

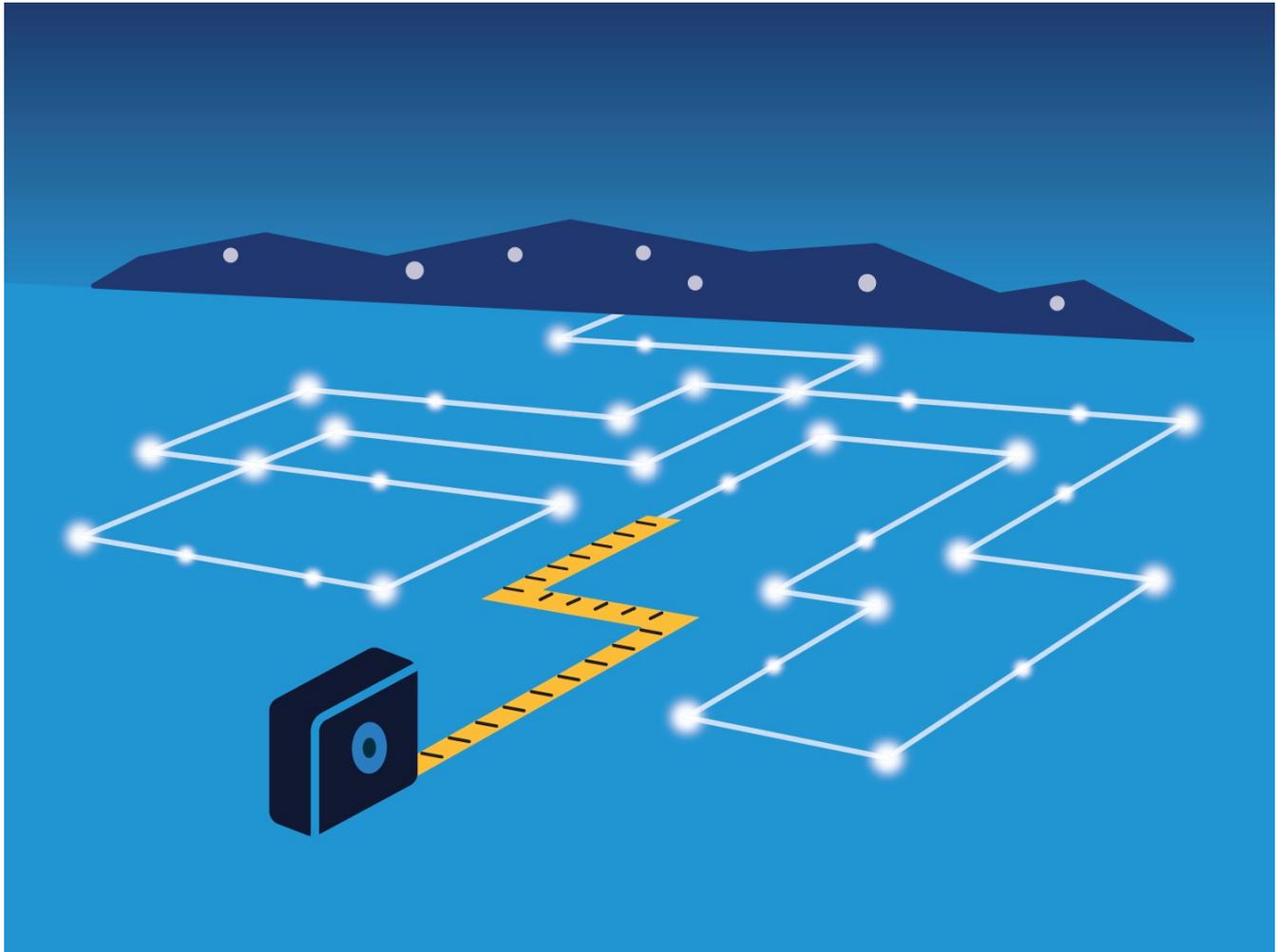


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Energy Trust of Oregon 2017-2018 Production Efficiency Process Evaluation

Final Report

February 21, 2020



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This document finalizes the draft report, submitted July 25, 2019, per comments received by Energy Trust staff.

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1. Executive Summary

Energy Trust of Oregon (Energy Trust) serves industrial and agricultural customers through its Production Efficiency Program. Launched in 2003, Production Efficiency offers customers financial incentives and technical assistance for energy efficiency upgrades through multiple tracks, including:

- Lighting track - Offers incentives for prescriptive and custom lighting projects; offers technical assistance for custom lighting; offers a buy-down on selected lamps purchased from a participating distributor
- Standard/streamlined track - Offers incentives for a set of standard non-lighting measures, both prescriptive measures and measures for which savings are easily calculated by common formulas with a small number of inputs
- Custom track - Offers incentives and technical assistance for custom non-lighting capital projects and operations and maintenance projects (O&M) for which energy savings must be estimated based on project-specific parameters
- Strategic Energy Management track - Offers group and one-on-one coaching to assist firms in actively managing their energy, including establishing goals, responsibility, and accountability, and identifying, planning for, and executing efficiency projects on an ongoing basis.

1.1 Study Objectives and Methods

Opinion Dynamics conducted a process evaluation of Production Efficiency's 2017-2018 program activities and accomplishments. Our research sought to assess:

- Program performance
- Energy management practices among industrial customers
- Program changes, successes, opportunities, and challenges
- Program communication and coordination
- Standard/streamlined measure development
- Reaching underserved markets and customers

From mid-2018 through spring 2019, we interviewed Production Efficiency program staff and Program Delivery Contractors (PDCs) multiple times, interviewed lighting contractors and distributors, and surveyed program participants and nonparticipants. We also reviewed program documents.

1.2 Key Findings and Conclusions

1.2.1 Program Performance

The Production Efficiency program in 2017-2018 served roughly the same number of projects and sites (over 2,000 of each) as served in the preceding two years (2015-2016) and saved roughly the same quantities of electricity and natural gas (over 330 million kWh and over 4.3 million therms). Compared to 2013-2014, the 2017-2018 program served more projects and sites, saved the same amount of electricity, and nearly doubled its natural gas savings. The number of technical analysis studies increased from each of the two prior biennia.

The average electricity and natural gas savings per project in 2017-2018 were comparable to those of 2015-2016; compared with 2013-2014, electricity savings per project decreased and natural gas per project savings increased.

1.2.2 SEM – Customer Practices

SEM participants undertake about one more Production Efficiency capital project (that is, a non-SEM project with claimed energy savings, which includes upgrades and O&M) than non-SEM participants (roughly a 70% increase in average number of projects). Further, average project size in terms of electricity savings is higher for SEM than non-SEM participants (roughly a 42% increase in electricity savings).

