to positively change how customers assess, approach and implement energy efficiency opportunities. One potential long-term benefit of customer participation in SEM is that customers should gain the capability to identify and complete more energy efficiency projects than they would have otherwise. This paper will seek to establish the extent to which customer project activity has been impacted following an SEM engagement. To analyze and compare the rate of customer participation in energy efficiency offerings, the co-authors will use Energy Trust Production Efficiency program data. Energy Trust has a diverse and active industrial customer base. Since 2002, the organization has served over 1,000 industrial customers and completed thousands of energy efficiency measures. Within this context, Energy Trust began to offer SEM to industrial customers in 2009. This research paper will analyze and compare the rates of energy efficiency project completion between the first 29 customers that completed an Energy Trust SEM engagement and the organization's remaining customer base. The research results in strong indications that SEM participation leads to an upward trend in project volume and project savings over time. By establishing that SEM positively impacts customers' rates of program participation and savings we feel utilities and program administrators can make more informed decisions about incorporating SEM into their portfolio of industrial program offerings.

Introduction to SEM and Energy Trust's Industrial Program

Energy Trust's Production Efficiency (Program) provides energy efficiency services and incentives to industrial and agricultural customers through a single program with a diverse set of custom and streamlined offerings. The Program's offerings, services, incentives and delivery have been crafted to help these energy intensive and complex organizations achieve cost-effective savings on an ongoing basis. The number of projects completed annually has more than quadrupled over the past 5 years as we have expanded tracks and created new initiatives. One new source of projects and savings has been Strategic Energy Management (SEM) offerings. Energy Trust piloted its first SEM offering in 2009. Since that time Energy Trust launched several other SEM offerings and has grown to become approximately 20% of Energy Trust's annual savings with over 150 companies having completed at least one SEM engagement since 2009.[1]

The Consortium for Energy Efficiency (CEE) defines industrial SEM as,

> *"…taking a holistic approach to managing energy use in order to continuously improve energy performance, by achieving persistent energy and cost savings over the long term. It focuses on business practice change from senior management through shop floor staff, affecting organizational culture to reduce energy waste and improve energy intensity. SEM emphasizes equipping and enabling plant management and staff to impact energy consumption through behavioral and operational change. While SEM does not emphasize a technical or project centric approach SEM principles and objectives may support capital project implementation."*
> -- *CEE Strategic Energy Management Minimum Elements, 2014*[2]

As CEE's definition above states, SEM may positively impact project implementation, either in completing existing projects or in identifying and more rapidly implementing new energy efficiency projects. The purpose of our research is to explore the extent to which SEM contributed toward greater rates of capital project implementation and activity? Can we determine if more projects are undertaken after an SEM engagement? Can we attribute to SEM any increase in project activities, energy savings, or studies to customers participating in SEM or to the Program as a whole?

In terms of "what" industrial SEM "is" CEE goes on to organize SEM activities along three major elements: (a) customer participation, (b) energy management plan & implementation, and (c) measuring & reporting performance. Energy Trust's SEM engagements are generally comprised of several structured group and individual SEM activities that fall under one of the CEE elements listed above. Specific to our Program, SEM is delivered by highly-specialized consultants, with customer engagements lasting between 12 and 16 months. Energy Trust SEM engagements seek to achieve and quantify energy savings from O&M and behavioral activities conducted during the SEM engagement. [3] SEM activities at Energy Trust are balanced between activities that result in verifiable savings and those activities that begin to create a long-term, cultural/behavioral shift toward energy efficiency at the site. These behavioral activities include:

- Establishing and empowering an energy team and an engaged executive sponsor;
- Conducting regular employee engagement events;
- Creating energy intensity models and data visualizations that allow participants to monitor, track, and report on energy use and energy use relative other variables and indicators important to the customer;
- Creating energy policies with energy saving goals;
- Establishing accountability between management and staff through defined roles and responsibilities and regular reporting;
- Continuously tracking energy efficiency projects – from identification to completion – through the use of an opportunity register.

These behavior-focused activities position SEM to support later project implementation.

