FINAL REPORT

C1906B: SEM Best Practices and Evaluation – Process Evaluation Report

Connecticut Energy Efficiency Board and Evaluation Administration Team

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Table of contents

List of figures

List of tables

ABSTRACT

This report presents the process evaluation findings, conclusions, and recommendations for the C1906 Strategic Energy Management (SEM) program evaluation in Connecticut, an initiative of the Business and Energy Sustainability (BES) suite of programs. This process evaluation had two main goals: to assess prior and revised SEM program processes to help utility program staff and determine whether the revised processes are set up for success, and to develop recommendations on future research topics.

In June 2022, the program selected new vendors and added provider requirements for outreach support to procure customers and cohorts. The DNV evaluation team first reviewed program documentation to inform the development of utility program staff interviews and assessed program design against identified best practices from other successful SEM programs in the country. The team fielded in-depth interviews (IDIs) to gather perspectives about the SEM program from different program actors, interviewing seven utility program staff and vendors, three participants, and one partial participant.

Recommendations for Companies

Recommendation 1: If non-routine adjustments (NRA) are warranted due to the identification of a non-routine event (NRE) in the baseline or implementation or reporting period, the implementation vendors should be prepared to use IPMVP provided procedures for various NRA methods before switching to the bottom-up calculation approach per *IPMVP's Application Guide on Non-Routine Events and Adjustments*.

Recommendation 2: Improve lead generation through utility staff and implementation vendors. Revisit overall enrollment in the program a year from the new vendor selection to ensure that benefits outweigh associated time and costs. Test different marketing messages about program benefits to refine the value proposition. Consider incorporating employee satisfaction as benefit in opportunity outreach material, and increasing or re-structuring the incentives and testing if such changes result in increased participation. Closely monitor future participation trends and assess them regularly.

Recommendation 3: Ensure program implementation vendors hold a meeting soon after completion of the treasure hunt to clearly define the data required from participants. Provide implementation vendors and participants with documentation that outlines standards and expectations for data collection, analysis, and data transfer processes. Reviewing and understanding this "checklist" type of documentation should be a key step in kicking off program participation.

Recommendation 4: Once participation substantially increases, consider splitting participants into cohorts based on the level of previous experience with SEM. This cohort breakout will provide training, coaching, and a level of interaction tailored to the needs of participants. The cohort approach can provide additional value from the interactions and collaboration among cohort members.

Recommendation 5: Ensure program implementation vendors provide in-person, hands-on training opportunities, when possible, as customers perceive value in these interactions. Ensure that a SEM specialist or expert is present for in-person activities, such as the initial walkthrough, to increase the value that each participant receives from the exercise.

Recommendation 6: The Companies and implementation vendors should continue to maintain ongoing communication with customer sites throughout their participation in the program to best understand and attempt to alleviate data concerns, so as to collect high-quality data over multiple years.

Recommendation 7: Continue to ensure that the SEM calculation models developed by the implementation vendors are carefully vetted independently in-house by the Companies or by a third-party vendor contracted by the Companies as a technical reviewer.

1   EXECUTIVE SUMMARY

This report presents the process evaluation findings, conclusions, and recommendations for the Strategic Energy Management (SEM) program evaluation in Connecticut.

1.1   Program overview

The SEM program in Connecticut is an initiative of the Business and Energy Sustainability (BES) suite of programs that target outreach and assistance to the C&I market to make continuous energy efficiency improvements to their buildings.[1] The Connecticut utilities, Eversource and United Illumination (UI)/Avangrid, revamped SEM program offerings in 2019 with a focus on how to better recruit new participants and claim energy savings under the 2019–2021 Conservation & Load Management (C&LM) Plan. In the 2022–2024 C&LM plan, the utilities expanded upon the earlier goals to integrate the benchmarking initiatives and optimize efforts in claiming energy savings in the form of collaborative training sessions with SEM providers, engineering reviewers, and internal evaluation staff.

Due to the historical low participation levels, the program selected new vendors in June 2022 through a formal RFP process and put forth more requirements on the SEM providers for outreach support to procure customers and cohorts.

1.2   Process evaluation goals

This process evaluation had two main goals. The first was to assess prior and revised SEM program processes to help utility program staff and determine whether the revised processes are set up for success. This included assessment of program design, implementation, customer awareness, and program communication. It also included identification of barriers to participation (which was prioritized due to low participant enrollment) and energy savings, as well as determining how to overcome these barriers. Finally, to assess processes and outcomes, the process evaluation sought to understand program influence to date.

The second overarching goal was to develop recommendations on future research topics.

1.3   Methodology and approach

The DNV evaluation team ("team") first reviewed program documentation, including a sample presentation, other marketing collateral, templates of the letter of intent, regression modeling agreement, SEM implementation agreement, program/operations manuals, and M&V plans. This review informed the development of utility program staff interviews and assessment of program design against identified best practices.

The team fielded in-depth interviews (IDIs) to gather perspectives about the SEM program from different program actors: utility program staff and implementation vendors, participants, partial participants, and non-participants. Partial participants are defined as customers that applied for the program and/or started participating in the program but dropped out at some stage prior to implementing projects and receiving an incentive.

The team interviewed seven utility program staff and implementation vendors, three participants, and one partial participant. The team also reached out to nonparticipants (i.e., those who were contacted by members of the program team but opted not to participate in the program); however, none agreed to participate in an interview. SEM utility program staff provided contact information for implementation vendors, participants, partial participants, and nonparticipants to DNV. The team attempted to recruit contacts via email as a primary method of communication, followed by two phone calls after three email

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[1] The other programs in the suite are Process Re-engineering for Increased Manufacturing Efficiency (PRIME), Operations & Maintenance (O&M) and Retro-commissioning (RCx).

attempts were exhausted, and SEM utility program staff were notified of the outreach. The team used phone and video conferencing as the medium for conducting the interviews.

1.4 Findings, conclusions, and recommendations

The team investigated seven topic areas during the interviews:

1. Barriers to participation
2. Data collection
3. Non-routine events (NREs) and adjustments
4. Modeling strategies and goodness of fit
5. Top down vs. bottom-up savings calculations
6. Effectiveness of training
7. Successful program elements

The team also compared findings from this study with findings from a recent literature review and in-depth interviews with SEM stakeholders and experts across the country to examine process evaluation findings against SEM best practices. Findings from this study were documented in the SEM Best Practices Report provided to the CT EEB in Q2 of 2021.[2]

The interviews and comparison against SEM best practices led the team to draw six conclusions and develop seven recommendations:

Conclusion 1 – The team found that, generally, program implementation vendors are utilizing the SEM Best Practices Report findings. Implementation vendors are following recommendations in the SEM Best Practices Report for handling non-routine events (NREs) and other facility adjustments, modeling strategies and goodness of fit, and determining when to conduct top-down or modeling vs. bottom-up or engineering savings calculations. The evaluation team also identified additional documentation released in October 2020 and not covered in the SEM Best Practices report to address NREs, from *IPMVP's Application Guide on Non-Routine Events and Adjustments*, which are relevant and should also be incorporated into the SEM program design in Connecticut.

Recommendation 1 – If non-routine adjustments (NRA) are warranted due to the identification of an NRE in the baseline or implementation or reporting period, the implementation vendors should identify the static factor changes, document them along with the actual dates, and be prepared to use IPMVP provided procedures for various NRA methods that must be used before switching to the bottom-up calculation approach per *IPMVP's Application Guide on Non-Routine Events and Adjustments*. Subsequently, if the data stabilizes with facility operations and good fit metrics can be demonstrated at a later stage of SEM implementation period, implementation vendors should be open to revert to top-down analysis models as applicable. Participants should be required to track planned and unplanned facility shutdowns and other NREs and report them to the utility program staff and vendors.

Conclusion 2 – Enrollment in the program has remained very low over the past three years. Broader market conditions and certain program-specific elements as described below have been reported as reasons for low participation. The expectation was to enroll 12 participants annually (per Statewide Plan). In 2020, enrollment was zero; in 2021, enrollment was two; and by Q4 2022, enrollment was six. Ramp up, although happening, is slow. Evaluators found the low enrollment to be a function of five factors: (1) lack of program awareness and understanding, (2) labor shortages, (3) length of commitment required, (4) COVID-19 related impacts reported by implementation vendors and participants when discussing program barriers (i.e., not being able to go on-site to recruit participants), and (5) low program incentives. Continued low enrollment presents a risk

that the time and costs associated with the program will not be worth the expected value. As the impacts of COVID-19 abate over time, some of the factors revealed during the current evaluation may subside. An evaluation of Xcel Energy's SEM program revealed that cost-effectiveness had been reached – in large part, by increasing the average project savings even while engaging a relatively small number of customers.[3] Methods to recruit customers for SEM programs in other states included program administration or implementation vendor outreach, account manager outreach, or customer-initiated recruitment.[4]

Recommendation 2 – The Companies should work to improve lead generation through utility staff and implementation vendors. Utility account managers should facilitate introductions between the customer and the SEM provider as an active participant in the recruitment process. With the selection of two new vendors in 2022 who are significantly experienced in SEM, the Companies should revisit the overall enrollment in the program a year from the new vendor selection to ensure that the benefits outweigh time and costs associated with the program. The Companies should test different marketing messages about the benefits of the program to refine the value proposition. For example, consider incorporating employee satisfaction as an additional benefit in opportunity outreach material, an approach taken by NYSERDA in their online promotional material.[5] This work may also include increasing or re-structuring the incentives and testing if such changes result in a significant increase in participation. Incentives were noted to be insufficient for especially large customers. For comparison, the study team discovered incentive amounts of the following amounts: $10,000 for each 1% energy savings with a $50,000 cap (Consumers Energy), $0.02/kWh for electric savings and $0.20/therm for natural gas savings (Energy Trust of Oregon), $35,000/year to support one FTE if performance objectives are met (Puget Sound Energy), an average of $0.03/kWh with maximum caps adjusted based on year post installation, up to year six (Snohomish County PUD), and up to $400 per kW saved (Xcel Energy).[6] Future participation trends should be closely monitored and regularly assessed. For example, the statewide plan calls for 12 participants annually; the Companies should measure a participation rate in line with that goal.

Companies will benefit from enhancing messaging about the tangible benefits of the program and making strategic and tactical adjustments to marketing and outreach to improve enrollment. Industries that have commonly participated in SEM programs in other states include industrial manufacturing facilities, healthcare facilities, universities, and wastewater treatment plants.

Conclusion 3 – Customers and implementation vendors seem to have different expectations as to what data can and should be provided. This disconnect is a potential barrier to program participation and can prevent successful modeling of program savings.

Recommendation 3 – The Companies should ensure program implementation vendors hold a meeting soon after completion of the "treasure hunt" to clearly define the data required from participants. Companies should provide implementation vendors and participants with documentation that outlines standards and expectations for data collection, analysis, and data transfer processes. Reviewing and understanding this "checklist" type of documentation should be a key step in kicking off program participation. Companies should clearly define "must-have" and "nice-to-have" types of data and how they will be included within the program.

Conclusion 4 – Training effectiveness varies depending on how much previous experience program participants have in energy efficiency prior to joining the SEM program (in this report, "training" consists of activities that are undertaken by

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[3] https://www.xcelenergy.com/staticfiles/xe/Regulatory/Regulatory%20PDFs/CO-DSM/CO-2012-Process-Efficiency-Final-Evaluation.pdf
[4] https://library.cee1.org/system/files/library/10806/PUBLIC_Bldg_Energy_Mgmt_Prog_and_Field_Asmts_Database_29July2013.xlsx
[5] Strategic Energy Management Program - NYSERDA
[6] https://library.cee1.org/system/files/library/10806/PUBLIC_Bldg_Energy_Mgmt_Prog_and_Field_Asmts_Database_29July2013.xlsx

program and vendor staff to improve participants' SEM expertise. These activities address topics such as portfolio management, energy efficiency, ISO standards, and other topics and are further described in Section 3.6). Participants with more experience desired more sophisticated coaching and training. Additionally, in general, customers preferred and valued in-person training opportunities and engagement.

Recommendation 4 – Once participation substantially increases, the Companies should consider splitting participants into cohorts based on the level of previous experience with SEM, for example, developing one cohort with participants who have no prior SEM exposure and a second cohort including participants who are familiar and have experience with SEM. This cohort breakout will provide training, coaching, and a level of interaction tailored to the needs of participants. The cohort approach can provide additional value from the interactions and collaboration among cohort members.

Recommendation 5 – The Companies should ensure program implementation vendors provide in-person, hands-on training opportunities when possible, as customers perceive value in these interactions. Before the COVID-19 pandemic, research from other states with SEM programs indicated that nearly all offered in-person opportunities.[7] The Companies should ensure that a SEM specialist or expert should be present for in-person activities, such as the initial walkthrough, to increase the value that each participant receives from the exercise.