We infer from survey findings that the SEM track is effective in increasing the uptake of energy management practices among participants and has not had a discernable effect on non-SEM program participants and program nonparticipants. SEM participants engage in six energy management behaviors investigated by the study more frequently than other customers, as consistent with SEM activities. Custom track participants were next most likely to report these energy management behaviors, followed by nonparticipants aware of Energy Trust.

1.2.3 Program Changes, Successes, Opportunities, Challenges

The Production Efficiency program staff practices adaptive management and the program is continually evolving.

Energy Trust program staff streamlined first-year SEM, launched continuous SEM, are investigating further modifications to first-year SEM to make delivery to smaller and rural customers feasible and cost-effective, and are deliberating ways to streamline continuous SEM. Interviewees expressed the view that these changes are effective and agree with the need for the change efforts that are underway.

In 2018, Energy Trust restructured the PDC role, making custom PDCs responsible for SEM engagements and technical analysis studies (accompanied by a re-bid of the custom PDC contracts), all PDCs responsible for processing project applications and reporting, and two PDCs responsible for developing standard/streamlined measures. Energy Trust improved its program databases and data access methods to facilitate these changes. Custom PDCs identified many benefits associated with the changes in their role, including improved customer service, quality control, cost control, and savings accountability.

Energy Trust developed a streamlined technical analysis study (TAS) process for smaller projects whose savings do not warrant the expense of a standard TAS. Contacts report this tool works well and hope to see its use expanded to somewhat larger projects, assuming the current application is proven to yield reasonably reliable results.

The lighting buy-down has had less uptake than anticipated. Both the lighting PDC contacts and lighting distributors noted the sales documentation requirements are burdensome and that the discounted lamp types are not a good match for the existing industrial lighting market structure (that is, the respective roles of distributors and contractors and their existing relationships with customers). Nonetheless, the lighting track broadly (not restricted to the lighting buy-down) generated nearly 40% more electricity savings in 2017-2018 compared with 2015-2016, and nearly 80% more savings than in 2013-2014.

The program was not successful in its first attempt to develop and launch a scoping tool. Program staff are investigating possible next steps, including a second attempt at a scoping tool.

All interviewed/surveyed groups – program staff and PDCs, lighting distributors and contractors, and participating and nonparticipating customers – reported they believe opportunities remain to improve the energy efficiency of the industrial sector.

The greatest challenge facing the program is not new, and both program staff and PDCs are acutely attuned to this challenge: maintaining program savings while cost-effectively expanding its reach to historically underserved customers. Facets of this challenge include the cost to conduct marketing and project development visits with geographically dispersed customers, the cost of specifying custom projects (which for small/medium businesses are large compared to project savings), and a customer base that has not fully recovered from the Great Recession, lacking both funds and staff to engage in energy efficiency.

Program and PDC staff are addressing this challenge on a number of fronts: increasing the standard/streamlined offerings, offering a lighting buy-down, evolving SEM to cost-effectively serve such customers, conducting cost-effective technical analysis studies of smaller savings opportunities, and improving project scoping.

One of the SEM methodologies used by the study suggests an opportunity to improve the electricity usage data in the UCI database. A program staff person reviewing the draft report noted that the distribution of annual kWh usage among SEM and control sites skewed low.

1.2.4 Program Communication and Coordination

Interviewees thought that program marketing and outreach is effective, and 90% of surveyed nonparticipants reported they had heard of Energy Trust prior to the survey (although this finding is likely inflated due to respondent self-selection bias – that is, respondents familiar with Energy Trust took the survey).

Interviewees were pleased with program communication and coordination. PDC contacts described Energy Trust program staff as accessible and responsive.

Interviewees agreed that changes to the PDC roles have substantially improved program communication and coordination.

1.2.5 Measure Development

This study does not support conclusions regarding measure development process effectiveness. Most of the program staff and PDC contacts we interviewed could not speak directly to this topic. The few contacts that were knowledgeable about measure development did not elaborate on the brief responses they offered to our questions related to measure development.

1.2.6 Reaching Underserved Markets and Customers

In 2018, Energy Trust launched its Diversity, Equity, and Inclusion initiative, which all PDCs reported awareness of and commitment to. The PDCs are actively seeking to serve customers historically underserved by Production Efficiency, but report ongoing challenges with serving them cost-effectively, as program staff are aware.

Much of program staff's efforts to evolve the program are directed to reaching historically underserved customers.

1.3 Recommendations

The evaluation team offers these recommendations for Energy Trust’s consideration regarding the Production Efficiency program, which study findings suggest is working well and is poised to continue to work well.

1.3.1 Participation by Rural Small and Medium Businesses

- Consider ways to “think outside the box” of the *constraints* limiting participation by rural small and medium businesses.
 - Consider whether economic development funds or other non-Energy Trust funds might be coupled with Production Efficiency offerings to defray the costs of serving these customers.
 - Consider developing with marketing funds case studies of targeted customers that have common equipment types or processes; provide Production Efficiency services as part of the cost of conducting the case studies.
 - Consider developing comparative case studies of similar efficiency upgrades conducted for rural and urban customers where the case studies document the full delivery cycle from initial contact through incentive delivery; use these case studies to inform Energy Trust regulatory and legislative stakeholders of the differential costs to serve rural customers and to appeal for a solution to the cost-effectiveness quandary Energy Trust faces in serving rural customers.

1.3.2 Past Lighting and Standard/Streamlined Participants

- Conduct outreach to customers participating solely in lighting and/or standard/streamlined projects to promote Production Efficiency’s additional offerings.

1.3.3 SEM Participant Support

- Offer workshops or other events a few times a year where attendees can interact with other SEM participants to discuss energy management practices.

1.3.4 Lighting Buy-Down

- Simplify the application requirements and processes for the lighting buy-down to address distributor concerns about the amount and redundancy of customer paperwork and a need for distributor staff training on proper invoicing and documentation.
- Improve communication with and training of lighting buy-down distributors.
- Conduct a deeper exploration of the existing market structure to better understand the industrial market potential of the buy-down. Interviewed distributors and contractors suggested barriers that limit the appeal of the buy-down, including a market characterized between long-term relationships between industrial customers and lighting contractors who provide turnkey solutions, and perceptions by contractors that the buy-down offering reduces their opportunities to get the installation work, make profits on mark-ups, and encourage customers to pursue more comprehensive lighting upgrades.