Research Data & Approach

Data

The population of industrial sites analyzed were Energy Trust's first 29 SEM sites. This initial round of research was conducted for internal Energy Trust evaluation purposes and was completed in mid-2013 but was never published. The data on projects and savings covers the years from 2003 through 2012. The customers in the analysis participated in SEM from 2009 to 2011. The table below captures participation by year and graphically represents the range of the data in the analysis:

	2003-2008	2009	2010	2011	2012
Non-SEM Customers					
Cohort #1		**7**			
Cohort #2			**10**		
Cohort #3				**12**	

Legend:

	= Non-SEM Project Activity		= Pre-SEM Project Activity
	= SEM Engagement (No Activity Counted)		= Post-SEM Project Activity

Energy Trust was selective about who participated in our first cohorts. Potential participants needed to meet several criteria, including the organizational capacity to adopt SEM and annual energy consumption.[4] Since then, we have learned that smaller industrial sites can also be successful with SEM, through a separate SEM pilot launched in 2012.[5]

The comparison group of non-SEM customers was comprised of 917 other industrial sites served by Energy Trust in the past that did not participate in an SEM offering. [6]

SEM representation across industries was not strongly skewed toward any particular NAICS classifications and the SEM study population could be considered somewhat representative of Energy Trust's customer population.[7]

Another area of difference between these two populations is in average electricity usage. Based on best available data, we believe the average annual energy usage of SEM participants in the population was approximately 4.4 million kWh annually. This is about 3.1 million kWh greater than the average Energy Trust industrial customer. [8]

Finally, in terms of overall program activity, the 29 customers in the SEM group were active with Energy Trust prior to SEM participation. 80% (32 of 40 sites) had completed at least one energy efficiency project with Energy Trust prior to initiating the SEM engagement.

Approach

Our analysis was designed to investigate the relative levels of customer participation pre- and post- SEM compared with other industrial sites over the same time period. To accomplish this, Energy Trust analyzed the differences in project activity within the SEM participants themselves and with a group of comparison sites.

We defined project activity as any customer activity that resulted in either an efficiency project or a technical study supported by Energy Trust. The year in which follow-through activity is recognized is the year when either savings are officially claimed by Energy Trust or the study is deemed completed.

In this study we use statistical tests and multivariate regression models to compare the annual participation rates of both groups, pre- and post- SEM.[9] We then analyzed the changes in program participation rates and quantitative measures of participation for SEM sites from pre-to-post SEM participation. Odds ratios and mean differences were used to show these changes.[10]

The next step in the analysis was to compare the change in annual participation rates over time between the SEM and comparison group sites. We conducted the analysis of simple participation variables using a series of multivariate, general, logistic regression models. [11] The regression coefficient of the interaction term was converted to an odds ratio to express the difference in the annual likelihood of participation between the SEM and comparison groups. P-values for the interaction terms were used to determine if the effect of SEM on participation rates was statistically significant. This approach allowed us to test if SEM sites increased their annual participation rate more than comparison group sites over time.

Next, we conducted a similar analysis comparing the quantitative measures of participation over time between the SEM and comparison group sites.[12] For each model, the regression coefficient of the interaction term expressed the difference in the annual change in participation level between the SEM and comparison groups. P-values for the interaction terms were used to determine if the effect of SEM on participation levels was statistically significant. This analysis allowed us to test whether SEM sites increased their annual level of participation more than comparison group sites over time.

For analysis comparing the pre- and post- activity levels of SEM participants, we did not use the regression models above. We created basic regressions and converted those into odds ratios.

Research – Establishing Pre- SEM Levels of Activity

Our assumption was that sites within the SEM group were more active with Energy Trust *prior* to SEM than the non-SEM sites. Our analysis confirmed this. Sites selected for SEM were nearly three times more likely to complete a project and nearly four times more likely to complete a study.

Table 1 illustrates these findings. The odds ratios in the fourth column signify the relative likelihood of participation in a given year for SEM sites versus the overall population of Energy Trust industrial customers.

Table 1. Comparison of Pre-SEM Annual Program Participation Measures, 2003-2008.

Variable	SEM Group Annual Part. Rate *(2003 – 2008)*	Non-SEM Group Annual Part. Rate *(2003 –2008)*	Odds Ratio	Fisher's Exact p-Value	Signif. ?
Any Part.	36.9%	14.5%	2.9	<0.001	Yes
Part/ w/ Savings	25.6%	11.0%	2.2	<0.001	Yes
Capital Measures	16.3%	5.9%	2.8	<0.001	Yes
Motor Measures	5.4%	1.4%	3.5	<0.001	Yes
Lighting Measures	11.8%	4.8%	1.7	<0.001	Yes
Studies	19.7%	5.5%	3.9	<0.001	Yes

Table 2 details annual rates of participation by both groups prior to the SEM pilot launch from 2003 through 2008. Relative to Energy Trust's other industrial customers, the SEM population was more active. The mean differences represent the additional amount of annual participation in the SEM group versus the comparison group. A test could not be performed for O&M measures because Energy Trust did not have services and incentives available for them prior to 2009.