Conclusion 5 – The DNV evaluation team's review of program material from both Companies did not consistently uncover documents provided to program participants that clearly pertain to guidance and standards of data acquisition processes. An additional data collection challenge for many SEM programs is reluctance from participants to share proprietary data. A separate evaluation effort for Bonneville Power Administration found that regular, ongoing communication between the program and customer teams over multiple years resulted in the collection of high-quality data.[8]

Recommendation 6 – The Companies and implementation vendors should continue to maintain ongoing communication with customer sites throughout their participation in the program to best understand and attempt to alleviate data concerns, in order to collect high-quality data over multiple years. For example, if obtaining proprietary data is a concern, the Companies and implementation vendors can sign non-disclosure agreements with the facility, aggregate and anonymize data, and remove identifying metrics. The agreement should also allow evaluators to use the data.

Conclusion 6 – The DNV evaluation team found that there was no independent review of implementation vendor modeling approaches being undertaken by one of the Companies within the program.

Recommendation 7 – Both Companies should ensure that the SEM calculation models developed by the implementation vendors are carefully vetted independently in-house by the Companies or by a third-party vendor contracted by the Companies as a technical reviewer.

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[7] https://library.cee1.org/system/files/library/10806/PUBLIC_Bldg_Energy_Mgmt_Prog_and_Field_Asmts_Database_29July2013.xlsx

[8] SBW Consulting. 2017. "Industrial Strategic Energy Management (SEM) Impact Evaluation Report." Prepared for Bonneville Power Administration by SBW Consulting and the Cadmus Group.

2 INTRODUCTION

The Strategic Energy Management (SEM) program in Connecticut is an initiative of the Business and Energy Sustainability (BES) suite of programs, which is a long-term engagement with energy users to pursue low- and no-cost energy efficiency measures and to identify capital projects and additional program participation opportunities. The SEM program focuses on setting goals, tracking progress, and reporting results. DNV carried out the process evaluation of the SEM program in Connecticut from September 2021 to October 2022. This report presents the results of the program's process evaluation.

2.1 SEM program background

The Connecticut utilities, Eversource and United Illumination (UI)/Avangrid, revamped SEM program offerings in 2019 with a focus on how to better recruit new participants and claim energy savings under the 2019–2021 Conservation & Load Management Plan. The following bullets show how the program has evolved since its inception:

- The SEM program promotion in Connecticut started in 2019 with a goal of enrolling six to twelve customers per year in the initial pilot.
- In program year 2020, no participants enrolled in the CT SEM program, predominantly due to the pandemic.
- In 2021, the program enrolled only two participants.
- Due to the low participation levels in 2021, Eversource selected new vendors in June 2022 through a formal RFP process and put forth more requirements on the SEM providers for outreach support to procure customers and cohorts.
- The utility selected two vendors who were significantly experienced in SEM, separated from the other BES offerings, and have SEM participation generation targets of up to 50 individual participants and 10 cohorts over the course of the contract.
- In 2022, the program had enrolled six participants.

While past participation has been below expectations, utility program staff expects it to grow markedly in 2023 and beyond due to the addition of the newly selected vendors.

2.2 Study purpose and objectives

SEM programs can be challenging to evaluate due to their complexity, their variability in implementation across participants, and the need to account for the myriad factors that affect energy use (including other utility programs and capital projects) that can confound estimation of the SEM program savings. Additionally, SEM program delivery is data- and analysis-intensive, and successful evaluation requires an extraordinary level of cooperation between implementation vendor and evaluator.

Prior to executing the process evaluation of the Connecticut utilities' SEM program, the DNV evaluation team conducted a literature review and in-depth interviews with SEM stakeholders and experts across the country to document typical SEM participants, measures implemented, data collection practices, and savings methodology best practices and/or considerations, and to offer recommendations on data collection and analysis to aid the evaluation. This phase (referred to as Phase 1) was completed, and the team provided a report to the CT EEB in Q2 of 2021. The team refers to this report as the "SEM Best Practices Report" throughout this document.

Phase 2, the SEM process evaluation, focused on these two primary objectives:

1. Assess current SEM program processes and outcomes to help SEM utility program staff (1) improve program design, implementation, customer awareness, and program communication; (2) identify barriers to participation (a priority topic given the low participant enrolment), energy savings, and how to overcome them; and (3) understand program influence to date.

2.   Develop recommendations for future research.

2.3   Organization of report

The rest of the report is organized as follows:

- Section 3: Study findings
- Section 4: Methodology and approach
- Section 5: Evaluability assessment
- Section 6: Conclusions and recommendations
- Appendices: Interview guides

3 STUDY FINDINGS

This section of the report documents findings that emerged from the staff, implementation vendor, participant, and partial participant interviews. The findings are organized by topic area, and each topic area concludes by comparing Phase 2 study findings against identified best practices in the SEM Best Practices Report to supplement primary data collection and findings. The team sought to gather input from utility program staff, implementation vendors, program participants, partial participants, and nonparticipants. The study findings are based on the interview responses, shown in Table 3-1:

Table 3-1. Interview counts

Group	Interviews completed
Utility program staff	3 individual, 1 group
Implementation vendors	3 individual, 1 group
Program participants	3
Partial participants	1
Nonparticipants	0

3.1 Challenges to participation

Low program enrollment and participation has been and continues to be a challenge. Several factors affected program enrollment and participation: labor shortages, the COVID-19 pandemic, and the fact that the program was new. Only some of these factors can be addressed through program iteration and time spent developing implementation vendor networks, garnering relationships with customers, and establishing a mature program.

3.1.1 Utility program staff and implementation vendor interviews

Program enrollment has been and remains low. Program data revealed zero participants in 2020, two in 2021, and six in 2022. Interviewed program delivery implementation vendors indicated low recruitment and participation in the current SEM programs compared to involvement in other projects or programs (e.g., capital projects or previous SEM structured programs) is a top program challenge. On the other hand, utility program staff noted that participation is expected to increase in the future and were generally not concerned with current enrollment numbers.

Labor shortages affected participation. Implementation vendors noted labor shortages as an issue facing some sites. With understaffed project teams within participant organizations, project sites found it difficult to allocate time and resources to SEM program. Similarly, some customers were reluctant to commit to the length of SEM program participation, a problem exacerbated by understaffed sites. Additionally, throughout the course of program participation, there was significant turnover in utility staff, implementation vendors, and participant staff. Frequent personnel changes can exacerbate the pressures caused by existing labor shortages and decrease availability of staff working hours to participate in an SEM program.

COVID-19 pandemic effects on participation are abating. At first, COVID-19 pandemic effects were a barrier to successful SEM participation as there were no effective processes in place to administer the program remotely. Communications strategies developed in response to COVID have made it feasible to conduct meetings virtually (after the initial on-site treasure hunt). Review of program material confirmed the availability of remote offerings when desired by program participants.

Leveraging existing utility customer relationships is an effective way to generate leads. From the implementation vendor perspective, it was noted that it is important to generate as many leads as possible. Not all generated leads will result in program participation, and there will be dropouts throughout the course of the program. One avenue to generate leads is direct outreach from the implementation vendors. A second is the utility providing leads from their existing customer contact lists and relationships. Implementation vendors noted that the direct relationship with utility customers provides an advantage over implementation vendor outreach and is the preferred approach, as there are challenges associated with building a relationship that is not preexisting. Implementation vendors suggested utilities should provide as many leads as possible and interact with eligible customers to generate leads.

Incentives may not be sufficient to entice customers to participate. Implementation vendors noted that incentives were small, and that it seemed unlikely that they would sway customers at large sites to participate. For those customers, a few thousand dollars may be nice, but that is little impact on their overall finances. These incentive amounts were confirmed during program material review, which revealed incentives offered between $1,000 and $5,000 from one utility, and $0.02 per kWh saved for the other utility. These incentive levels are compared with programs in other states in Section 3.1.3.

New program needs optimization. As utility program staff explained, any kind of new program (and the Connecticut SEM program is a new program) requires a learning curve to ensure processes are optimized and customers are clear on expectations. One implementation vendor explained that utility program staff had initially used many program delivery implementation vendors who were not SEM experts and not familiar with the program. This contact noted that since hiring implementation vendors with previous experience delivering SEM programs (the program has cut down to just two implementation vendors), program delivery has noticeably improved.

3.1.2   Participant and partial participant interviews

The main challenges respondents faced within the program were related to staff turnover (internally and within program staff and implementation vendor organizations), data collection and analysis practices, identifying the highest value projects, and the time and resource constraints of the project application process. These challenges prevented some participants from taking more actions available within the program.

Participants dealt with challenges related to turnover and internal staff resources while also working with implementers and program staff that were experiencing those same challenges. Staff changes to primary contacts within the implementation vendors, program staff, and program participant organizations added a level of complexity to participants' experiences, but they did note that over time they were able to rebuild solid lines of communication.

Some respondents also had trouble in establishing baseline consumption due to the difficulty of analyzing data from meters and submeters on large sites with multiple processes and operations. One participant explained: "Getting information at the individual meter level is challenging… normally we just get an overall total."

Others had to contend with COVID-19 pandemic impacts. One participant experienced occupancy and operational changes at their location, a college campus, due to COVID-19. The COVID-19 pandemic also created issues in project timelines and efficiency of engagements with utility program staff – participants reported preferring in-person interactions which were less common during much of the COVID-19 pandemic timeline (2020 and 2021).

In some cases, participants felt that some of the recommended measures within the SEM program did not align with their organization's priorities which resulted in participants limiting the number of actions taken through the program. Participant follow-through on actions recommended through the program can be limited by the specificity of the recommended action, as well as how that recommendation is prioritized within the customer's overall organization. Interviews revealed that low- or no-cost improvements were sometimes prioritized over capital-intensive projects. Fiscal constraints can prohibit the

completion of larger projects. Additionally, participants noted that the complexity of their operations, along with their own, independent internal SEM activities undertaken prior to program participation, limited the extent to which they pursued recommendations generated by the program. This scenario is similar to the need for more customization around educational opportunities within the program – participants will achieve more value from program activities when actions and recommendations are tailored to the participants' SEM knowledge level and previous experience.

The one partial participant noted that the time needed for a capital project application identified through SEM participation is sometimes a prohibiting factor for their organization. The respondent expressed interest in having a dedicated role within the Companies to work directly with organizations to submit applications on their behalf. The respondent added that it is challenging to dedicate staff time and resources to exploring project applications and measures to determine if a project is eligible or not for a large incentive: "If we can get an incentive upwards of $5k, then I can justify putting some resources in to get it."

Participant respondents chose not to implement a project for a few key reasons:

- Overall cost of project and priority within overall company portfolio
- Unclear data about potential benefits of project
- Unclear solution for complex, niche problems specific to the participant's industry or operation

3.1.3   Comparison to best practices findings

The SEM Best Practices Report addressed the unique challenges brought about by the COVID-19 pandemic. The report named a potential increase in value of SEM by shifting to remote methods of communication. The implementation vendors indicated that remote options are now feasible for program participants, thus meeting the recommendations of the best practices report.

Additionally, the report noted that "the level of commitment needed from participants is typically very high, and unlike other utility-funded programs, there may not be large monetary incentives tied to participation. To get full buy-in from participants, there needs to be an understanding of the level of commitment and the anticipated benefits upfront in the form of incentives available from utilities and monetary benefits due to energy and non-energy savings."[9] While the incentives offered in other states with successful SEM programs are similar to the SEM program in Connecticut, the current program implementation vendors in CT believe that incentives currently offered may not be enough to sway large numbers of organizations into participating in the program. For comparison, the study team discovered incentive amounts of the following amounts: $10,000 for each 1% energy savings with a $50,000 cap (Consumers Energy), $0.02/kWh for electric savings and $0.20/therm for natural gas savings (Energy Trust of Oregon), $35,000/year to support one FTE if performance objectives are met (Puget Sound Energy), an average of $0.03/kWh with maximum caps adjusted based on year post installation, up to year six (Snohomish County PUD), and up to $400 per kW saved (Xcel Energy).[10] Additionally, non-energy impacts (e.g., technical support from the SEM providers, improvements in quality and safety, and/or decreased maintenance costs) were not named as being an important factor in deciding to participate during interviews with participants and may represent a missed opportunity in the program in touting program value.

The report also noted that "staff turnover can lead to substantial and unpredictable drop-offs in savings, while sites with committed employees and low turnover may experience savings for years."[11] These savings are a direct result of regular staff following established best practices. High turnover reported by utility program staff, implementation vendors, and

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[9] Ibid
[10] https://library.cee1.org/system/files/library/10806/PUBLIC_Bldg_Energy_Mgmt_Prog_and_Field_Asmts_Database_29July2013.xlsx
[11] Ibid

participants may play a role in the longevity of savings for program participants. However, participation in the SEM program requires a letter of commitment from an Energy Champion, as well as senior leadership at the organization. Breadth of support and acknowledgment provide a greater opportunity for persistence amidst turnover.