1.3.5 Measure Development

- Assess the PDC's measure development processes and outcomes. This study was not able to adequately address this research question given that most of the program staff and PDC contacts we interviewed could not speak directly to this topic and given limited responsiveness of knowledgeable PDC contacts.

1.3.6 SEM Database Refinement

Compare customers' annual electricity usage in the UCI database with their usage as gathered through SEM, which is judged to be comprehensive. Investigate the extent the UCI database omits some of these SEM customers' meters.

Memo

To: Board of Directors

From: Erika Kociolek, Evaluation Sr. Project Manager
Amanda Potter, Industry and Agriculture Sector Lead

Date: August 21, 2020

Re: Staff Response to 2017-2018 Production Efficiency Process Evaluation

The 2017-2018 Production Efficiency process evaluation, conducted by Opinion Dynamics, demonstrates that while the program is mature and well-established in the market, it has evolved and continues to evolve to serve existing and new customers. The program has worked to streamline its first-year strategic energy management (SEM) offering, develop a continuous SEM offering for graduates of first-year SEM, and streamline the technical analysis study (TAS) process for smaller, less-complex projects. The program has also restructured the role of the custom program delivery contractors (PDCs) by shifting responsibility of delivering of SEM and technical analysis studies, and processing project applications. These changes were made to improve customer service and reduce costs while seeking to cost-effectively reach and serve historically underserved customers; they have been well-received by Energy Trust program staff as well as staff at the PDCs.

Analysis performed as part of this process evaluation showed that SEM provides benefits beyond the O&M and behavioral savings achieved as part of SEM – namely, boosting participation in other program offerings. SEM sites completed one additional capital project compared to sites not enrolled in SEM, and SEM sites achieved about 159,000 kWh more in savings than sites not enrolled in SEM. These are tangible benefits that should be considered when assessing SEM delivery costs.

Overall, the evaluator found the program is working well, and is poised to continue work well in the future. The evaluator's recommendations focused on participation among rural small and medium businesses, the program's lighting buy-down, and measure development, as described below:

- The evaluator recommended the program understand what constraints are limiting participation among rural small and medium businesses, and suggested considering co-funding opportunities and developing case studies to document and demonstrate to stakeholders the challenges with cost-effectively serving rural small and medium businesses. In 2020, the program launched a lighting direct-install offering for Eastern and Southern Oregon small businesses, and is continuing to focus on serving rural small and medium businesses.
- The program's lighting buy-down saw less uptake than originally anticipated, due to site documentation requirements that were viewed as burdensome by the lighting PDC and lighting distributors, as well as discounted lamp types that are not a good match for the existing structure of the industrial lighting market. The evaluator recommended simplifying the documentation requirements and conducting targeted market research to better understand the market potential of the lighting buy-down. Starting in 2021, the program will transition away from the lighting buy-down and adopt a midstream model that eliminates site documentation requirements.

- The evaluator noted the process evaluation did not adequately answer research questions related to measure development and recommended assessing the measure development process through a separate study. At this time, there are no immediate plans to assess the measure development process given recent and major changes to roles and responsibilities related to the measure development process.

2. Introduction

This report provides the findings of a process evaluation of Energy Trust of Oregon's Production Efficiency Program 2017-2018 program activities and accomplishments. Opinion Dynamics conducted the study in 2018-2019.

Energy Trust launched the Production Efficiency program in 2003 and practices adaptive management, continually evolving the program in response to market conditions and lessons learned. Unlike other Energy Trust programs, Production Efficiency is designed and managed by Energy Trust staff, with assistance from and implementation by program delivery contractors (PDCs).

The program offers industrial and agricultural customers (referred to in this report as simply industrial customers) financial incentives and technical assistance for energy efficiency upgrades through multiple tracks, described below:

- Lighting track
 - Offers incentives for prescriptive and custom lighting projects; offers technical assistance for custom lighting; offers a buy-down on selected lamps purchased from a participating distributor
 - Delivered throughout Energy Trust's service territory by a single PDC that also supports lighting measures for Energy Trust's New Buildings, Existing Buildings, and Existing Multifamily programs
- Standard/streamlined track
 - Offers incentives for a set of standard non-lighting measures, both prescriptive measures and measures for which savings are easily calculated by common formulas with a small number of inputs¹
 - Developed and managed by a single PDC that recruits trade allies and provides them with calculated savings tools and a simplified incentive process
- Custom track
 - Offers incentives and technical assistance for custom non-lighting capital projects and O&M for which energy savings must be estimated based on project-specific parameters
 - Must be preceded by a technical analysis study (TAS), which quantifies the opportunity and establishes its cost-effectiveness
 - Delivered by three geographically-based PDCs, which act as long-term energy efficiency account managers (Appendix A provides a map of the custom PDC territories)
- Strategic Energy Management track
 - Offers group and one-on-one coaching to assist firms in actively managing their energy, including establishing goals, responsibility, and accountability, and identifying, planning for, and executing efficiency projects on an on-going basis
 - Prior to 2019, delivered by a pool of SEM coaches; starting in 2019, delivered by each of the three custom PDCs

¹ Includes projects categorized as Green Rewind (motor rewinds) and Small Industrial.

2.1 Evaluation Objectives

This study documents recent (2017-2018) and planned (2019-2020) program changes and obtains feedback on current program structure, design and implementation that can be used to enhance program implementation (Table 1).

Table 1. Evaluation Objectives and Sources

Research Topics	Research Questions	Sources	Report Section
Program performance	<ul style="list-style-type: none"> ▪ Annual savings ▪ Participation rates 	<ul style="list-style-type: none"> ▪ Program tracking data 	Chapter 3
Strategic Energy Management	<ul style="list-style-type: none"> ▪ Current customer practices ▪ Impact of SEM on participating and nonparticipating sites 	<ul style="list-style-type: none"> ▪ Program tracking data ▪ Participant and nonparticipant surveys 	Chapters 4 and 7
Program changes	<ul style="list-style-type: none"> ▪ Recent changes and impacts ▪ Planned changes 	<ul style="list-style-type: none"> ▪ Interviews with Energy Trust program staff and PDCs 	Chapter 5
Program successes, opportunities, challenges	<ul style="list-style-type: none"> ▪ Successes and challenges ▪ Opportunities for deeper savings 	<ul style="list-style-type: none"> ▪ Interviews with Energy Trust program staff and PDCs 	Chapters 5, 6, and 7
Communication and coordination	<ul style="list-style-type: none"> ▪ Coordination effectiveness ▪ Opportunities for improvement 	<ul style="list-style-type: none"> ▪ Interviews with Energy Trust program staff and PDCs 	Chapter 5
Measure development	<ul style="list-style-type: none"> ▪ Measure development process effectiveness 	<ul style="list-style-type: none"> ▪ Interviews with Energy Trust program staff and PDCs 	Chapter 5
Reaching underserved markets and customers, including small- and medium-sized customers	<ul style="list-style-type: none"> ▪ Program definition of “underserved” ▪ Efforts taken and learnings; opportunities to cost-effectively serve 	<ul style="list-style-type: none"> ▪ Interviews with Energy Trust program staff and PDCs 	Chapter 5

2.2 Methods

Table 2 describes our data collection approach. Sample sizes are numbers of unique individuals. We conducted multiple waves of interviews with Production Efficiency and custom PDC staff, interviewing some individuals twice.