Table 2. Pre-SEM Energy Trust Annual Program Participation, 2003-2008.

Variable	Mean Difference (SEM - Comparison)	Mann-Whitney-U "p"-value	Significant Diff.?
Annual # of Projects	0.34	<0.001	**Yes**
Annual # of Projects with Savings	0.22	<0.001	**Yes**
Annual Incentive Amount	$12,409	<0.001	**Yes**
Annual Project Costs	$27,214	<0.001	**Yes**
Annual KWH Savings	78,660	<0.001	**Yes**

Research: Comparing Pre-/Post- SEM Levels of Activity

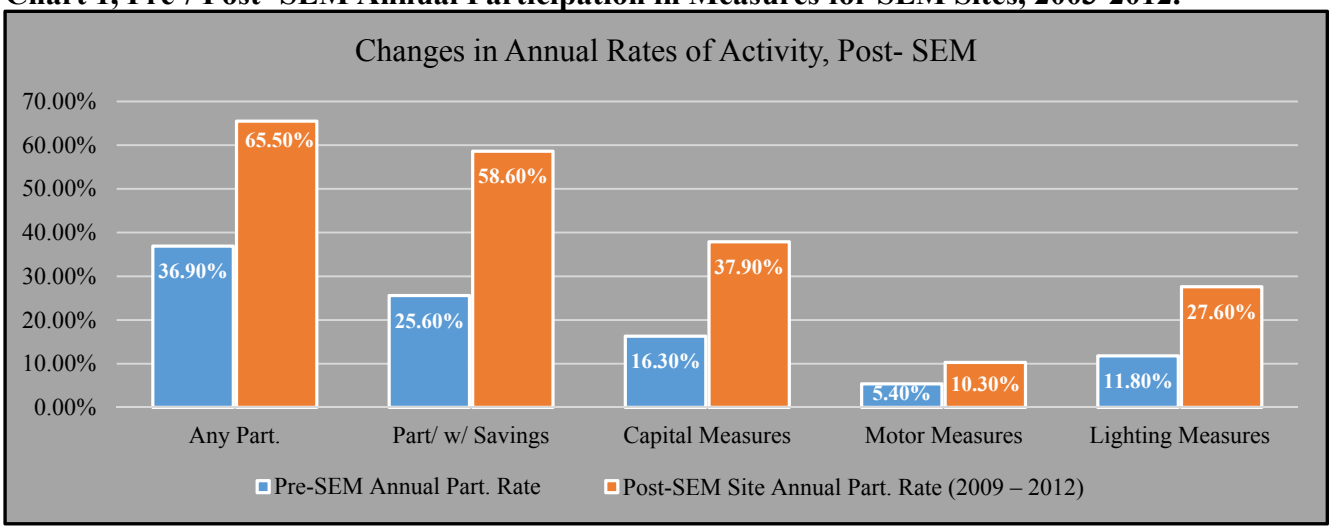
Our research confirmed that SEM participation positively impacted project activity. Table 3 detail the extent of this pre- to post- increase in quantitative activities for SEM participants.

Table 3. Pre-/ Post- SEM Annual Participation in Measures for SEM Sites, 2003-2012.

Variable	Pre-SEM Annual Part. Rate	Post-SEM Site Annual Part. Rate	Odds Ratio	Fisher's Exact p-Value	Signif ?
Any Part.	36.9%	65.5%	3.2	<0.004	Yes
Part. w/ Savings	**25.6%**	**58.6%**	**4.1**	<0.001	Yes
Capital Measures	16.3%	37.9%	3.2	<0.010	Yes
Motor Measures	5.4%	10.3%	2.0	0.393	***No***
Lighting Measures	11.8%	27.6%	2.8	0.038	Yes
Studies	19.7%	31%	1.8	0.221	***No***

In some cases the level of project activity increased substantially after customers participated in SEM. For the binary variable "Participation with Savings" the odds of participation in a given year *increased fourfold* after going through SEM. In most of the quantitative measures we analyzed above, there was an increase in the likelihood of activity that was significant. Chart 1 below details the changes graphically.