One possible route to bolster participation might include testing different marketing messages about the benefits of the program to refine the value proposition[12]. For example, consider incorporating employee satisfaction as an additional benefit in opportunity outreach material; an approach taken by, NYSERDA in their online promotional material.[13] Figure 3-1 provides an example of the approach taken by NYSERDA.

Figure 3-1. NYSERDA online promotional material

How You Benefit

- **Profitability.** Reduce overhead costs and production downtime.
- **Competitive Advantage.** Differentiate yourself in the market as a sustainability leader.
- **Employee Satisfaction.** Improve workforce retention and talent acquisition.
- **Reduce Environmental Impact.** Move closer to achieving your climate and environmental goals.
- **Success Stories.** Learn how other businesses are seeing the benefits of Strategic Energy Management.

SEM opens a door to parallel DOE programs which is recognition your customers and shareholders will appreciate.

If you're interested in this opportunity, you can review the training options below or connect with a NYSERDA representative via email energymanagement@nyserda.ny.gov to ask questions and get the application process started.

3.2   Data acquisition

Best practices research, along with in-depth interviews with utility program staff, implementation vendors, program participants, and partial participants, revealed a need for good access to data to estimate SEM program impacts. Good access includes gathering multiple data inputs in addition to energy consumption. Collecting data on operations or production data was largely found to be the hardest data to collect, possibly because customers believe they are providing necessary data and are satisfied with the data sharing processes, while implementation vendors claim it takes multiple meetings to review what data is required. A review of program material did not uncover any documents clearly pertaining to data acquisition that were provided to program participants.

3.2.1   Utility program staff/implementation vendor interviews

Implementation vendors frequently named production data as the hardest to collect for regression modeling. This is because production data is dependent upon information shared by program participants, whereas other inputs into the model are more readily available from other sources (either utilities or publicly available data sources, such as NOAA for weather data). Additionally, production data may not be provided at the same intervals as other, more accessible data. For example, interval metered electricity consumption data and weather data from National Oceanic and Atmospheric

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[12] The NW SEM Collaborative's Beyond the E working group developed a guide with suggestions to improve SEM recruitment, found here:
https://semhub.com/resources/sem-recruitment-best-practices
[13] Strategic Energy Management Program - NYSERDA

Administration[14] can be available in 15-minute intervals. However, production data is most commonly provided at a daily level.

One implementation vendor mentioned that an avenue to overcome the hesitation caused by time required on the part of participants to share production data is to be open to receiving existing reports that organizations are already producing. Instead of requesting certain information from participants in a specific format, allow program participants to provide production data in an existing format.

Both program utility staff and implementation vendors expressed a desire to obtain as much good data as possible – either receiving from or providing to program participants. Utility staff reported that utilizing one primary data acquisition tool (Sensei,[15] for example, has the functionality of keeping track of components like energy savings and project status for all projects in the SEM program in the dashboard) may allow for easier transfer and sharing of data for all parties: Utility program staff, implementation vendors, and participants. Implementation vendors noted the importance of holding meetings with relevant parties to ensure everyone understands what data needs to be provided, how to provide data in a useful form, and how to access and share data.

3.2.2   Participant and partial participant interviews

Participants indicated that they were very satisfied with the level of instruction they received from utility program staff for what types of data should be provided to conduct an accurate savings estimate. When asked about data provided to utility program staff and implementation vendors, some survey respondents were not intimately aware of the entirety of the data collection and transfer processes conducted because it was handled outside of their direct purview. However, respondents were familiar with details of some portions of the data collection, analysis, and transfer process and able to comment on data activities in a general sense.

Participants track energy consumption and energy efficiency actions to varying degrees of detail. Data collection practices and capabilities varied among respondents and were often influenced by the energy intensity, process lines, or complexity of industry the customer operates within. Respondents found it difficult to track data related to niche processes and activity across multiple locations (water usage, process lines, multiple sites, etc.). Participants' operations are complex and have many variables to account for that make it challenging to neatly package and present data internally and externally. Some respondents would choose not to implement certain projects if the related data was unclear or incomplete.

Participants do not track or report planned or unplanned shutdowns of the facility, changes in product lines, or other NREs. Respondents are reactive in these scenarios and address issues as they arise to keep the operation running continuously. Some respondents track NREs only when a larger-scale incident has a more pronounced impact on their operations.

3.2.3   Comparison to best practices findings

Findings from in-depth interviews generally revealed that implementation vendors are following best practices on data acquisition. However, one area for improvement is an upfront agreement from stakeholders on the data requirements for the SEM model. Interviews revealed that participants generally believe that they received ample instruction for providing useful data, yet implementation vendors revealed that additional data cleaning and manipulation was often necessary for obtained production data. As indicated in the SEM Best Practices Report, there should be clear, upfront requirements on the data collection protocol and the need to customize data collection based on facility and customer types.

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[14] Weather | National Oceanic and Atmospheric Administration (noaa.gov)

[15] Sensei is an SEM software platform developed by Cascade Energy, Inc. used to measure savings, track project implementation, establish persistence strategies, report results, and export data.

Implementation vendors were found to be in communication with participants to obtain data and are bearing the responsibility of acquisition. Implementation vendors also report collecting and storing robust data at the highest possible frequency on facility characteristics, weather, and other independent variables named in the SEM Best Practices Report as essential for SEM evaluation.

3.3 Non-Routine Events (NRE) adjustments

The most-cited component of NRE adjustments resulted from the COVID-19 pandemic. Implementation vendors noted that changes in production and schedules due to the pandemic resulted in abnormal baselines and caused models to fail. In these instances, implementation vendors reported reverting to bottom-up approaches.[16]

3.3.1 Utility program staff and implementation vendor interviews

Implementation vendors incorporated NRE data into regression models when they acquired such data. Interviewed utility program staff deferred to implementation vendors to speak on how NRE adjustments were handled. Implementation vendors reported the importance of pulling schedule-based data into models to account for holiday schedules and periods of atypical operation when estimating savings. They also acknowledged that checking in with customers regularly to obtain a better understanding of what is occurring at the facility, which otherwise may have not been uncovered, is also very important.

The COVID-19 pandemic resulted in a shift to bottom-up approaches. Interviewed utility program staff again deferred to implementation vendors to speak on how NRE adjustments caused by COVID-19 were handled. Implementation vendors reported that the pandemic had a direct impact on the quality of baseline calculations. This often resulted in a shift to a bottom-up approach for facilities who had production schedule changes caused by the pandemic.

3.3.2 Participant and partial participant interviews

Participants confirmed COVID-19 pandemic resulted in substantial NREs. About half of participant respondents experienced impacts from the COVID-19 pandemic on production schedules and occupancy. Some participants were already dealing with a lean staff, and any staff members becoming ill would exacerbate staffing challenges and further slow down business operations. One respondent in higher education said they saw a drastic change in occupancy and shut down a substantial portion of their operation for 3+ months of the year due to COVID-19 pandemic impacts. The respondent stated, "Buildings that [previously] had never been unoccupied were turned off…."

3.3.3 Comparison to best practices findings

The SEM Best Practices Report labeled COVID-19 changes as requiring necessary NRE adaptations in models. In these instances, the report names that it may be necessary to switch to a bottom-up approach for modeling. Implementation vendors reported to be following this guidance, as interviewees explained that a switch to bottom-up was made if there were COVID-19 changes in production schedules or facility operations.

The evaluation team also identified additional documentation released in October 2020 and not covered in the SEM Best Practices report to address NREs, from *IPMVP's Application Guide on Non-Routine Events and Adjustments*,[17] which are relevant and should also be incorporated into the SEM program design in Connecticut, where applicable. In the event NREs are detected and are deemed to be significant compared to the initial model assessment, IPMVP provides procedures for

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[16] There are two approaches to estimating savings associated with SEM: top-down and bottom-up. The top-down or facility level regression model uses the high-level information that a facility routinely collects regarding its activities and performance (weather, production etc.) and associates that data with the corresponding energy consumption. The bottom-up model requires an exhaustive inventory of all facility equipment affected by the SEM project, and uses either the energy consumption pattern for each of those equipment through metering installation or proxy measurements with engineering calculations to estimate impacts.

[17] IPMVP NRE_A Guide Final 10.26.2020_Final.pdf (evo-world.org)

various NRA methods that must be used before switching to the bottom-up calculation approach. The Connecticut utilities must review the NRE application guide and adopt the most appropriate NRA method based on when the impacts from NRE begin, i.e., baseline/implementation/reporting period.

3.4   Modeling strategies and goodness of fit

The SEM Best Practices Report and utility program guides are referenced as being useful to help determine appropriate modeling strategies and goodness of fit. While there may be some vagueness associated with determining the best modeling strategy and goodness of fit, the two cited resources were named by implementation vendors to provide helpful guidance. Continuing to follow best practices will position implementation vendors for success in developing energy savings estimates with acceptable levels of uncertainty.

3.4.1   Utility program staff and implementation vendor interviews

Utility program staff deferred to implementation vendors to provide input on modeling strategies and how they determine whether the model fits the data well (i.e., how they assess goodness of fit of a statistical model).

Implementation vendors generally followed best practices when modeling energy savings. Interviewed implementation vendors reported that goodness of fit metrics and modeling strategies followed recommendations provided in the SEM Best Practices Report. For example, implementation vendors tested the models to verify that the established standards for mean bias error (MBE) and coefficient of variation of root-mean squared error (CV(RMSE)) as set out by ASHRAE Guideline 14 are met, and whether expected savings exceed the fractional savings uncertainty. Implementation vendors also referenced the p-values and general t-statistic metrics which they utilized to validate regression models as recommended in the SEM Best Practices Report. One implementation vendor said, "the goal is to meet what was outlined in the [best practices] report." Implementation vendors also identified utility SEM program guides as another source to obtain information on modeling strategies and goodness of fit. Implementation vendors often cited that their philosophy was to utilize the simplest model that worked well for each specific case.

Implementation vendors conceded that there is some vagueness regarding the goodness of fit threshold criteria. For example, in one scenario, an implementation vendor noted that the R-square of 0.75 and above indicates the model fits the data well, but one site realized a value of 0.74. In cases like this, the participant models were not technically meeting the threshold.

3.4.2   Participant and partial participant interviews

The participant and partial participant interviews did not cover modeling of energy savings because implementation vendors conduct the modeling. [18]

3.4.3   Comparison to best practices findings

Implementation vendor interviews revealed a reliance on following the SEM Best Practices Report to determine appropriate modeling strategies and goodness of fit. However, the utility program staff should provide additional clarity to implementors that MBE, CV(RMSE), and FSU are the most important goodness of fit tests and achieving an R-square of 0.75 is not always essential. Additionally, review of program material confirmed that implementation vendors are reviewing model validity via the performance statistics (e.g., p-values).

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[18] The DNV team did not collect information on how program participants accounted for energy savings outside of, or prior to, participating in the SEM program.

3.5 Top-down vs. bottom-up savings calculations

The top-down (regression) models are the preferred approach to estimating savings. The bottom-up (engineering) approach is considered when the top-down modeling approach fails to provide valid or defensible findings. Top-down findings are suspect when model goodness of fit statistics are inadequate or NRAs cannot be developed for NREs that impact building or production operations substantially (for example, COVID-19 pandemic impacts). Overall, the program is following best practice regarding savings calculations, prioritizing top-down models and using bottom-up when the former is not viable.

3.5.1 Utility program staff and implementation vendor interviews

A top-down approach is preferred for savings estimations. Implementation vendors in collaboration with program participants and the utilities determine whether to use a top down or bottom-up (engineering) model for savings estimation. Implementation vendors reported that, typically, a top-down model approach is preferred. One implementation vendor noted that most sites (90%–95%) attempt to start with a top-down approach. To change to a bottom-up approach is only made after data collection and regression model trials result in poor fit or data trends, per interviewed contacts.

There are challenges associated with bottom-up calculations. Bottom-up calculations require equipment-level data that might be hard to obtain after the decision to switch to bottom-up is made. Another salient challenge is the ability to obtain enough data points, as there is a low sample when switching to a bottom-up approach, which is generally more expensive and data intensive than top down or regression modeling. One possible way to approach this is by treating M&V cost and time as scalable factors and prioritizing the number of projects that should be looked at in the set time and budget.