Table 2. Summary of Data Collection Approaches

Target Groups	Method	Sample
Production Efficiency Staff	Phone in-depth interviews	7
Lighting PDC Staff ^a	Phone in-depth interviews	2
Custom PDC Staff ^a	Phone in-depth interviews	5
Lighting Contractors	Phone interview	6
Lighting Distributors	Phone interview	3
Program Participants	Phone and web surveys	64
Program Nonparticipants	Phone and web surveys	31

^a Lighting – a single firm. Custom – four firms – the three custom PDC firms selected to work with the program starting in 2019 as part of the custom PDC re-bid, and a custom PDC firm that worked with the program prior to 2019.

We also reviewed documents related to the Production Efficiency program. We obtained the information reported and assessed in Section 3, Program Accomplishments, from Energy Trust evaluation staff, in an Excel file entitled *PE Program Charts_Updated to Include 2018.xlsx*.

Appendix C, Appendix D, and Appendix E provide additional methodological detail.

3. Summary of Program Accomplishments

3.1 Summary

Production Efficiency conducted 2,750 projects at more than 2,000 industrial sites that saved a total of 332.9 million kWh and 4.3 million therms in program years 2017-2018. Electricity savings were roughly equivalent in each of the years, whereas natural gas savings increased from 2017 quantities by more than half in 2018. The program also conducted 549 technical analysis studies in the two years.

3.2 Number of Projects and Participant Sites

The Production Efficiency program averaged about 1,375 projects a year during the evaluation period, with a slight decline (about 14%) in number of projects from 2017 to 2018 (Table 3). Given the small numbers of custom O&M and SEM projects, small variations in counts from one year to the next appear relatively large. With that caveat, we note that custom O&M projects declined by nearly one-third (28%) from 2017 to 2018 while SEM projects increased by just under a third (30%).

Table 3. Number of Production Efficiency Projects, by Year and Program Track

Program Track	2017	2018
Streamlined Industrial	681	608
Lighting	578	480
Custom Capital	144	116
Custom O&M	46	33
SEM	27	35
Mega-projects ^a	1	1
Total	1,477	1,273

Note that if a project had measures spanning multiple years, that project will be counted multiple times.

^a Mega-projects are very large custom capital projects and are shown separately; the custom capital data exclude mega-projects.

The distribution across program tracks varied little across the two years, with streamlined industrial projects comprising nearly half (47%) of program projects, lighting projects comprising over one-third (39%), and custom capital projects comprising 9% (Table 4). Custom O&M and SEM projects were roughly equal in numbers, at around 3%.

Table 4. Distribution of Production Efficiency Projects, within Year by Program Track

Program Track	2017	2018
Streamlined Industrial	46%	48%
Lighting	39%	38%
Custom Capital	10%	9%
Custom O&M	3%	3%
SEM	2%	3%
Mega-projects	0%	0%
Total	100%	100%

More than 90% of projects had electricity-savings only; about 5% had natural gas savings only, and about 2% of projects reduced both electricity and natural gas consumption (Table 5). Excluding lighting projects and the two mega-projects, the program tracks had between about 10% and 15% of projects with natural gas savings.

Table 5. Distribution of Production Efficiency Projects within Program Track, by Project Type and Year

Program Track	2017			2018		
	Electric-Only	Gas-Only	Dual-Fuel	Electric-Only	Gas-Only	Dual-Fuel
Streamlined Industrial	91%	6%	2%	89%	10%	1%
Lighting	100%	0%	0%	100%	0%	0%
Custom Capital	83%	11%	6%	87%	9%	4%
Custom O&M	91%	4%	4%	94%	3%	3%
SEM	89%	0%	11%	86%	0%	14%
Mega-projects	100%	0%	0%	100%	0%	0%
Total	94%	4%	2%	93%	5%	2%

Production Efficiency conducted an average of 275 technical analysis studies each year (Table 6).

Table 6. Number of Studies, by Year and Program Track

	2017	2018
Number of studies	248	301

The program upgraded equipment or supported O&M and SEM at an average of about unique 1,000 sites² a year during the evaluation period, with a slight decline (about 10%) in number of sites from 2017 to 2018 (Table 7). Similar to total projects overall, number of sites with custom O&M projects declined (by about one-quarter, 24%) from 2017 to 2018, however SEM projects increased (by about one-quarter, 26%), but these relatively large swings may simply be an artifact of the comparatively small denominators (41 and 54 sites in 2017) against which change is assessed and not indicative of future trends.

Table 7. Number of Participant Sites, by Year and Program Track

Program Track	2017	2018
Streamlined Industrial	600	504
Lighting	427	380
Custom Capital	113	102
Custom O&M	41	31
SEM	54	67
Mega-projects	1	1
Total ^a	1,081	952

^a Total is less than the sum of the rows because a site may have participated in multiple program tracks.

The distribution of participant sites (Table 8) is similar to that of projects (Table 3), as we would expect given the approximate correspondence of projects with sites.

² A site may complete multiple projects.

Table 8. Distribution of Participant Sites, within Year by Program Track

Group	2017	2018
Streamlined Industrial	50%	48%
Lighting	35%	36%
Custom Capital	9%	10%
Custom O&M	3%	3%
SEM	2%	3%
Mega-projects	0%	0%
Total	100%	100%

3.3 Production Efficiency Energy Savings

The Production Efficiency program averaged about 166 million kWh (or about 166,500 MWh) each year, with 2018 electricity savings running about 94% of 2017 savings (Table 9). The relative shortfall in 2018 can be considered as owing entirely to the 2018 mega-project generating less than half the savings as its predecessor. Omitting mega-projects from the calculations, 2018 savings rose 11% from the 2017 value (~145 MWh 2018 versus ~131 MWh 2017, sum of project tracks exclusive of mega-projects). Although the 2018 electricity savings for custom O&M and SEM are collectively about 80% of the 2017 savings for these tracks, lighting savings rose 30%, and savings from standardized industrial and custom capital also rose.