Chart 1, Pre-/ Post- SEM Annual Participation in Measures for SEM Sites, 2003-2012.



We also explored the impact of SEM on quantitative variables like "Annual # of Projects with Savings" where there could be a range of results. One very interesting finding is that an SEM participant is likely to complete *at least one additional project per year* after an SEM engagement. Table 4 details these results.

Table 4. Pre- & Post- SEM Annual Program Participation for SEM Sites, 2003-2012.

Variable	N	Mean Difference (Post - Pre)	Wilcoxon Signed Rank p-value	Signif?
Annual # of Projects	29	**1.0**	0.003	Yes
Annual # of Projects with Savings	29	**0.80**	0.002	Yes
Annual Incentive Amount	29	$9,430	0.096	Borderline
Annual Project Costs	29	$25,664	0.183	No
Annual kWh Saved	29	78,835	0.201	No

We tested the differences between these groups as the range of the variables were not normally distributed. Because we are comparing each site against itself pre- to post- SEM it is a paired analysis. As the distribution within each of the variables is not necessarily normal we opted for the non-parametric equivalent of the t-test, the Wilcoxon Signed Rank Test.

Research: Comparing Post- SEM Results to All Industrials

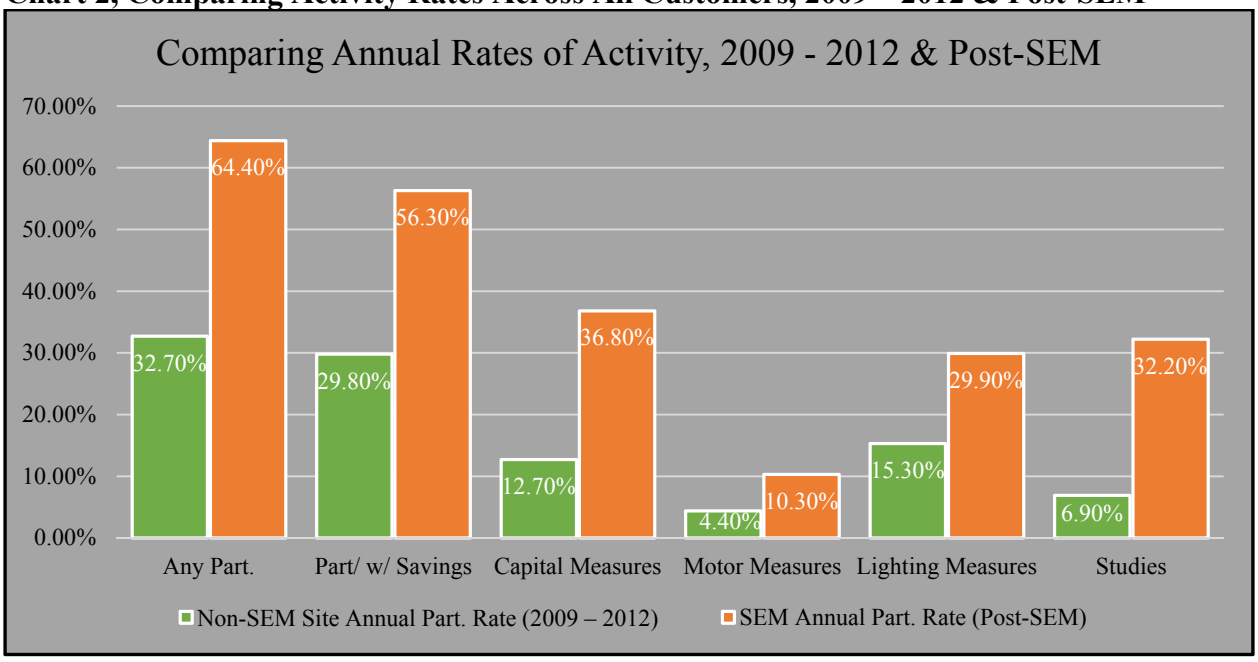
We compared the project activity levels of SEM participants to non- SEM participating industrials. The analysis determined that participation rates grew more quickly for SEM participating sites during the same timeframe (i.e., 2009 and on). We did find that project activity levels grew across all groups beginning in 2009. This overall increase in industrial program activity appears to coincide with an organization wide change. Beginning in 2009 Energy Trust launched an ambitious five year initiative to double the organization's total electric and natural gas savings. It is possible that the substantial rise in industrial program activity *across all customers* is related to Energy Trust's more proactive activities. Even so, our analysis shows that the increase in program activity was larger among SEM sites than among the comparison group. Table 5 below captures the relative rate of growth for both groups beginning in 2009.