COVID-19 caused more customers to switch to bottom-up calculations. One implementation vendor explained, prior to the COVID-19 pandemic, approximately one-quarter of SEM projects they were working on in the country would need to shift gears to a bottom-up approach. Post-COVID-19 pandemic, this same implementation vendor reported using a bottom-up approach for closer to half of their projects. Contacts explained that it is challenging to use a top-down approach post COVID-19. COVID-19 impacted commercial and industrial facility operations, which put in question the regression model results. In some cases, COVID-19 caused commercial buildings to become newly vacant. This caused regression energy models to fail or to simply measure the effects of the significant changes to the operations due to COVID-19 rather than the program. In such cases, the implementation vendor will often decide to pivot to a bottom-up approach.

Interviewed implementation vendors have cited notable changes in operations due to COVID-19 (as have participants, as discussed in Section 3.3).

3.5.2 Participant and partial participant interviews

The participant and partial participant interviews did not cover savings estimations because implementation vendors are responsible for those calculations.

3.5.3 Comparison to best practices findings

Implementation vendors are following the SEM Best Practices Report by including a robust top-down analysis as the default analysis model. Bottom-up calculations are used to determine the reported savings only when the regression model provides unacceptable fractional savings uncertainty and goodness of fit metrics during model validation. Subsequently, if the data stabilizes with facility operations and good fit metrics can be demonstrated at a later stage of SEM implementation period, implementation vendors should be open to revert to top-down analysis models as applicable.

3.6 Effectiveness of training

Training activities within the program include multiple activities led by utility program staff and vendor staff with program participants, such as: initial walkthroughs ("treasure hunts"), virtual workshops, in-person workshops, and hybrid workshops on a variety of topics (portfolio management, energy efficiency, behavioral changes, ISO standards, etc.). The effectiveness of provided training varied. Participants with less prior knowledge valued training and input, whereas those who were further along in their energy management journey stated that the training provided by the program did not provide an appropriate level of detail or rigor that aligned with their energy management needs. When asked about the effectiveness of various activities within the program that help identify actions that resulted in energy savings, participants provided the following responses:

Table 3-2. Effectiveness of program activities

Program Activity	Participant 1	Participant 2	Participant 3
Initial walkthrough with program representative	Very effective	Somewhat effective	Very effective
Virtual workshops	Somewhat effective	Somewhat effective	Very effective
In-person workshops	Very effective	N/A (did not participate in this activity)	Very effective

Participants generally preferred in-person training opportunities and engagement over virtual engagements. Increased effectiveness of training could be achieved by splitting participants into cohorts based on the level of previous experience with SEM. Designating specific cohorts for organizations with different levels of SEM experience will allow training, coaching, and the level of interaction to be tailored to the needs of participants while allowing additional interaction and collaboration.

3.6.1 Utility program staff and implementation vendor interviews

Utility program staff and implementation vendors both cited SEM as providing a framework that organizations can use to complete projects sooner, and with a deeper understanding and awareness of how those projects impact energy use. This framework is mainly composed of workshops and webinars provided for program participants. Interviews noted that the effectiveness of training is a result that may not show up on paper but is useful for the participating companies.

3.6.2 Participant and partial participant interviews

Some participants said that they would likely have completed similar projects to what was undertaken as part of SEM; however, **the participation in the program helped speed up the timeline and increase awareness of energy consumption** among members of their organization.

Respondents found the initial walkthrough with program representatives to be "somewhat effective" to "very effective." Those who found the exercise somewhat effective have been working on SEM-related activities internally for years prior to their participation in the program. For this reason, they have already either prioritized, implemented, or ruled out certain measures. Virtual workshops were also "somewhat effective" to "very effective," but respondents expressed more interest in in-person workshops and trainings, which they rated "very effective."

The implementation staff delivering the initial walkthroughs are SEM experts. However, the initial walkthrough included general recommendations that some participants had already considered. The implementation staff could increase the effectiveness of the initial walkthrough by tailoring the topics covered to the customer's sophistication level and their previous experience with SEM. This can ensure that participants with varying levels of experience in SEM all get value from the exercise.

Participants coming into the program with previous SEM experience reported requiring added depth or detail to program interactions (such as walkthroughs and workshops) to achieve the intended value of the activities. This indicates that the Companies could consider adjusting program interactions with participants based on their SEM activity history, experience, and overall sophistication. Participants newer to SEM activities will likely get more value out of the initial walkthrough than an organization that has been proactively working on SEM over the years.

When asked to rate how influential the program's influence was (scale of 0 – 10 where 0 is completely uninfluential, 5 is neither uninfluential or influential, and 10 is completely influential) on helping to improve the efficiency of buildings systems, respondents provided scores of 7-10 signaling that the program helps improve building efficiency. The program's influence on helping to improve building operations and maintenance scored slightly lower overall, with one respondent providing a 3.5 score on the same scale.

Figure 3-2. Program influence on improvement of building system efficiency
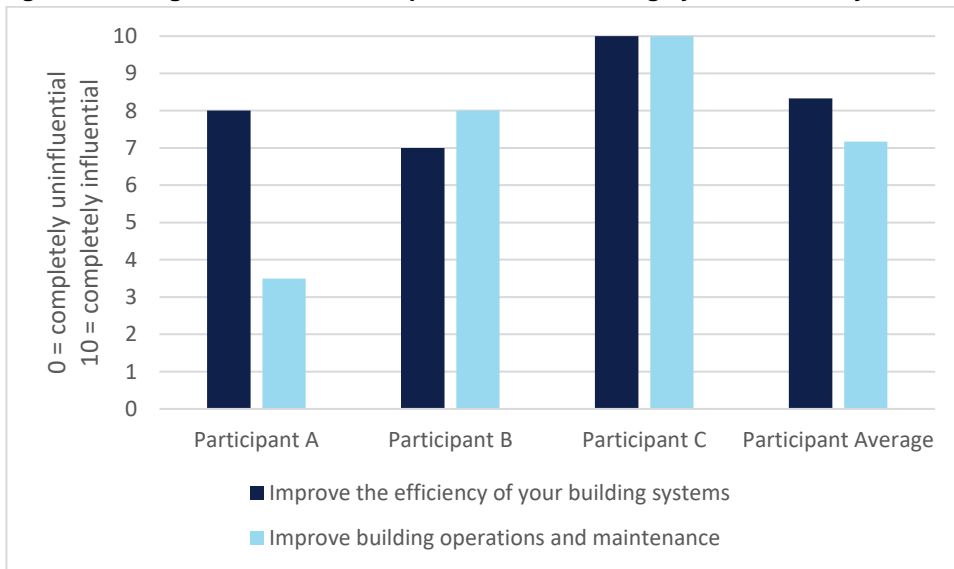
Overall, program participants indicated that they were highly satisfied and enjoyed their experience with all aspects of the program. Participants found that the program nearly completely met their expectations, and they communicated their appreciation for program and vendor staff.

Figure 3-3. Program participants' satisfaction and experience
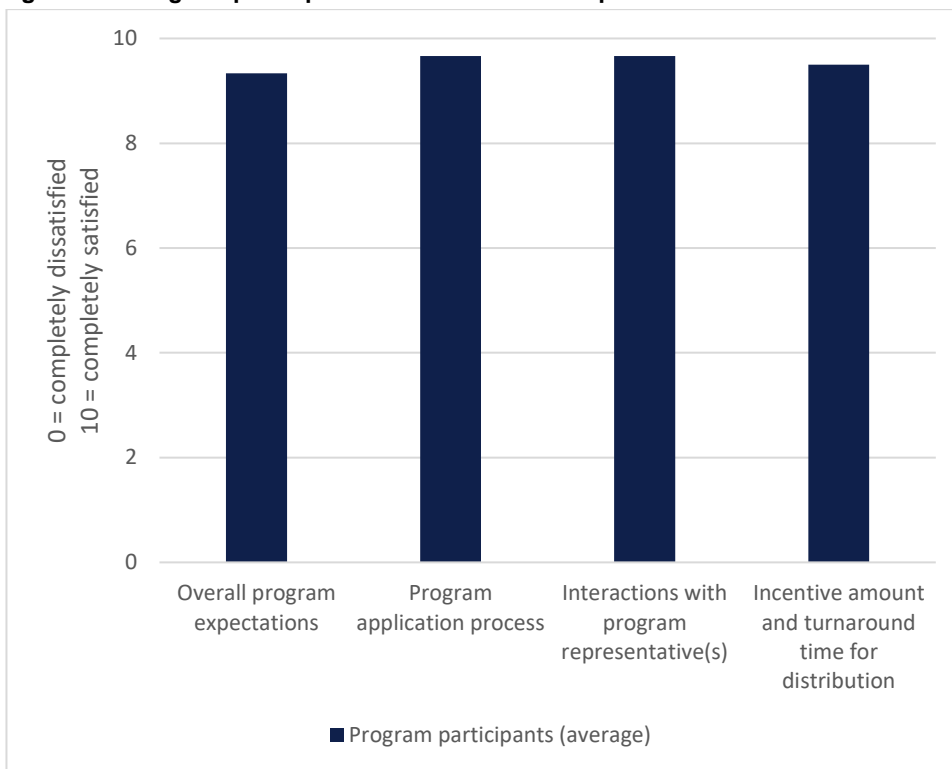
3.6.3 Comparison to best practices findings

The SEM Best Practices Report did not provide specific recommendations about the effectiveness of SEM training.

3.7 Other successful program elements

Interviews revealed that communication with program participants has been successful thus far and should be built upon. Utility program staff and implementation vendors repeatedly stated that the program is most efficacious when participants receive individualized and personalized attention. Participant interviews revealed that communication is also important to them to help establish and build trust and collaboration.

3.7.1 Utility program staff and implementation vendor interviews

Interviewed program utility staff and implementation vendors cited the importance of personalizing SEM for customers. This personalization shows customers due diligence in preparation and active listening. Both items are critical to display to participants, since their continued participation is a large commitment.

Program utility staff and implementation vendors also agreed that participants' buy-in or ownership for engaging in SEM is key to success. Program utility staff and implementation vendors explained that having an internal "champion" for SEM who celebrates successes is important to spreading awareness and involvement across the organization. The best-case scenario is when this buy-in comes from an executive level, as that feeling reverberates throughout the company. Implementation vendors noted that this type of engagement helps with participants' willingness to provide data and be communicative.

Finally, program utility staff and implementation vendors repeatedly spoke of the importance of communication from all parties involved. Since the SEM program is complex and lengthy, it is critical for communication to occur early and

often throughout the process. Program material also demonstrates the importance of communication and requires regular operations meetings as well as written reports.

3.7.2   Participant and partial participant interviews

All participants became aware of the SEM program through program utility staff, either through routine communication with utility contacts or a result of proactive outreach by the utility program staff. Some respondents indicated that their existing relationship with utility representatives prompted them to trust in the program representative's recommendation to participate in the program. One respondent indicated that a motivating factor to participate in the program was to recoup some of the money they are paying into the program funding: "We're paying into the fund… we want to recoup some of our ratepayer money… [We have] plenty of opportunities to reduce [our load] to benefit the environment and our financial wellbeing."

Participants also appreciated the support they received from program utility staff in assisting in collaboration with engineering consultants, as well as regular communication and responsiveness to questions and requests. Respondents were vocal about their appreciation of the Utility program staff's efforts to provide excellent customer service and ensure participants received value from the program: "[They are] great people, wonderful to work with." Respondents also noted that Utility program staff has been very supportive and collaborative despite turnover challenges.

3.7.3   Comparison to best practices findings

The SEM Best Practices report included literature reviews and interviews that both revealed a high level of participant satisfaction with SEM programs and an increased likelihood of participant engagement with other utility programs for additional capital projects, following SEM participation. Participant engagement is a key indicator of success. The SEM Best Practices report also suggested that a strong connection is needed among SEM program implementation vendors, program managers, and participants; this may involve weekly or bi-weekly check-ins, training sessions with coaches, and "homework" to ensure that participants are deriving the full benefits of SEM. Our process evaluation found that both implementation vendors and participants reported that there is regular communication between the parties which contributes to success, as was detailed in the best practices findings. Connecticut SEM can increase engagement even further using a cohort strategy when recruiting and promoting energy savings at participating facilities.

4 METHODOLOGY AND APPROACH

To achieve the process evaluation objectives, the DNV evaluation team reviewed program material and then conducted in-depth interviews (IDIs) to gather perspectives about the SEM program from different program actors: Utility program staff and implementation vendors, participants, partial participants, and non-participants.

4.1 Program material review

First, the DNV evaluation team ("team") reviewed program documentation, including a sample presentation, other marketing collateral, templates of the letter of intent, regression modeling agreement, SEM implementation agreement, program/operations manuals, and M&V plans. This review informed the development of utility program staff interviews and assessment of program design against identified best practices.