Table 9. Electricity (kWh) Savings, by Year and Program Track

Group	2017	2018
Streamlined Industrial	15,730,426	18,653,709
Lighting	47,222,209	61,330,526
Custom Capital	41,003,212	43,277,676
Custom O&M	10,882,643	7,544,950
SEM	15,914,055	13,712,221
Mega-projects	40,495,427	17,215,856
Total	171,247,971	161,734,938

Electricity savings for mega-projects fell from about one-quarter (24%) of 2017 savings to about one-tenth (11%) of 2018 savings (Table 10). Lighting as a share of annual savings exclusive of mega-projects rose to 42% (2018) from 36% (2017); share of other program tracks changed little from 2017 to 2018 (again, excluding mega-projects from the program total).

Table 10. Distribution of Electricity (kWh) Savings, within Year by Program Track

Track	2017	2018
Streamlined Industrial	9%	12%
Lighting	28%	38%
Custom Capital	24%	27%
Custom O&M	6%	5%
SEM	9%	8%
Mega-projects	24%	11%
Total	100%	100%

Natural gas savings increased substantially from 2017 to 2018, increasing by more than half (55%; Table 11). Savings averaged over two million (~2.2 million) therms for the two years. SEM natural gas savings increased more than 16-fold (1642%), and standardized industrial and custom O&M therm savings each increased more than four-fold (~450%). Natural gas savings for the custom capital track declined slightly (2018 therms were 87% of 2017 therms).

Table 11. Natural Gas (Therm) Savings, by Year and Program Track

Group	2017	2018
Streamlined Industrial	219,418	998,662
Lighting	0	0
Custom Capital	1,408,921	1,230,131
Custom O&M	58,939	263,126
SEM	8,685	142,613
Mega-projects	0	0
Total	1,695,963	2,634,532

The distribution of natural gas savings by program track clearly shows the program diversified its acquisition of natural gas savings (Table 12). Custom capital projects, which comprised the bulk of 2017 natural gas savings (83%), comprised less than half (47%) of natural gas savings in 2018. Streamlined industrial savings, which were just over one-tenth (13%) of program total in 2017, climbed to over one-third (38%) in 2018. Natural gas savings from custom O&M and SEM projects increased in share of total by three- and five-fold, respectively.

Table 12. Distribution of Natural Gas (Therm) Savings, within Year by Program Track

Group	2017	2018
Streamlined Industrial	13%	38%
Lighting	0%	0%
Custom Capital	83%	47%
Custom O&M	3%	10%
SEM	1%	5%
Mega-projects	0%	0%
Total	100%	100%

Custom capital and SEM projects save the most electricity on an average, per-project basis (Table 13). Note, however, that for each program track the average project size is influenced by large projects; median project size is lower than average size.

Table 13. Average Electricity (kWh) Savings by Project, by Year and Program Track

Program Track	2017	2018
Streamlined Industrial	24,695	33,978
Lighting	81,699	127,772
Custom Capital	320,338	408,280
Custom O&M	247,333	235,780
SEM	589,409	391,778
Mega-projects	40,495,427	17,215,856
Average of Total	121,023	134,443

Custom capital and custom O&M projects save the most natural gas on an average, per-project basis (Table 14). As with electricity savings, for each program track the average project size is influenced by large projects; median project size is lower than average size.

Table 14. Average Therm Savings, by Year and Program Track

Program Track	2017	2018
Streamlined Industrial	3,783	14,686
Lighting	0	0
Custom Capital	58,705	82,009
Custom O&M	14,735	131,563
SEM	2,895	28,523
Mega-projects	0	0
Average of Total	19,056	29,273

4. SEM Follow-Through and Free-Ridership Analyses

4.1 Summary

The Production Efficiency program's SEM offerings provide benefits beyond those associated with SEM activities. The evaluation team estimates that SEM participants undertake about one more capital project (that is, a non-SEM project with claimed energy savings, which includes upgrades and O&M) than non-SEM participants (roughly a 70% increase in average number of projects). Further, average project size in terms of electricity savings is higher for SEM than non-SEM participants. SEM participants had about 159,000 kWh more savings from capital projects in the two years after SEM engagement (roughly a 42% increase in electricity savings) than comparable non-SEM participants. The results show no statistically significant increase in natural gas savings among SEM participants. While the lack of statistical significance means that we cannot conclude with confidence that SEM leads to more natural gas savings, neither can we conclude that SEM definitely does not lead to more gas savings.

In separate, complementary research, the evaluation team found that participation in SEM, as well as repeat participation, is not associated with an increase in participant self-reported free-ridership for subsequent projects.

4.2 Introduction

Production Efficiency's SEM offerings provide coaching and technical services over a typically 14-month engagement to help industrial facilities of any size and type develop and implement a holistic approach to energy management, including teaching customers to identify energy-saving opportunities at their facilities. SEM savings are typically estimated using whole-facility regression models; any capital projects completed during the baseline, SEM engagement, and reporting periods are backed out of the SEM savings.

The Production Efficiency program has seen an increasing number of customers participating in SEM and then participating in other program offerings after their SEM engagement. Interviewed PDCs reported valuing SEM both for the direct savings it generates, which are large, but also for its indirect effect of leading customers to do additional upgrades. The evaluation team investigated whether the SEM offering is related to an increased number of program-supported capital projects and/or increased savings through such projects. The approach and high-level findings from this analysis are described in section 4.3, below. More detail can be found in Appendix B.

Energy Trust expects the PDCs to form long-term relationships with its industrial customers to acquire energy savings through facility retrofits, selection of equipment as facilities change, and savings from O&M projects. Energy Trust was interested in learning whether this program implementation approach might result in participants increasingly seeing the benefits of energy efficiency – benefits that outweigh the project costs and thus not depend on technical services and incentives to be viable. Were this the case, participants over time would be less likely to credit the program influence in their decision to conduct the efficiency project. Thus, participants would increasingly self-report higher rates of free-ridership as their program participation increases.³ The evaluation team investigated possible associations between repeat participation and free-

³ There is a second mechanism whereby repeat participation might lead to increased self-reports of free-ridership: even if repeat participants would not actually invest in energy efficiency without program assistance, their participation could affect the way they respond to a self-report free-ridership battery in such a way that it might make them more likely to look like free-riders. Given the repeated interactions the customer has with PDCs during the long-standing relationship, the customer may forget the specific input from PDCs that contributed to the firm's decision to undertake the project.

ridership self-reports to ascertain whether free-ridership, on average, increases (or decreases) with repeated program participation or SEM participation. The approach and high-level findings from this analysis are described in section 4.4. More detail can be found in Appendix C.