Table 6. Comparison Post- SEM Program Participation between ALL Sites, 2009-2012.

Variable	Non-SEM Site Annual Part. Rate *(2009 – 2012)*	SEM Annual Part. Rate (Post-SEM)	Odds Ratio	Fisher's Exact p-Value	Signif?
Any Part.	32.7%	64.4%	3.7	<0.001	Yes
Part/ w/ Savings	29.8%	56.3%	3.0	<0.001	Yes
Capital Measures	12.7%	36.8%	4.0	<0.001	Yes
Motor Measures	4.4%	10.3%	2.5	0.016	Yes
Lighting Measures	15.3%	29.9%	2.4	0.001	Yes
Studies	6.9%	32.2%	6.4	<0.001	Yes

Despite the comparison group's growth in program participation beginning in 2009, SEM participants had much higher rates of project activity over the same time period. These findings were statistically significant across all quantitative measures. Chart 2 below captures the differences of annual percentages of participation across the quantified measures.

Chart 2, Comparing Activity Rates Across All Customers, 2009 – 2012 & Post-SEM



Our analysis also determined that the statistical difference we found regarding the additional one project per year being completed by SEM participant held when compared to the entire population of industrial customers. This outcome was not certain given the growth experienced across all customers beginning in 2009. Table 7 details these results.

Table 7. Total Post- SEM Energy Trust Project Activity for ALL sites, 2009-2012.

Variable	Mean Difference (SEM -Comparison)	Mann-Whitney-U "p"-value	Signif?
Annual # of Projects	**0.91**	<0.001	**Yes**
Annual # of Projects with Savings	**0.72**	<0.001	**Yes**
Annual Incentive Amount	$20,767	<0.001	**Yes**
Annual Project Costs	$50,645	<0.001	**Yes**
Annual kWh Savings	198,106	<0.001	**Yes**

The mean difference in "kWh savings" detailed above should be of interest to industrial program administrators. In essence, the enhanced levels of customer participation following an SEM engagement do appear to translate into higher annual savings from those customers.

SEM participating customers averaged nearly 200,000 kWh of savings more per year following their SEM engagements when compared to the other industrial customers during the time frame from 2009 to 2012.

Research: Comparing Rates of Change

We attempted to determine which groups' participation level increased most rapidly over time. As Table 8 below illustrates our initial analysis determined there were no significant differences in the annual odds of program participation between SEM and comparison sites when compared across the entire study period of 2003 to 2012.

Table 8. Odds Ratio for Participation in Program for ALL sites, 2003-2012.

Dependent Variable [a]	Annual Odds Ratio for SEM Sites	Annual Odds Ratio for Non-SEM Sites	Annual Odds ratio for SEM vs. Non-SEM	Interaction p-value[b]	Trends Sig. Different?
Any Participation	1.24	1.27	0.98	0.732	No
Participation with Savings	1.36	1.34	1.02	0.771	No
Capital Measures	1.25	1.21	1.03	0.558	No
Lighting Measures	1.42	1.39	1.02	0.788	No
Motor Measures	1.25	1.29	0.97	0.747	No
Studies	1.13	1.02	1.10	0.122	No

[a] General logistic regression equation:
$\log(Pr(y=1)/(1 - Pr(y=1))) = \alpha + \beta_1$*[Year] + β_2*[Group(0/1)] + β_3*[Year]*[Group(0/1)]
[b] Parameter p-values adjusted for clustering by site.

To better determine the differences in participation level attributable to SEM over time, we created a series of general linear regression models that allowed us to establish comparative slopes documenting the rate of change. As Table 9 and the graphs below illustrate, the annual rate of change in program participation level was significantly higher for SEM sites than for the comparison group.