4.2 Utility program staff and implementation vendors interviews

The team conducted two individual interviews and one group interview with four utility program staff members. Both Eversource and United Illumination (UI)/Avangrid utility program staff ("Utility program staff") were involved in the interviews. Researchers also conducted three individual interviews and one group interview with two implementation vendor representatives ("implementation vendors"). In total, three of the four active SEM implementation vendors participated in an interview. The team was unable to contact one implementation vendor to complete an interview, despite six contact attempts.

Interviews were completed between January and August of 2022 and covered the following topics:

- Causes for low participation
- Type of marketing, promotion, and program messaging activities implementation vendors undertook to enroll participants, as well as any changes planned to increase enrollment
- The application, communication, project and data verification, and incentive processes (to assess, to the extent possible, whether the program delivery is the same across CT)
- The program structure (to assess how the design could be improved)
- Best practices that are leveraged to deliver this program (to compare what is being done in the field to the identified SEM best practices from Phase 1 of this study)
- Delivery challenges (to capture any early concerns with the participation process or project data collection practices)
- Current or expected future ability of the program to act as a reference source for capital-intensive Energy Opportunities (EO) program measures.

4.3 Program participant, partial participant, and non-participant interviews

4.3.1 Program participants

Utility program staff provided contact information for four enrolled participants in 2021. Thus, the team attempted to interview all 2021 program participants. A summary of contact attempts is provided in Table 4-1. Each participant organization was contacted up to three times via email and up to two times via phone.

Primary contacts within participant organizations held a variety of roles and responsibilities at different levels of authority within their respective organizations. All respondents sought approval and buy-in from higher-level staff to proceed with participation in the program. In some cases, the respondent started as the "champion" of the program initiative internally and would enlist peers and direct reports for support, and seek input and approval from superiors for larger decisions related to the program.

Some participants' level of involvement within the program or activities undertaken is a result of where their site(s) fit within the overall corporate portfolio and how projects are prioritized internally. Participants reported they can identify areas for improvement, but based upon internal priorities across the company outside of the participant's control, those areas might not be approved for program participation.

The participant interviews also provided insight into program processes and challenges that could result in delayed projects. Specifically, the team investigated:

- Experience with the application process and communication about program requirements (data, reporting, training, and whether performance goals are communicated continuously or at specific reporting intervals)
- Interactions with utility program staff or representatives/implementation vendors
- Whether current energy management practices were assessed, if metrics were developed to achieve energy performance goals, and whether energy performance is periodically assessed
- Staff engagement and effectiveness of training
- Reasons for participation
- Energy savings actions, if implemented, and insight into these processes
- Respondents' suggestions for improvement (including barriers faced and how to overcome them)

Table 4-1. Program participant interview outreach summary

Contact	Email Contact Attempts	Phone Contact Attempts	Survey Completes
Organization 1	2	0	1
Organization 2	2	0	1
Organization 3	5	0	Refused
Organization 4	2	0	1

4.3.2   Partial participants

Similarly, the utility program staff provided contact information for four partial participants (customers that applied for the program and/or started participating in the program but dropped out at some stage prior to implementing projects and receiving an incentive) in 2021. Therefore, the team attempted to interview all 2021 partial program participants. A summary of contact attempts is provided in Table 4-2. Each contact was contacted up to three times via email and up to two times via phone. Partial participants were customers that had exposure to the SEM program; they joined and then dropped out. The DNV team attempted to keep these interviews to no longer than 30 minutes and offered a $50 gift card to incentivize partial participants to complete the interview.

The interviews included a mix of closed-ended and open-ended questions. Specifically, the team investigated:

- Barriers to participation, including effects from the COVID-19 pandemic (e.g., higher overall project costs, uncertain business environment, and new focus on indoor air quality)
- How the program could adapt to entice participation
- Sources of program awareness
- Reasons for initial interest in the program

Table 4-2. Program partial participant interview scheduling outreach

Contact	Email Contact Attempts	Phone Contact Attempts	Survey Completes
Organization 1	3	0	1
Organization 2	3	2	No response
Organization 3	3	2	No response
Organization 4	6	4	No response

4.3.3   Non-participants

Non-participants were defined as customers that had exposure to the SEM program (such as expressed interest or utility program staff reached out to them) but did not join. For this group, utility program staff provided contact information for three organizations in 2021, and the team attempted to interview all those contacts. The DNV evaluation team offered a $50 gift card to incentivize non-participants to complete the interview. Each contact was contacted up to three times via email and up to two times via phone. None responded to the interview invite.

A summary of contact attempts is provided in Table 4-3.

Table 4-3. Program non-participant interview scheduling outreach

Contact	Email Contact Attempts	Phone Contact Attempts	Survey Completes
Organization 1	3	2	No response
Organization 2	3	2	No response
Organization 3	3	2	No response

4.4   Comparing to SEM best practices

The Phase 1 SEM Best Practices Report identified best practices for data acquisition for SEM and for evaluating such a program in Connecticut. The DNV (formerly ERS) and Industrial Economics (IEc) evaluation team reviewed eight SEM evaluation reports that covered SEM program activity in 12 states, along with 16 other papers and technical documents, to develop the findings presented in that report. The authors also conducted in-depth interviews with SEM program managers, implementation vendors, and industry experts from across the country, many of whom contributed to the evaluation reports that were reviewed. Overall, the team completed 10 interviews, including 4 with evaluators, 3 with technical leads, and 3 with SEM implementation vendors. The literature that was reviewed in Phase 1 is detailed in APPENDIX A.

The DNV process evaluation compared the findings from the process evaluation study against the best practices identified in the Best Practices Report referenced above. The following SEM program and evaluation best practices were considered when comparing findings from the current process evaluation or Phase 2 study of the SEM program in Connecticut:

1. **Identified best practice #1:** The implementation vendor should collect and store robust data on energy consumption, facility characteristics, weather, and other influential independent variables, as these data are essential for SEM evaluation. Developing and testing the baseline model before starting the program will give an indication of whether a

whole facility analysis will work based on an estimate of fractional savings impacts of the program and the expected fractional savings uncertainty.[19]

2. **Identified best practice #2:** The implementation vendor bears significant responsibility for data collection. The nature of the SEM relationship with implementation vendors allows for good access to data during the engagement period.

3. **Identified best practice #3:** The default savings approach should include a robust top-down analysis model that has been tested for validity and has accounted for non-routine adjustments and other factors. The model should meet established standards for mean bias error (MBE) and coefficient of variation of root-mean squared error (CV(RMSE)) as set out by ASHRAE Guideline 14, and expected savings should exceed the fractional savings uncertainty. Otherwise, a bottom-up analysis approach should be taken.

4. **Identified best practice #4:** Stakeholders should agree upfront on the data and methodological requirements for the SEM savings model and have a contingency plan in place. The requirements should specify the data collection protocol and accepted method(s) to calculate SEM impacts.

5. **Identified best practice #5:** Non-routine events (NREs) must be diligently identified, documented, and accounted for during reported savings estimation. The identification and explanation of non-routine adjustments (NRAs) is easiest during implementation.

6. **Identified best practice #6:** Measure lives/persistence assumptions vary widely by program and region and must be investigated for Connecticut's SEM program design. The measure life for SEM in the 2020 Connecticut program savings document (PSD) is four years. From literature review and expert interviews, SEM measure lives in other jurisdictions ranged from one to seven years, with most programs centering on a three- to five-year period for SEM interventions.

Additionally, based on literature reviews and SEM expert interviews, the Best Practices Report identified typical SEM parameters and best practices, which are summarized in the figure on the next page and were considered when conducting the Phase 2 study, the process evaluation of the SEM program in Connecticut:

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[19] Fractional savings uncertainty (FSU) is defined as "savings uncertainty as a percentage of savings. Generally, as the FSU of a Portfolio decreases, the confidence in a Portfolio's savings increases". Additional information on FSU and calculation can be found at https://www.bing.com/ck/a?!&&p=02615023e66ce40eJmltdHM9MTY2NjY1NjAwMCZpZ3Z0pZD0wOTNmMDRlYi1lNmYyLTY3Y2ItMGVjNi0xNmQyZTc1YTY2ZmQmaW5zaWQ9NTE2NQ&ptn=3&hsh=3&fclid=093f04eb-e6f2-67cb-0ec6-16d2e75a66fd&psq=nyserda+fractional+savings+uncertainty&u=a1aHR0cHM6Ly93d3cubnlzZXJkYS5ueS5nb3YvLS9tZWRpYS9Qcm9qZWN0L055c2VyZGEvRmlsZXMvUHJvZ3JhbXMvQnVzaW5lc3MtRW5lcmd5lcmd5LVByby9FLS0tRnNhY3Rpb25hbC1TYXZpbmdzLVVuY2VydGFpbnR5LWFuZC1Qb3J0Zm9saW8tU2l6aW5nLnBkZg&ntb=1

Typical SEM Parameters	SEM Best Practices
• **Savings** - 3-5% of overall facility usage (energy and demand), with a range as wide as <1% to >8% • **Measure life** - 1 to 7 years, with most SEM programs centering on a 3- to 5-year period for SEM interventions • **Participants** - Large C&I customers (facility annual usage of 1–20 GWh or 500,000–1 million therms of natural gas) **Activities** • **General** - Optimizing equipment schedules and utilizing higher efficiency equipment (i.e., shifting load to more efficient equipment) • **HVAC** - Shutoffs and setbacks, optimized controls, energy management system (EMS) improvements, and ventilation controls • **Lighting** - De-lamping, reducing service to low-occupancy areas, changing maintenance schedules, and adding occupancy sensors • **Other industrial** - Compressed air optimization (leak reduction, controls, air pressure reduction, kick-switches for on/off or setbacks, and startup and shutdown checklists) and other O&M measures	• **Data collection** – All impactful variables (facility-wide and activity-specific energy use billing and/or submetered data, independent variables that drive energy use such as weather, occupancy, facility usage schedules, and manufacturing production levels) to be collected typically for 12 months in the baseline and program period. – Communication with facility staff to understand changing practices and non-routine events (NRE) is a key component. • **Data collection frequency -** Models are typically more reliable when data are collected daily or weekly as opposed to monthly. • **Data confidentiality -** If data confidentiality is an issue, utilize non-disclosure agreements (NDAs), anonymize data through undisclosed static multipliers on proprietary data, and use energy management information systems (EMIS) to anonymize data. • **Model specifications –** A baseline model should be developed prior to the SEM engagement to ensure the model meets goodness of fit criteria and is likely to produce savings estimates that meet savings uncertainty criteria. If the top-down approach is infeasible, the modeling and data collection procedures should shift to a bottom-up approach. • **Baseline –** The baseline modeling period should include sufficient data to meet ASHRAE Guideline 14 data coverage criteria. For weather-sensitive measures, this generally requires a 12-month baseline period to account for seasonality. • **Treating non-routine adjustments** – Baseline and program period models should be adjusted as needed to account for NREs – Conduct interviews with participants to identify potential NREs – Track model results against actual energy consumption (model residuals) to identify potential NREs. • **Treating Overlapping Capital Projects -** These effects must be netted out from SEM savings by subtracting their estimated savings from the model results. • **Treating Negative Savings** – Evaluators and implementation vendors should understand how capital project savings may diminish over time while still ensuring that the effects are properly netted out over the program period. – The evaluator needs to understand the program's policy on zeroing out a site's negative savings when reporting, if one exists, and assess it for bias. • **Treating Non-Energy Impacts -** Track NEI metrics including reduced GHG emissions, water savings, and increased productivity from SEM projects to highlight the success of the program and increase buy-in from sites who may have specific non-energy goals. • **Dealing with COVID-19** – Understand changes to facilities' schedules and outputs as a first step in understanding COVID-19 impacts. – If possible, treat COVID-19 changes as non-routine events in the models – Some models may require switching to a bottoms-up approach to account for COVID-19 changes.

5 EVALUABILITY ASSESSMENT

The DNV evaluation team performed an evaluability assessment of the SEM program from an impact evaluation perspective, to determine if the program was collecting the requisite data to perform an impact evaluation in the future. The evaluation team identified, collected, and reviewed the following documentation to perform the evaluability assessment:

- Eversource SEM Program Manual v1.1
- Eversource SEM Regression Modeling Agreement
- UI SEM Operations Manual
- UI SEM Measurement and Verification Plan for Electricity and Natural Gas Savings

Based on project documentation reviewed and in-depth interviews with the utility program staff and implementation vendors about data collection activities, the DNV evaluation team determined that the SEM program in Connecticut had a plan in place for collecting the requisite data to perform an impact evaluation of the program in 2023 and beyond.