4.3 SEM Follow-Through Analysis

4.3.1 SEM Follow-Through Analysis Approach

The ideal approach to investigating whether SEM engagement increases the number or savings of Production Efficiency capital projects would be through a randomized controlled trial (RCT) in which program participants are randomly assigned to receive SEM engagement (treatment) or not (control). This would help ensure that any observed difference in later project activity would be due only to the treatment effect and not to any pre-existing differences between the groups. Note that in this analysis, “capital projects” refers to all projects with claimed energy savings, including O&M projects.

Of course, an RCT is not possible, yet the sites that have participated in SEM represent a self-selected group of customers that differ significantly from most other program sites: SEM sites on average are larger (higher energy consumption) and have done more program projects than non-SEM sites (Table 15).

Table 15. Distribution of Annual “Pre” Period kWh Usage, SEM and Controls

	Group	Annual kWh Usage in “Pre” Period ^a						Total
		1 to 50k	> 50k to 500k	> 500k to 2.5M	> 2.5M to 5M	> 5M to 25M	> 25M	
Number of Sites	SEM	7	16	54	26	20	4	127
	Control	773	748	291	47	24	5	1,888
Percentage of all Sites	SEM	6%	13%	43%	20%	16%	3%	100%
	Control	41%	40%	15%	2%	1%	0%	100%

^a Program staff reviewing the draft report noted that program eligibility requirements include a threshold of energy costs of \$50,000 or more, which roughly equates to 775,000 to 1,000,000 kWh. Energy Trust provided us with the SEM customer data analyzed. It appears that the usage data in the UCI database is incomplete.

Our efforts comparing SEM participants and nonparticipants accounted for these differences by using propensity score matching with inverse probability weighting to develop a control sample that was comparable to the SEM sample on energy consumption, building size, and project activity in a defined period – the period before SEM engagement for participants and a comparable period among the nonparticipant comparison group. The team then used regression analysis to assess whether SEM engagement from 2010 through 2016 was associated with increased likelihood of completing program-supported capital projects and increased energy savings.

Appendix B provides the SEM follow-through analysis methodology in detail.

4.3.2 SEM Follow-Through Analysis Findings and Discussion

The regression analyses indicate that SEM participation leads to both increased Production Efficiency project activity and increased electricity savings relative to other program participants. Specifically, the beta coefficients shown in Table 16 indicate that SEM is associated with, on average, about one more program capital (i.e., non-SEM) project and about 159,000 more kWh savings from capital projects in the two years

after SEM engagement than occurred among weighted controls. Expressed in terms of percentage increases, SEM increased the mean number of projects by about 70% and the mean level of kWh savings by about 42%.

Table 16. Effects of SEM Participation on Number of Projects and kWh Savings

Dependent Variable	N			β	Standard Error	t	p
	SEM	Control					
		Weighted	Un-weighted				
Number of projects	100	101	362	1.05	0.309	3.41	0.001
kWh savings	100	101	362	158,918	74,862	2.12	0.035
Therm savings	42	43	495	-108.6	1,594.4	-0.07	0.946

The regression analyses show no statistically significant increase in natural gas savings among SEM participants. While the lack of statistical significance means that we cannot conclude with confidence that SEM leads to more natural gas savings, neither can we conclude that SEM definitely does not lead to more gas savings.

The lack of significance in natural gas savings possibly owes to the small number of SEM sites that had gas usage and limits to the comparability of the control group to the SEM group. The small final sample of 42 natural gas SEM sites means that the statistical power for detecting an effect was less than that for the kWh analyses. Perhaps due to the limited natural gas sample size, the comparison group the team developed to investigate natural gas effects was not as comparable to SEM participants with natural gas savings as was the comparison group for SEM participants with electricity savings (as discussed in Appendix B). Energy Trust may want to further investigate SEM effects on natural gas projects and savings.

The evaluation team notes an important study limitation. The above analyses excluded very large customers – those with pre-SEM annual electricity usage of greater than 25M kWh, as well as smaller customers – those with usage at or below 500k kWh. Thus, the results do not necessarily apply to those groups. However, the SEM sites selected for the analysis represented 89% of all SEM sites (as discussed in Appendix B). Therefore, the team believes the conclusion reached by this analysis that SEM participation increases both number of projects and electricity savings are robust even with this exclusion of the very large and the small sites.

4.4 Free-Ridership Analysis

4.4.1 Free-Ridership Analysis Approach

For this analysis, the evaluation team examined whether free-ridership was:

- Higher or lower, on average, for a participant’s first project compared to the same participant’s later projects.
- Higher or lower, on average, for participants with multiple projects compared to participants with just one project.
- Related to the year of completion of the most recent project with a free-ridership assessment.
- Related to the number of projects a customer completed.
- Higher or lower, on average, for participants who did and did not engage in SEM through the program.

- Higher or lower, on average, after SEM engagement than before SEM engagement, for participants who engaged in SEM through the program.

In these analyses, the evaluation team focused on the primary tracks for capital projects (Custom, Lighting, Prescriptive, and Small Industrial);⁴ these account for nearly all program participant sites, projects, and free-ridership assessments.

Energy Trust provided the evaluation team with three datasets (summarized in Table 17):

1. Production Efficiency projects, going back to 2003, with project-level records showing customer and site identifiers, project year, project track, and kWh and therms saved.
2. Responses to the free-ridership battery in Energy Trust’s Fast Feedback survey, going back to 2011.
3. SEM projects, going back to 2009, with project-level records showing customer and site identifiers.

The evaluation team merged the three datasets, de-duplicating on site.

Table 17. Counts of Projects and Project Sites

Group	Projects	Sites
All Production Efficiency	12,747	4,854
Custom, Lighting, Prescriptive, Small Industrial	11,763	4,854
With Free-Ridership Rates	1,311	1,058
With SEM Engagement ^a	217	161

^a Sites with SEM overlap with sites with free-ridership rates: of the 1,058 sites with free-ridership rates, 102 had participated in SEM and 956 did not participate in SEM engagement.

Appendix C provides methodological detail, including methods the team used to use to control for relationships in the data that otherwise would confound any assessment of repeat participation effects on free-ridership.