The slopes capture the rate of change across both groups using the data from 2003 to 2012. We did not create separate pre- and post- slopes for SEM participation due to data limitations. However, if SEM did have an impact on participation we would expect to see an overall steeper rates of increase reflected in the overall slope relative to the comparison group.

The results of this analysis are displayed in Table 9.

Table 9. Slope Analysis of Dependent Variables for ALL sites, 2003-2012.

Dependent Variable [a]	Slope (year) SEM Sites	Slope (year) Non-SEM Sites	Change in Slope	p-Value[b] of Year*SEMSite	Trends Signif. Diff.?
Any Proj.	0.14	0.05	2.7	<0.026	Yes
Proj. w/ Savings	0.14	0.05	2.7	<0.008	Yes
Incentive Amount	$25,582	$3,395	7.5	<0.037	Yes
Project Costs	176.8	49.8	3.6	0.165	No
kWh Savings	2,527.7	726.5	3.5	0.099	Borderline

[a] - General linear regression equation:
$y = \alpha + \beta_1$*[Year] + β_2*[SEMSite(0/1)] + β_3*[Year]*[SEMSite(0/1)]
[b] - Parameter p-values have been adjusted for clustering by site.

The slope of each dependent variable indicates the annual rate of change in that metric. The "Change in Slope" is the relative difference in the slopes between the two groups. All of the results pointed in the same direction, which indicates the SEM population did have a more rapidly increasing rate of participation over time. In all, we feel that by establishing slopes capturing the general rate of change from 2003 to 2012 we support the idea that participation in SEM is causing an increase in energy efficiency projects.

The charts below (Figures 1 through 4) plot the results above. The error bands at the 95% confidence interval are included. Again, all of the slopes indicate that the rate of increase for SEM sites is much higher than for comparison sites. This lends support to the idea that at least some of the change in the level of project activity s is attributable to participation in SEM.

Graphs of Participation Rates for SEM and Comparison Groups, 2003-2012.

Figure 1. Total Number of Projects.

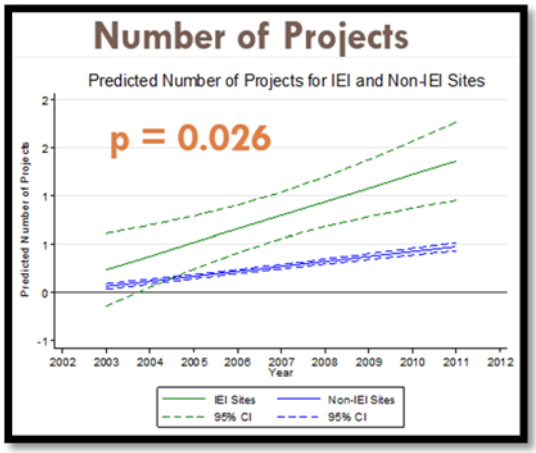


Figure 2. Number of Projects with Savings.

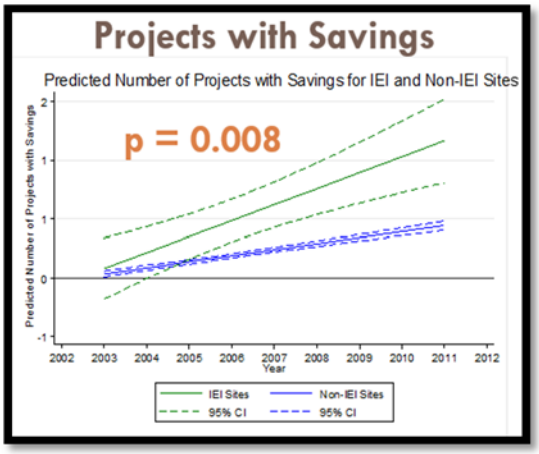


Figure 3. Total Project Costs.