The DNV evaluation team's review of program material uncovered a gap in documentation pertaining to data acquisition that were provided to program participants. If obtaining proprietary data is a concern, the Companies and implementation vendors can sign non-disclosure agreements with the facility, aggregate and anonymize data, and remove identifying metrics. The agreement should also allow evaluators to use the data to streamline the impact evaluation process.

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

Conclusion 1 – The team found that, generally, program implementation vendors are utilizing the SEM Best Practices Report findings. Implementation vendors are following recommendations in the SEM Best Practices Report for handling non-routine events (NREs) and other facility adjustments, modeling strategies and goodness of fit, and determining when to conduct top-down or modeling vs. bottom-up or engineering savings calculations. The evaluation team also identified additional documentation released in October 2020 and not covered in the SEM Best Practices report to address NREs, from *IPMVP's Application Guide on Non-Routine Events and Adjustments*, which is relevant and should also be incorporated into the SEM program design in Connecticut.

Conclusion 2 – Enrollment in the program has remained very low over the past 3 years. Broader market conditions and certain program-specific elements as described below have been reported as reasons for low participation. The expectation was to enroll 12 participants annually (per Statewide Plan). In 2020, enrollment was zero; in 2021, enrollment was two; and by Q4 2022, enrollment was six. Ramp up, although happening, is slow. Evaluators found the low enrollment to be a function of five factors: (1) lack of program awareness and understanding, (2) labor shortages, (3) length of commitment required, (4) COVID-19 related impacts reported by implementation vendors and participants when discussing program barriers (i.e., not being able to go on-site to recruit participants), and (5) low program incentives. Continued low enrollment presents a risk that the time and costs associated with the program will not be worth the expected value. As the impacts of COVID-19 abate over time, some of the factors revealed during the current evaluation may subside.

An evaluation of Xcel Energy's SEM program revealed that cost-effectiveness had been reached – in large part, by increasing the average project savings even while engaging a relatively small number of customers. Methods to recruit customers for SEM programs in other states included program administration or implementation vendor outreach, account manager outreach, or customer-initiated recruitment.

Conclusion 3 – Customers and implementation vendors seem to have different expectations as to what data can and should be provided. This disconnect is a potential barrier to program participation and can prevent successful modeling of program savings.

Conclusion 4 – Training effectiveness varies depending on how much previous experience program participants have in energy efficiency prior to joining the SEM program (in this report, "training" consists of activities that are undertaken by program and vendor staff to improve participants' SEM expertise. These activities address topics such as portfolio management, energy efficiency, ISO standards, and other topics and are further described in Section 3.6). Participants with more experience desired more sophisticated coaching and training. Additionally, in general, customers preferred and valued in-person training opportunities and engagement.

Conclusion 5 – The DNV evaluation team's review of program material did not consistently uncover documents provided to program participants that clearly pertain to guidance and standards of data acquisition processes. An additional data collection challenge for many SEM programs is reluctance from participants to share proprietary data. A separate evaluation effort for Bonneville Power Administration found that regular, ongoing communication between the program and customer teams over multiple years resulted in the collection of high-quality data.

Conclusion 6 – The DNV evaluation team found that there was no independent review of implementation vendor modeling approaches being undertaken by one of the Companies within the program.

6.2   Recommendations

Recommendation 1 – Review modeling approaches to confirm adherence to best practices. If non-routine adjustments (NRA) are warranted due to the identification of an NRE in the baseline or implementation or reporting period, the implementation vendors should identify the static factor changes, document them along with the actual dates, and be prepared to use "IPMVP provided procedures for various NRA methods that must be used before switching to the bottom-up calculation approach" per *IPMVP's Application Guide on Non-Routine Events and Adjustments*. Subsequently, if the data stabilizes with facility operations and good fit metrics can be demonstrated at a later stage of SEM implementation period, implementation vendors should be open to revert to top-down analysis models as applicable. Participants should be required to track planned and unplanned facility shutdowns and other NREs and report them to the utility program staff and vendors.

Recommendation 2 – Increase volume of leads through multiple channels. The Companies should work to improve lead generation through utility staff and implementation vendors. Utility account managers should facilitate introductions between the customer and the SEM provider as an active participant in the recruitment process. With the selection of two new vendors in 2022 who are significantly experienced in SEM, the Companies should revisit the overall enrollment in the program a year from the new vendor selection to ensure that the benefits outweigh time and costs associated with the program. The Companies should test different marketing messages about the benefits of the program to refine the value proposition. For example, consider incorporating employee satisfaction as an additional benefit in opportunity outreach material; an approach taken by NYSERDA in their online promotional material. This work may also include increasing or re-structuring the incentives and testing if such changes result in a significant increase in participation, as incentives were noted to be insufficient for especially large customers. For comparison, the study team discovered incentive amounts of the following amounts: $10,000 for each 1% energy savings with a $50,000 cap (Consumers Energy), $0.02/kWh for electric savings and $0.20/therm for natural gas savings (Energy Trust of Oregon), $35,000/year to support one FTE if performance objectives are met (Puget Sound Energy), an average of $0.03/kWh with maximum caps adjusted based on year post installation, up to year six (Snohomish County PUD), and up to $400 per kW saved (Xcel Energy). Future participation trends should be closely monitored and regularly assessed. For example, the statewide plan calls for 12 participants annually; the Companies should measure a participation rate in line with that goal.

Companies will benefit from enhancing messaging about the tangible benefits of the program and making strategic and tactical adjustments to marketing and outreach to prevent low enrollment in the future. Industries that have commonly participated in SEM programs in other states include industrial manufacturing facilities, healthcare facilities, universities, and wastewater treatment plants.

Recommendation 3 – Set data standards for all program parties. The Companies should ensure program implementation vendors hold a meeting soon after completion of the "treasure hunt" to clearly define the data that are required from participants. Companies should provide implementation vendors and participants with documentation that outlines standards and expectations for data collection, analysis, and data transfer processes. Reviewing and understanding this "checklist" type of documentation should be a key step in kicking off program participation. Companies should clearly define "must-have" and "nice-to-have" types of data and how they will be included within the program.

Recommendation 4 – Establish cohorts for different experience levels. Once participation substantially increases, the Companies should consider splitting participants into cohorts based on the level of previous experience with SEM, for example, developing one cohort with participants who have no prior SEM exposure and a second cohort including participants who are familiar and have experience with SEM. This cohort breakout will provide training, coaching, and the level of interaction tailored to the needs of participants. The cohort approach can provide additional value from the interactions and collaboration among cohort members.

Recommendation 5 – Prioritize in-person activities over virtual activities. The Companies should ensure program implementation vendors provide in-person, hands-on training opportunities, when possible, as customers perceive value of energy efficiency from these interactions. Before the COVID-19 pandemic, research from other states with SEM programs indicated that nearly all offered in-person opportunities. The Companies should ensure that a SEM specialist or expert should be present for in-person activities, such as the initial walkthrough, to increase the value that each participant receives from the exercise.

Recommendation 6 – Mitigate data collection challenges by working closely with the facility. The Companies and implementation vendors should maintain ongoing communication with customer sites throughout their participation in the program to best understand and attempt to alleviate data concerns, in order to collect high-quality data over multiple years. For example, if obtaining proprietary data is a concern, the Companies and implementation vendors can sign non-disclosure agreements with the facility, aggregate and anonymize data, and remove identifying metrics. The agreement should also allow evaluators to use the data.

Recommendation 7 – Set up technical review for checking the appropriateness and accuracy of the implementation vendor savings calculation models. Both Companies should ensure that the SEM calculation models developed by the implementation vendors are carefully vetted independently by the utilities in-house or by a third-party vendor contracted by the Companies as a technical reviewer.

APPENDIX A. PHASE 1 LITERATURE REVIEW REFERENCES

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APPENDIX B. UTILITY PROGRAM STAFF AND IMPLEMENTATION VENDOR INTERVIEW GUIDE

C1906 SEM Process Evaluation: Eversource Utility program staff and Implementation vendor Interview Topics

PURPOSE

The DNV team interviewed program delivery stakeholders –program utility managers or staff and implementation vendor staff. These interviews focused on topics listed in Table B-1.

Table B-1. Process evaluation objectives mapped to interview topics

Objective	Interview Topics
Examine program design, administration, and delivery processes to identify program improvements	Eversource provided a manual describing the pre-qualification, commitment, assessment, implementation, and M&V processes. Thus, the process evaluation team will focus on select topics to fill in the gaps.
	Marketing/Outreach: How are leads generated (through implementation vendors or in other ways, leveraging digital, mail, or other channels)? What is the best approach? How are leads or who to market identified? What type of messaging in marketing collateral or material is highlighted about the program? When is the appropriate time to approach customers?
	Pre-qualification – How does Utility program staff and/or implementation vendors assess whether potential participants demonstrate sustainability business practices and/or willingness to implement actions encouraged by the program? Why are energy consumption targets different for multi-site facilities versus single-site facilities?
	Commitment/customer engagement: What is the typical timeframe from initial engagement to when customers sign a Letter of Intent (LOI) to indicate their commitment? Who signs it (seniority of that signature)? How effective are Treasure Hunt assessments in identifying SEM opportunities/savings approach, post LOI? How does staff engage with participants to offer suggestions that yield high savings for the program?
	Baseline: What data/variables are typically included in the regression model(s) - weather, schedule or operational changes, capital equipment or EE implementation, production changes, or other significant operational variables during the model baseline year? What data are most difficult to obtain and include in the models? How granular are energy usage and other data? How are the models specified, examined, and finalized?
	Implementation: How are energy targets established? How are measures / actions prioritized? What type of measures/actions do participants typically complete? What type of SEM training is provided both short-term and long-term to maintain the persistence of SEM savings? How is the program helping participants capture the data needed to assess SEM impacts?
	M&V: Confirm consumption data are reviewed quarterly. What does the quarterly review of consumption data entail? How are non-routine events (unexpected shutoffs, setbacks, impacts

Objective	Interview Topics
	from COVID-19 on production schedules, non-SEM related capital projects etc.) identified and addressed in the models? What happens or will happen when expected performance is not observed or analysis yields zero or negative savings? How does implementation vendor work with a customer to help them achieve expected performance target? When is the top-down regression approach replaced by the bottom-up engineering approach to estimate savings? Since each approach has different data needs, what challenges with data availability and quality have you encountered when switching approaches? **Incentives:** What type of incentives are provided for participating? How are incentives structured? How does the utility account for benefits other than energy savings (i.e., NEBs)? How should the incentive structure change to improve the appeal of the program?
Identify barriers to participation, energy savings, and how to overcome them	What are top three program delivery challenges? Will probe for details, as well as whether and how COVID-19 pandemic impacted participation. What will it take to minimize or eliminate these challenges? How can a program be adjusted to remove any of these challenges? How flexible is the program design/delivery so adjustments can be made to address challenges? What is stopping customers from enrolling presently? How are enrollment challenges addressed? If participating, what are the reasons for performing below the expected target? What support do customers need when they are not meeting their savings target? (These topics might not be appropriate if participants are still in the early stage of participation). Is energy analysis performed in the beginning of the engagement to estimate the probability of detecting the expected savings at the site? If yes, what is included in the analysis? How are savings estimated?
Assess program effectiveness to date, qualitatively, and how the program is adapting to be more effective	Will staff assess whether SEM increased participation in other energy efficiency programs? How will staff track whether SEM training/coaching and associated savings persist? How is the program optimizing the impact of training? (e.g., is implementation vendor/ testing whether certain cohorts perform better to test relationship between implementation vendor training activities and adoption of specific SEM activities to optimize program performance.) How are implementation vendors, if at all, screening for those who likely would have done SEM actions in the absence of the program (i.e., free-riders)?
Provide recommendations on future research topics	This will be based on information gathered on topics provided above.

INSTRUMENT

Thank you for taking the time to talk to us about the CT SEM program. As noted, we would like to learn more about how your team will or plans to administer and deliver the SEM program.

I would like to record this interview for my note-taking purposes. Do I have your permission?

General information

[ASK ALL] Let's begin. Please describe your anticipated role with the SEM program.

Program design, administration, delivery & suggestions for improvement

[ASK ALL] How will you or your team promote this program, if at all?

[IF APPLICABLE] Please tell us what type of messaging or value propositions work best to garner leads for the program – solely energy efficiency / savings or other messages?

[ASK ALL] How will you identify potential candidates for this program?

    a.   [*If not mentioned*:] How will you leverage utility program data information to identify potential candidates?]

    b.   [If not mentioned:] Will you rely on additional information (not from the utility) to identify potential candidates? If so, which information? [*Probe for if they look for whether organizations are members of certain trade groups/associations that may indicate this predisposition, or look for sustainability goals on organizations' websites, or they base this on certain energy usage patterns.*]

[ASK ALL] Where are the opportunities to recruit or generate leads for the CT program? [*If needed probe if type of opportunities they note are being pursued by the program.*]

[ASK ALL] My next question is about the initial SEM assessment, where you review low cost/no cost operation and maintenance or O&M opportunities in the facility with customers and take notice of capital expenditure upgrades that customers could do leveraging incentives from other programs. You may have not done this activity yet. Please tell us about your process or, if you haven't done the activity, how do you plan to identify the savings potential when doing the initial SEM facility assessment?