4.4.2 Free-Ridership Analysis Findings and Discussion

The following subsections show the results of the analyses on the relationship of free-ridership with: 1) repeated participation over time; 2) repeated versus single participation; and 3) SEM engagement.

Note that a free-ridership rate of 0 indicates no free-ridership; without the program, the likelihood the customer would have implemented the efficiency measure is essentially 0%. A free-ridership rate of 1.0 indicates complete free-ridership; without the program, the likelihood the customer would have implemented the efficiency measure is essentially 100%.⁵

The following sections provide a synopsis of the detailed free-ridership research findings, which appear in Appendix C.

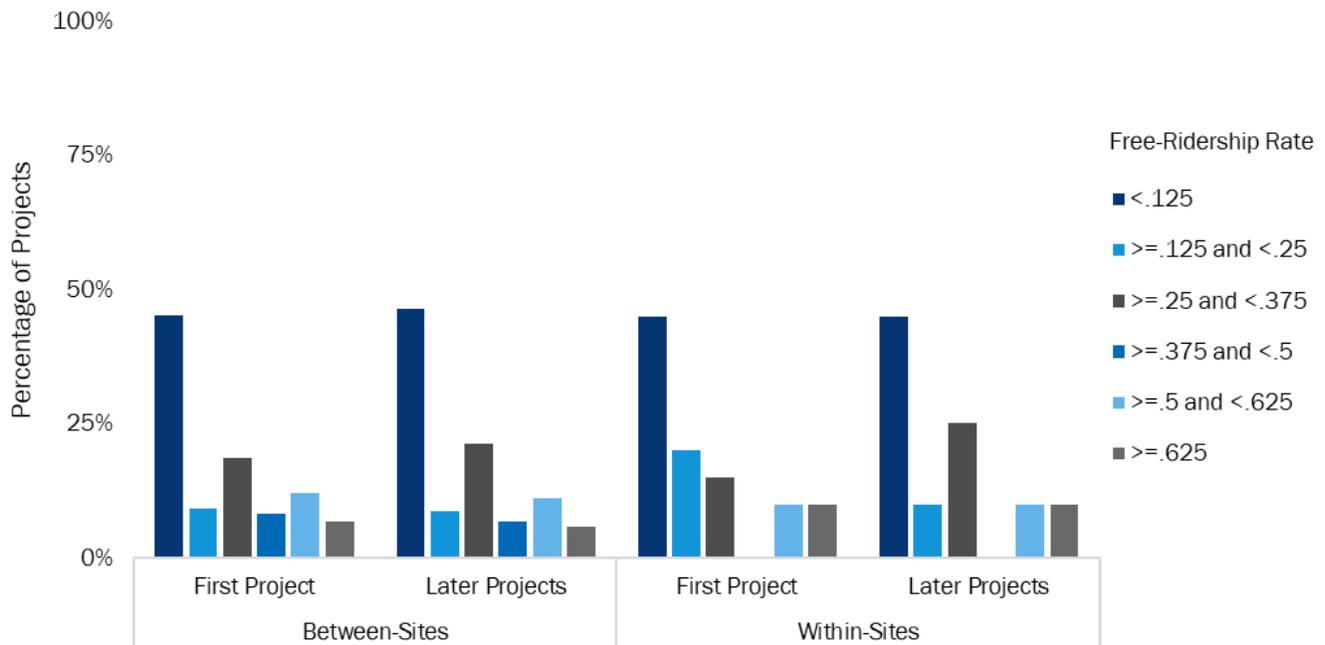
⁴ Subsequent to this analysis, Energy Trust adopted the terminology “streamlined” for its prescriptive and small measures.

⁵ Energy Trust’s documented method for assessing free-ridership rates is available here: https://www.energytrust.org/wp-content/uploads/2016/12/Energy_Trust_Free_Ridership_Methods.pdf.

Repeated Participation over Time

Neither the between-sites or within-sites comparison of the mean free-ridership value of first and later projects showed a statistically significant difference (see Appendix C Table 44 for detail).⁶ The distributions of free-ridership values were highly similar for “first project” and “later project” in both the between-sites and within-sites comparisons (Figure 1). For example, in both the between-sites and within-sites analyses, just under half of both first and later projects had free-ridership rates less than 0.125 and just under half of first and later projects had free-ridership rates from 0.125 to 0.625.

Figure 1. Distribution of Free-Ridership Rates for First Project and Later Project



Repeated versus Single Participation

The above analyses ask whether free-ridership might be related to a site’s repeated participation over time. There is another way in which free-ridership may be related to repeated participation – that is, if repeat participants tend to have higher or lower free-ridership, on average, than sites that participate only once.

Results of the ANCOVA indicate that the mean free-ridership rates for sites with only one project did not differ, on average, from the mean free-ridership rates of the first projects done by those sites with more than one project (Table 18). This may suggest that sites that have done more than one project may not have been any more inclined to be free-riders at the outset than sites that have done only a single project.

⁶ The between-sites analysis compared the mean free-ridership for those non-SEM sites having free-ridership assessments of projects in the target types ($n = 956$) separately with the mean free-ridership assessed on projects in target types before SEM engagement ($n = 47$) and with the mean free-ridership assessed on projects in target types after SEM engagement ($n = 87$). The within-sites analysis compared the mean before- and after-SEM free-ridership values for those SEM sites that had free-ridership assessments of projects in target types both before and after SEM engagement ($n = 27$).

Table 18. Comparison of Free-Ridership: Sole Project Versus First of Repeated Projects