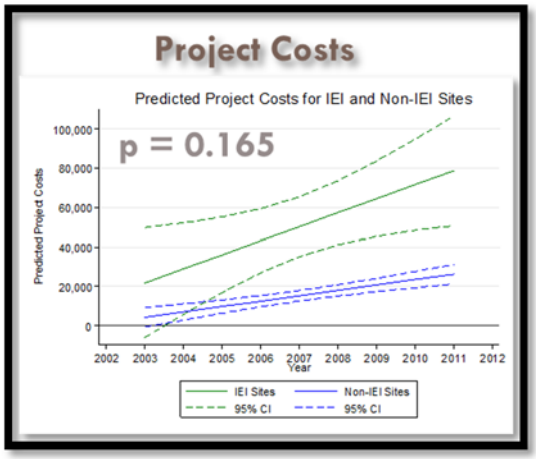
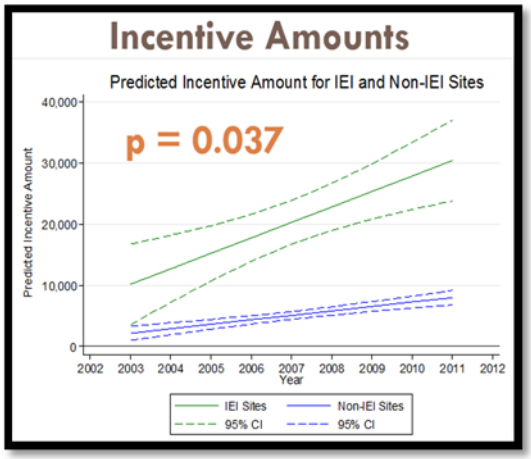


Figure 4. Total Incentive Amounts Paid.



Follow-Up Research

As was stated previously, the analysis above only covers the years 2003 through 2012. It is also limited to the first 29 SEM participants. There is admittedly more work to be done especially around rates of change and the persistence of that change at the customer and aggregate level. We plan to explore this – and other issues – in an updated analysis.

With that said, Energy Trust has been updating the original analysis that was the source of this report's results. Our revised and updated analysis is slated to cover all SEM sites through 2014 and use a more robust regression analysis method. However, it will not be complete until and ready for release until mid-2016.

We can release one preliminary finding from our updated work that covers SEM sites that participated through 2012 with follow up through 2013. In this follow-on analysis, we have found that the annual odds of program participation for SEM sites increased about two-fold after SEM, as compared with non-SEM industrial customers. This indicates that SEM participation may be responsible for a near doubling in number of sites that implement an energy project in a given year. This is a much more robust finding than our original analysis.

Table 10 summarizes the findings for difference between the two groups in changes in the binary and quantitative annual participation levels we have been looking at.

Table 10. Difference in Difference Summary, 2003-2012.

Dependent Variable	Difference in pre-to-post SEM change between groups	p-value	Significant differences?
Annual rate of participation	Odds ratio = 2.1	0.006	Yes
Annual rate of participation resulting in savings	Odds ratio = 2.1	0.003	Yes
Annual project costs	$50,317	0.011	Yes
Annual incentives	$20,265	0.010	Yes
Annual kWh savings	14,848	0.918	No

We determined that not only was there a two-fold increase in annual site participation in the Program, but the SEM sites also increased their investment, on average by $50,000 per year, increased the amount of incentives they received, on average, by $20,000 per year, etc.

Summary of Findings

Our first-ever analysis of SEM impacts on customer activity shows that SEM has a positive effect on rates of participation. In summary:

- Customers were four (4) times more likely to complete a project with savings on an annual basis after participating in an SEM engagement.
- Customers completed one additional project per year, on average, following an SEM engagement.
- SEM participation accelerates customer participation in energy efficiency offerings faster than companies that do not participate.
- Enhanced levels of customer participation following an SEM engagement do appear to translate into higher annual savings from those customers.
- Further research remains to be done using more recent data. However, the preliminary analysis of this larger dataset show that after an SEM-engagement

the annual odds of program participation doubles. This is an improvement over our original findings as the dataset and analysis technique is more robust.

Broader Implications of Findings on Program Design

Independent of these findings, Energy Trust had already determined SEM offerings to be a cost-effective source of electric savings to the Production Efficiency Program. In addition, our analysis indicates that SEM supports customer's implementation of projects and most likely increases project activity.

These secondary benefits to SEM offerings pose Program design questions for administrators to explore. These include such Program design questions as:

- Do the savings from later capital projects justify scaling SEM to reach smaller customers, where the current design of a year-long SEM engagement is generally not cost-effective?
- Does the increase in customer project activity from a one-year SEM engagement make the case for longer, more continuous SEM engagements?
- Which aspects of an SEM engagement should just be folded into standard program delivery design and/or customer relationship management?
- Given the benefits of SEM on later project activity, should completing an SEM offering be a prerequisite for customers seeking certain types of high-value and/or high-cost services from the Program?