[ASK ALL] What type of actions do you expect will interest participants the most?

[ASK ALL] Based on your prior experience with SEM programs, which actions do participants typically complete?

[ASK ALL] How will you encourage participants to implement additional actions (beyond those they are interested in) to achieve more energy savings?

Program challenges, reasons for underperformance, & support offered

[ASK ALL] Please list top three SEM program challenges, what you have seen in the past in other places that might also occur in CT? [*Probe about Covid-19 pandemic, whether incentives are not appealing, and any other factors that may be stopping customers from enrolling.*]

[ASK ALL] How do SEM programs typically address these challenges we just discussed?

[ASK ALL] What will it take to eliminate these challenges?

[ASK ALL] Now please describe how are participant energy savings targets established, if you know.

[ASK ALL] If, for example, participants fail to achieve their performance targets, what support will you offer to participants to achieve their performance targets? And for how long will this support be offered?

[IF APPLICABLE] How do you go about in optimizing the impact of support you'll be offering? [Probe if implementation vendor is testing whether certain cohorts perform better to test relationship between training activities and adoption of specific SEM activities to optimize program performance.]

M&V, data challenges, & savings estimation

[ASK ALL] Let's talk now about M&V, baseline. What data/variables will you be looking to include in the regression model(s) for estimating savings, if that is part of your role? [*Probe for weather, schedule or operational changes, any data on capital equipment or EE implementation (i.e., date of participation in other EE programs and associated savings), production changes, or other significant operational variables during the model baseline year.*]

[ASK ALL] Of the data/variables you just noted, what data are generally most difficult to obtain and include in the models?

How will you help participants, if at all, to gather the data needed to assess SEM impacts?

[ASK THOSE DOING ESTIMATION] What will be your approach to arriving at the final model specification? [*Probe for goodness of fit tests or if multiple specifications are considered.*]

[ASK IMPLEMENTATION VENDOR] How often will you review consumption data from participant facility(ies)/building(s)? And tell me about your review, what will you look for? [*Probe for outliers, estimated versus actual meter reads, the number of months or data points in the pre or baseline and the post period.*]

[ASK ALL] How will you track non-routine events, such as unexpected shutoffs, setbacks, impacts from Covid-19 on production schedules, and non-SEM related capital projects?

[ASK THOSE DOING ESTIMATION] How do you deal with non-routine events in your models?

[ASK ALL] If expected savings are not observed, including when savings are zero or negative, what will happen?

[ASK ALL] When do you decide (or how do you decide) to replace the regression approach with an engineering approach to estimate savings?

[ASK ALL] What challenges with data availability and/or quality have you experienced in the past when switching approaches?

[ASK ALL] Will you perform energy analysis in the beginning of the engagement with participants to estimate the probability of detecting the expected savings at the site?

    a. [*if yes:*] Please tell us about that analysis.

    b. [*If not mentioned ask:*] How will you determine expected savings?

    c. [*If not mentioned ask*:] Can you tell us about your fractional savings uncertainty criteria? What is your maximum acceptable level of fractional savings uncertainty at the building-level? Why that threshold?

Wrap up

We are almost done. We have two more questions.

[ASK UTILITY STAFF] Will you track if SEM increased participation in your other energy efficiency program?

[ASK ALL] Will you screen out those who likely would have done SEM actions in the absence of the program or free-riders, if at all?

Those are all my questions. Thank you for your feedback.

APPENDIX C. PARTICIPANT INTERVIEW GUIDE

C1906 SEM EVALUATION: PROGRAM PARTICIPANT IN-DEPTH INTERVIEW GUIDE

Interview instrument overview

Objective: The goal of this interview is to obtain feedback from participants pertaining to program design, delivery, influence, and barriers to participation. These findings will provide information for the team to provide recommendations for improvement.

Anticipated timing (survey length): 30 minutes

Method of data collection: In-depth interview (IDI)

Question	Instrument Goal
1-4	General information
5-7	Establish program awareness
8-17	Examine program expectations, design, satisfaction, and administration and delivery processes to identify program improvements
18-2017	Request to share tracked data
21-25	Identify barriers to participation, energy savings, and how to overcome them
26-28	Determine program influence
29	Closing

![DNV logo]

Input prior to calling

Interview Information

Interviewer	
Interview Completion Date	

Contact Information

Interviewee Name	
Phone	
Email	

Call Tracking

Date/Time	Notes

Introduction

[INTERVIEWER NOTE: THE QUESTIONS IN THIS INTERVIEW GUIDE SHOULD NOT NECESSARILY BE READ VERBATIM BUT MAY BE MODIFIED TO SUIT THE INTERVIEW]

Thank you for taking the time to talk to us about the Connecticut Strategic Energy Management program, which I'll refer to as the SEM program. We would like to learn about your experience in the program, and any barriers to your participation experience. We also will use your feedback to enhance and improve program opportunities for you and future program participants.

It would help me if I could record this interview for my note-taking purposes. Do I have your permission?

Background

1. What is your role and what are your responsibilities with your company?

2. What types of energy efficiency projects does your company focus on?

3. How are you involved with the SEM program at your company?

4. What stage of SEM participation are you at?

    a. Apply for program

    b. Signed contract

    c. Identified savings opportunities

    d. Established baseline

e. Implementing actions

f. Monitoring/measuring savings now that actions are implemented

g. Received incentive(s)

Program awareness

5. How did you first hear about the SEM program? [PROBE: account executive recruiter, energy efficiency consultant recruiter, webinar, flyer, personal Powerpoint presentation]

6. Why was your company interested in participating in the SEM program? [PROBE: What was the most attractive feature of the program that enticed you to participate?]

7. What person or group of people at your organization was the most influential in deciding to participate in the SEM program? [PROBE: please ask for a role or position type.]

Program expectations, satisfaction, and experience

8. Based on the information you received about the program, how well did the SEM program meet your expectations? Please answer on a scale from 0-10, where 0 is completely unmet expectations and 10 is completely met expectations.

    a. [If rating of less than 7 is given, please ask for explanation as well as what would have resolved their dissatisfaction]

9. Similarly, on a scale of 0-10, where 0 is completely dissatisfied, 5 is neither satisfied or dissatisfied, and 10 is completely satisfied, how satisfied were you with the following elements of the program:

    a. Program application process

        i. [If rating of less than 7 is given, please ask for explanation as well as what would have resolved their dissatisfaction]

    b. Interactions with program representative(s)

        i. [If rating of less than 7 is given, please ask for explanation as well as what would have resolved their dissatisfaction]

    c. Incentive amount and turnaround time for distribution

        i. [If rating of less than 7 is given, please ask for explanation as well as what would have resolved their dissatisfaction]

    d. Instructions on what type of data to provide so program can assess savings for actions they did

        i. [If rating of less than 7 is given, please ask for explanation as well as what would have resolved their dissatisfaction]

10. Please tell me whether these interactions were highly effective, somewhat effective, or not at all effective in helping you identify actions that will result in energy savings:

    a. Initial walkthrough with program representative

i. [FOLLOW-UP] What additional type of information, if any, would have been useful during this stage to improve your experience?

b. Virtual workshops

i. [FOLLOW-UP] What additional type of information, if any, would have been useful during this stage to improve your experience?

c. In-person workshops

i. [FOLLOW UP] What additional type of information, if any, would have been useful during this stage to improve your experience?

11. Now tell me how did you prioritize which energy efficiency actions and/or equipment upgrades to complete first? [PROBE: decision-making criteria, factors considered outside of energy efficiency]

12. What type of upgrades or actions did you implement to date?

13. What upgrades or actions have you decided not to implement?

a. [ASK FOR EACH UPGRADE/ACTION NOT IMPLEMENTED] Why did you not implement this upgrade or undergo this action?

14. What benefits did you observe after the upgrades and/or actions you mentioned were completed?

15. What support did the program representative(s) provide you with to help you achieve expected performance targets based on the actions you selected to do? [PROBE: portfolio manager training, behavioral training for employees, energy efficiency 101 webinars, ISO 5001 ready, technical training]

16. [ASK IF RESPONDENT NAMED EQUIPMENT UPGRADES IN Q12] You noted previously implementing capital equipment upgrades. For which of those upgrades did you receive an incentive for from other energy efficiency programs?

17. [ASK IF PARTICIPANT WAS PART OF A COHORT] Are you getting any particular benefit out of moving through the process as part of a cohort with other peers, as opposed to just getting one-to-one advice from the utility? [PROBE: is the cohort format the best way to obtain technical evidence on how to operate more efficiently, or is a different format preferable]

Data tracking and sharing

18. As part of participating in the SEM program, can you share with me the data you are tracking and sharing with the SEM Utility program staff?

a. [IF NOT MENTIONED, ASK:] Are you tracking:

i. Energy efficiency actions and/or capital equipment upgrades? [*If needed: do you have log of those actions?*]

ii. Planned or unplanned shutdowns of the facility?

iii. Changes in product lines?

iv. Non-routine events like equipment failures or COVID-19 impacts on occupancy or operations?

v. Energy consumption data?

19. What data was the most difficult to obtain and share with SEM program representatives?

    a. Why did you experience these difficulties?

20. While participating in the SEM program, did you experience any of these non-routine events?

    a. Unexpected shutoffs *(Ask interviewee to elaborate on experience)*

    b. Equipment failing *(Ask interviewee to elaborate on experience)*

    c. Impacts from COVID-19 on production schedules or occupancy [PROBE: for the impact – increased/decreased production, increased/decreased occupancy, other?] *(Ask interviewee to elaborate on experience)*

    d. Changes in product lines that did not receive an incentive from energy efficiency programs other than SEM *(Ask interviewee to elaborate on experience)*

Barriers and program opportunities

21. What challenges did you encounter when establishing the baseline consumption?

    a. [PROBE: baseline model not projecting savings reasonably, non-routine events that impacted baseline, replacement of regression approach with engineering approach, challenges with data availability and/or quality, lacking sufficient energy analysis at the beginning of engagement]

22. What suggestions do you have to improve these issues?

23. In terms of your overall experience, what have been the top three program participation challenges?

    b. [PROBE: challenges with program support, issues with performance period models, non-routine events (unexpected shutoffs, setbacks, impacts from COVID-19 on production schedules, non-SEM related capital projects), expected savings not observed]

24. I know we discussed a little bit about COVID-19 impacts previously, how else did the COVID-19 pandemic impact your company's participation in the SEM program? [PROBE: Did you increase ventilation or change other equipment settings? Did COVID-19 introduce business uncertainty that impacted your decision to participate in SEM?]

25. What has been your favorite aspect of the program?

Program influence

26. On a scale of 0-10, where 0 is completely uninfluential, 5 is neither uninfluential or influential, and 10 is completely influential, how influential was the program in helping you improve the efficiency of your building systems?

27. On a scale of 0-10, where 0 is completely uninfluential, 5 is neither uninfluential or influential, and 10 is completely influential, how influential was the program in helping you improve building operations and maintenance?

28. Before you heard of the SEM program, which of the actions, if any, were you planning to implement?

    a. [ASK FOLLOW-UP QUESTION FOR EACH ACTION THAT WAS PLANNED TO BE IMPLEMENTED PRIOR TO HEARING ABOUT THE SEM PROGRAM] At what time do you think those actions would have been implemented?

Program improvements

29. Do you have any other comments or suggestions to help improve this program?

APPENDIX D. PARTIAL PARTICIPANT INTERVIEW GUIDE

C1906 SEM EVALUATION: PARTIAL PARTICIPANT IN-DEPTH INTERVIEW GUIDE

Interview instrument overview

Objective: The goal of this interview is to obtain feedback from partial participants (those that applied for the program and/or started participating in the program but dropped out) pertaining to program design and barriers to participation. These findings will provide information for the survey team to provide recommendations on how to overcome barriers and potential future research topics.

Anticipated timing (survey length): 30 minutes

Method of data collection: in-depth interview (IDI)

Question	Instrument Goal
1-**4**	General information
5-**7**	Establish program awareness
8-**17**	Examine program expectations, design, satisfaction, and administration and delivery processes to identify program improvements
18-**20**	Request to share tracked data
21-**27**	Identify barriers to participation, energy savings, and how to overcome them
26-**28**	Determine program influence
31	Closing

Input Prior to Calling

Interview Information

Interviewer	
Interview Completion Date	

Contact Information

Interviewee Name	
Phone	
Email	

Call Tracking

Date/Time	Notes

Introduction

[INTERVIEWER NOTE: THE QUESTIONS IN THIS INTERVIEW GUIDE SHOULD NOT NECESSARILY BE READ VERBATIM BUT MAY BE MODIFIED TO SUIT THE INTERVIEW]

Thank you for taking the time to talk to us about the Connecticut Strategic Energy Management program, which I'll refer to as the SEM program. We would like to learn about any barriers to your participation in the program or simply your application process. We want to get your feedback to enhance and improve program opportunities.