The Production Efficiency Program at Energy Trust has just begun to explore these broader questions. In some cases, Energy Trust has already begun to try to answer these questions. In 2012 we launched an SEM pilot exploring how to scale SEM to smaller customers. Our updated analysis will attempt to look at how SEM participation impacts may differ by customer by size. As we complete our next round of analysis – and as the Program's relationship with SEM evolves – we hope to begin to address these questions more fully.

Conclusion

Overall, the direction of the effect of SEM on customer participation and project activity was consistently positive and, in many cases, significant. Even in the post- 2009 atmosphere of increasing overall customer participation in the PE Program, SEM participation appears to have been influential in generating a higher levels of project implementation and program involvement. Our data supports the claim in the CEE definition that SEM supports capital project installation. In later analysis we plan to explore this topic more fully.

ENDNOTES

[1] To see the most recent history of energy savings and the source of those savings from Energy Trust's Production Efficiency Program please see the presentation to Energy Trust's Conservation Advisory Council on April 24, 2014 http://assets.energytrust.org/api/assets/meetings-cac/140423_CAC_Packet.pdf

[2] *CEE Strategic Energy Management Minimum Elements, 2014, Available upon request for non-members.*

[3] SEM customers receive an incentive of $0.02/kWh and $0.20/therm. Energy Trust claims savings from SEM engagements using a regression models developed by our SEM consultants. Energy savings from any capital projects completed during an SEM engagement are not claimed by the SEM program and are eligible for incentives under Energy Trust's SEM offerings. Rather the savings and incentives for these projects are handled through the Program's regular incentive process.

[4] At the time of the SEM launch in 2009 Energy Trust defined "large customers" as having an annual electric budget of at least $450,000. By the third year of the SEM this threshold evolved into an annual energy budget that could include natural gas costs, if the customer was gas eligible. The budget amount was also lowered by year three to an annual total of $300,000.

[5] The "small" customer SEM pilot was called CORE. This two-year pilot just completed in 2014. Energy Trust did find that the smaller customers could successfully participate in a year-long, comprehensive SEM engagement. To learn more about this pilot and its broader implications on SEM offering design at Energy Trust, please see the first of three CORE Pilot evaluations at http://assets.energytrust.org/api/assets/reports/CORE_Year_1_Evaluation_Report-Final_wSR.pdf

[6] The sample population only included Energy Trust industrial customers with annual electric usage >100,000 kWh/yr and that had not participated in SEM.

[7] During the time period covered by this study Energy Trust also offered two industry specific O&M offerings to the "Food Products" sector. In three instances, Food Product firms were steered toward one of these offerings instead of SEM.

[8] Until 2012 Energy Trust had very limited access to customer energy usage history. Energy Trust's only method of determining customer energy usage was to have the customer sign a utility release form that we would then submit on their behalf. For this reason, Energy Trust only has a moderate level of insight into the relative levels of annual energy usage across all of our customers.

[9] This level of analysis was conducted by computing odds ratio and using the Fisher's exact test to identify differences in baseline participation levels between the two groups. A similar analysis was conducted with the quantitative measures of annual participation, using mean differences and the Mann-Whitney-U test (a non-parametric analog to Student's t-test for non-normally distributed data) to identify differences between the groups.

[10] For the odds ratios we used Fisher's exact test and for the mean difference we used the Wilcoxon signed rank test (a non-parametric analog to the paired t-test for non-normally distributed data) to determine statistical significance.

[11] The regression model for rates of participation took the form of:
$\log(Pr(y=1)/(1 - Pr(y=1))) = \alpha + \beta1*Year + \beta2*Group + \beta3*Year*Group$
where:

- y = the outcome variable of interest
- Pr(y=1) = the probability that y=1
- α = the model intercept
- β = regression coefficients for each explanatory variable
- Year = variable denoting the program year [2003-2011]
- Group = variable denoting the study group [0=comparison, 1=SEM]
- Year*Group = interaction term

[12] The regression model for the measures took the form of:
$y = \alpha + \beta_1*Year + \beta_2*Group + \beta_3*Year*Group$
where:

- y = the outcome variable of interest
- α = the model intercept
- β = regression coefficients for each explanatory variable
- Year = variable denoting the program year [2003-2011]
- Group = variable denoting the study group [0=comparison, 1=SEM]
- Year*Group = interaction term