It would help me if I could record this interview for my note-taking purposes. Do I have your permission?

Background

1. What is your role and what are your responsibilities with your company?

2. What types of energy efficiency projects does your company focus on?

3. How are you involved with the SEM program at your company?

4. What stage of SEM participation did you last complete?

    a. Apply for program

    b. Signed contract

    c. Identified savings opportunities

    d. Established baseline

    e. Implementing actions

f. Monitoring/measuring savings now that actions are implemented

g. Received incentive(s)

Program awareness

5. How did you first hear about the SEM program? [PROBE: account executive recruiter, energy efficiency consultant recruiter, webinar, flyer, personal Powerpoint presentation]

6. Why was your company interested in participating in the SEM program? [PROBE: What was the most attractive feature of the program that enticed you to apply/begin participation?]

7. What person or group of people at your organization was the most influential in deciding to participate in the SEM program? [PROBE: please ask for a role or position type.]

Program expectations, satisfaction, and experience (ask to those who participated, but then dropped out)

8. Based on the information you received about the program, how well did the SEM program meet your expectations? Please answer on a scale from 0-10, where 0 is completely unmet expectations and 10 is completely met expectations.

    a. [If rating of less than 7 is given, please ask for explanation as well as what would have resolved their dissatisfaction]

9. Similarly, on a scale of 0-10, where 0 is completely dissatisfied and 10 is completely satisfied, how satisfied were you with the following elements of the program:

    a. Program application process

        i. [If rating of less than 7 is given, please ask for explanation as well as what would have resolved their dissatisfaction]

    b. Interactions with program representative(s)

        i. [If rating of less than 7 is given, please ask for explanation as well as what would have resolved their dissatisfaction]

    c. [ASK ONLY IF ORGANIZATION RECEIVED AN INCENTIVE BEFORE DROPPING OUT] Incentive amount and turnaround

        i. [If rating of less than 7 is given, please ask for explanation as well as what would have resolved their dissatisfaction]

    d. Instructions on what type of data to provide so program can assess savings for actions they did

        i. [If rating of less than 7 is given, please ask for explanation as well as what would have resolved their dissatisfaction]

10. Please tell me whether these interactions were highly effective, somewhat effective, or not at all effective in helping you identify actions that will result in energy savings:

a. [ASK IF ORGANIZATION PERFORMED INITIAL WALKTHROUGH BEFORE DROPPING OUT] Initial walkthrough with program representative

    i. [FOLLOW-UP] What additional type of information, if any, would have been useful during this stage to improve your experience?

b. [ASK IF ORGANIZATION PARTICIPATED IN WORKSHOPS BEFORE DROPPING OUT] Virtual workshops

    i. [FOLLOW-UP] What additional type of information, if any, would have been useful during this stage to improve your experience?

c. [ASK IF ORGANIZATION PARTICIPATED IN WORKSHOPS BEFORE DROPPING OUT] In-person workshops

    i. [FOLLOW-UP] What additional type of information, if any, would have been useful during this stage to improve your experience?

11. [ASK ONLY IF ORGANIZATION STARTED IMPLEMENTING ACTIONS BEFORE DROPPING OUT] Now tell me how did you prioritize which energy efficiency actions and/or equipment upgrades to complete first while participating in the program? [PROBE: decision-making criteria, factors considered outside of energy efficiency]

12. [ASK ONLY IF ORGANIZATION STARTED IMPLEMENTING ACTIONS BEFORE DROPPING OUT] What type of upgrades or actions did you implement before discontinuing participation in the program?

13. [ASK ONLY IF ORGANIZATION STARTED IMPLEMENTING ACTIONS BEFORE DROPPING OUT] What upgrades or actions did you decide not to implement before discontinuing participation in the program?

a. [ASK FOR EACH UPGRADE/ACTION NOT IMPLEMENTED] Why did you not implement this upgrade or undergo this action?

14. [ASK ONLY IF ORGANIZATION STARTED IMPLEMENTING ACTIONS BEFORE DROPPING OUT] What benefits did you observe after the upgrades and/or actions you mentioned were completed?

15. [ASK ONLY IF ORGANIZATION STARTED IMPLEMENTING ACTIONS BEFORE DROPPING OUT] What support did the program representative(s) provide you with to help you achieve expected performance targets based on the actions you selected to do? [PROBE: portfolio manager training, behavioral training for employees, energy efficiency 101 webinars, ISO 5001 ready, technical training]

16. [ASK IF RESPONDENT NAMED EQUIPMENT UPGRADES IN Q12] You noted previously implementing capital equipment upgrades. For which of those upgrades did you receive an incentive for from other energy efficiency programs?

17. [ASK IF PARTICIPANT WAS PART OF A COHORT] Did you get any particular benefit out of moving through the process as part of a cohort with other peers, as opposed to just getting one-to-one advice from the utility? [PROBE: is the cohort format the best way to obtain technical evidence on how to operate more efficiently, or is a different format preferable]

Data tracking and sharing (ask to those who participated, but then dropped out)

18. [ASK ONLY IF ORGANIZATION STARTED ESTABLISHING BASELINE BEFORE DROPPING OUT] As part of participating in the SEM program, can you share with me the data you began tracking and sharing with the SEM Utility program staff?

a. [IF NOT MENTIONED, ASK:] Did you track:

      i.   Energy efficiency actions and/or capital equipment upgrades? [*If needed: did you have a log of those actions?*]

      ii.   Planned or unplanned shutdowns of the facility?

      iii.   Changes in product lines?

      iv.   Non-routine events like equipment failures or COVID-19 impacts on occupancy or operations?

      v.   Energy consumption data?

19.   [ASK ONLY IF ORGANIZATION STARTED ESTABLISHING BASELINE BEFORE DROPPING OUT] What data was the most difficult to obtain and share with SEM program representatives?

      a.   Why did you experience these difficulties?

20.   [ASK ONLY IF ORGANIZATION STARTED ESTABLISHING BASELINE BEFORE DROPPING OUT] While participating in the SEM program, did you experience any of these non-routine events?

      a.   Unexpected shutoffs *(Ask interviewee to elaborate on experience)*

      b.   Equipment failing *(Ask interviewee to elaborate on experience)*

      c.   Impacts from COVID-19 on production schedules or occupancy [PROBE for the impact – increased/decreased production, increased/decreased occupancy, other?] *(Ask interviewee to elaborate on experience)*

      d.   Changes in product lines that did not receive an incentive from energy efficiency programs other than SEM *(Ask interviewee to elaborate on experience)*

Barriers and program opportunities

21.   In terms of your overall experience, what were the top three program participation challenges? [PROBE: challenges with program support, issues with performance period models, non-routine events (unexpected shutoffs, setbacks, impacts from COVID-19 on production schedules, non-SEM related capital projects), expected savings not observed]

      a.   [IF MULTIPLE REASONS ARE PROVIDED] What was the biggest barrier or challenge you encountered?

22.   [ASK ONLY IF ORGANIZATION ESTABLISHED BASELINE BEFORE DROPPING OUT] What challenges did you encounter when establishing the baseline consumption? [PROBE: baseline model not projecting savings reasonably, non-routine events that impacted baseline, replacement of regression approach with engineering approach, challenges with data availability and/or quality, lacking sufficient energy analysis at the beginning of engagement]

      a.   [IF ANY CHALLENGES ARE NAMED] What could have been done by program representatives to alleviate the challenge(s)?

      b.   [IF ANY CHALLENGES ARE NAMED] Do you have any other suggestions as to what could have been done to reduce the challenge(s) you encountered?

23.   How did the COVID-19 pandemic impact your company's participation in the SEM program? [PROBE: uncertainty for business or need for increased ventilation, etc.]

24. [IF CUSTOMER PARTICIPATED BUT DROPPED OUT] What stopped your organization from continuing to participate in the SEM program?

    a. [IF MULTIPLE REASONS ARE PROVIDED] What was the biggest factor in your organization's decision to discontinue program participation?

25. What other services, tools, or education could the program have offered to entice your organization to continue to participate?

    a. [IF MULTIPLE REASONS ARE PROVIDED] What offering would be the most enticing?

26. Does your organization have financial thresholds that would have to be met to participate in a program like SEM?

    a. [IF YES] What are those thresholds?

27. Are there other requirements (non-financial) that would have to be met to participate in a program like SEM? [PROBE: certain number of technical training opportunities provided, certain number of behavioral training provided, etc.]

    a. [IF YES] What are those requirements?

Program influence (ask to those who participated, but then dropped out)

28. [ASK ONLY IF ORGANIZATION STARTED IMPLEMENTING ACTIONS BEFORE DROPPING OUT] On a scale of 0-10, where 0 is completely uninfluential, 5 is neither uninfluential or influential, and 10 is completely influential, how influential was the program in helping you improve the efficiency of your building systems?

29. [ASK ONLY IF ORGANIZATION STARTED IMPLEMENTING ACTIONS BEFORE DROPPING OUT] On a scale of 0-10, where 0 is completely uninfluential, 5 is neither uninfluential or influential, and 10 is completely influential, how influential was the program in helping you improve building operations and maintenance?

30. [ASK ONLY IF ORGANIZATION STARTED IMPLEMENTING ACTIONS BEFORE DROPPING OUT] Before you heard of the SEM program, which of the actions, if any, were you planning to implement?

    a. [PROBE: Ask follow-up question for each action that was planned to be implemented prior to hearing about the SEM program] At what time do you think those actions would have been implemented?

Program improvements

31. What other suggestions do you have on how to improve the program?

C1906 SEM EVALUATION: NONPARTICIPANT IN-DEPTH INTERVIEW GUIDE

Interview Overview

Objective: The goal of this interview is to obtain feedback from nonparticipants pertaining to program design and barriers to participation. These findings will provide information for the survey team to provide recommendations on how to overcome barriers and potential future research topics.

Anticipated timing (survey length): 15 minutes

Method of data collection: in-depth interview (IDI)

Question	Instrument Goal
1-2	General information
5-7	Establish program awareness
7-27	Identify barriers to participation, energy savings, and how to overcome them
11	Closing

Input prior to calling

Interview Information

Interviewer		Interview Length (min)	
Completion Date			

Contact Information

Interviewee Name	
Phone	
Email	

Call Tracking

Date/Time	Notes

Introduction

[INTERVIEWER NOTE: THE QUESTIONS IN THIS INTERVIEW GUIDE SHOULD NOT NECESSARILY BE READ VERBATIM BUT MAY BE MODIFIED TO SUIT THE INTERVIEW]

Thank you for taking the time to talk to us about the Connecticut Strategic Energy Management program. We would like to learn about any barriers to your participation in the program. We want to get your feedback to enhance and improve program opportunities.

I would like to record this interview for my note-taking purposes. Do I have your permission?

Background

1. What is your role and what are your responsibilities with your company?

2. What types of energy efficiency projects does your company focus on?

Program awareness

3. How did you first hear about the SEM program? [PROBE: account executive recruiter, energy efficiency consultant recruiter, webinar, flyer, personal PowerPoint presentation]

4. Why was your company interested in participating in the SEM program? [PROBE: What was the most attractive feature of the program that enticed you to reach out?]

5. What information would have been helpful as you were considering the program offerings? [PROBE: expected savings, examples of the actions/upgrades program participants completed, etc.]

6. What person or group of people at your organization was the most influential in deciding to not participate in the SEM program? [PROBE: please ask for a role or position type.]

Barriers and program opportunities

7. What stopped your organization from participating in the SEM program? [PROBE: concerns about time commitment, concerns about saving money, etc.]

    a. [IF MULTIPLE REASONS ARE PROVIDED] What was the most important reason?]

8. What other services, tools, or education could the program offer to entice your organization to participate?

    a. [IF MULTIPLE REASONS ARE PROVIDED] What offering would be the most enticing?]

9. Does your organization have financial thresholds that would have to be met to participate in a program like SEM?

    b. [IF YES] What are those thresholds?

10. Are there other requirements (non-financial) that would have to be met to participate in a program like SEM? [PROBE: certain number of technical training opportunities provided, certain number of behavioral training provided, etc.]

    b. [IF YES] What are those requirements?

Program improvements

11. What other suggestions do you have on how to increase participation in the program?

About DNV
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