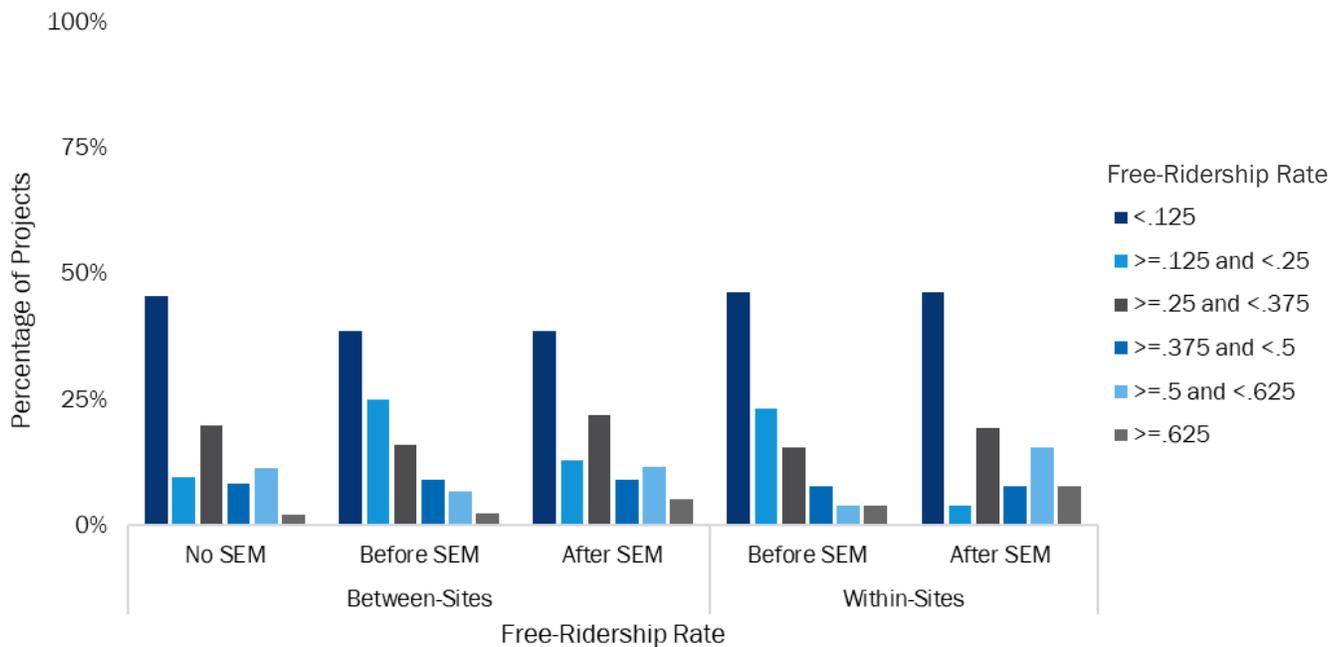
	Sole Project	First of Repeated Projects
Mean	0.23	0.22
Std. Deviation	0.25	0.25
N	385	194
F	0.08	

One caveat to the above is that the analysis took account only of completed projects, and not projects in the pipeline at the time, and so it is possible that some of the “sole project” sites were “repeated projects” sites. Moreover, it is not possible to know whether any of the sites with a “sole” project would do no more projects in the future.

SEM Engagement

Mean free-ridership values were similar for SEM and non-SEM sites and were similar before and after SEM engagement at SEM sites (values were approximately 0.20; see Appendix C Table 47). None of the differences was statistically significant. The distributions of free-ridership values were similar for “no SEM,” “before SEM,” and “after SEM” in both the between-sites and within-sites comparisons (Figure 2).

Figure 2. Distribution of Free-Ridership Rates for No SEM, Before SEM, and After SEM



As noted above, it is possible that some of the “sole project” sites in the comparison of “sole project” and “repeated projects” sites may have had projects in the pipeline or could do additional projects later. Thus, the result of that analysis must be seen as suggestive but not conclusive.

Taken together, however, the above findings provide no evidence that participation in Production Efficiency program “teaches” customers to be, or to respond to self-report surveys as, free-riders. Nor do they provide evidence that SEM participation, in particular, teaches customers to be free-riders. Finally, since program participants who did not participate in SEM had similar free-ridership rates compared to those who did

participate in SEM, the results do not provide any evidence that the SEM offering attracts free-riders from among the population of Production Efficiency participants.

5. Findings from Program Staff and PDCs

5.1 Summary

The evaluation team conducted 19 interviews with multiple Production Efficiency staff and PDC staff at multiple times.

Energy Trust staff continually evolve the Production Efficiency program, an approach interviewed PDCs value. Program staff introduced a number of changes in late 2018 (late in the evaluation period addressed by this report). Feedback received from program staff and custom PDC contacts in early 2019 indicate widespread support and enthusiasm for these changes.

Contacts are especially pleased with the restructuring of the custom PDC role, with PDCs now responsible for delivery of TAS, SEM, and processing project applications and reporting. Contacts named numerous benefits flowing from these changes, including improved customer service, quality control, cost control, and savings accountability.

All aspects of the Production Efficiency program appear, from the comments of interviewed program staff and PDCs, to be working well, although the program continues to face ongoing challenges of delivering cost-effective services to small and medium-size customers – especially customer engagement, technical analysis studies, and SEM.

5.2 Introduction

The evaluation team conducted multiple waves of interviews with Energy Trust's Production Efficiency program staff and PDC staff. We conducted the first wave of interviews in the summer of 2018. We conducted additional interviews in winter 2018 and April 2019 to better understand staffs' experiences with program changes initiated in 2018, including contracting with new custom PDCs for the 2019-2020 program period. Across all waves, we conducted 19 interviews. Appendix D provides more detail about the interviews conducted with Energy Trust program staff and PDC staff.

Interviews covered program implementation and delivery; marketing and outreach; communication and coordination, within Energy Trust, within the PDCs, and among Energy Trust, PDCs, and others; measure development; and challenges the program faces.

5.3 Program Implementation and Delivery

The evaluation team focused the discussion of program implementation and delivery on getting a more complete understanding of recent changes to the Production Efficiency program. Particular topics of discussion were changes to the SEM track; changes to the role of PDCs (including changes in delivery of SEM and technical analysis studies); the roll-out of the lighting buy-down; Energy Trust's Diversity, Equity, and Inclusion (DEI) initiative; and the development of a scoping tool.

5.3.1 Changes to SEM

After launching SEM in 2009, Energy Trust has continually reassessed and evolved its SEM offering, as well as the broader Production Efficiency program. Interviews with PDCs indicated they appreciate Energy Trust's approach to program improvement.

"I think Energy Trust's approach now of iterating the program without huge changes is good. Small ongoing innovations will keep the program strong."

In recent years, program staff identified trends that have presented potential challenges for continued program success. A primary trend was the increasing saturation of large industrial customers, with many of those having participated in SEM. This has eliminated much of the "low hanging fruit." The program has responded over the past several years to this trend by introducing four major changes to SEM: offering "continuous" SEM to encourage continued energy savings (initiated in 2016); standardizing first-year SEM; placing a focus on working with small and medium rural businesses;⁷ and restructuring the custom PDC role, which is discussed in a separate, subsequent section. Each of these changes is discussed in more detail below.

Continuous SEM

In 2016, Energy Trust launched continuous SEM to help customers continue on the path started in what is now termed first-year SEM. Staff described first-year SEM as "SEM 101," providing the "things you need to know" about SEM, such as getting a team in place and developing an opportunity register. Staff contacts reported that customers characterize first-year SEM as a "whirlwind," and that it operates at "a grueling pace." The methods and approach to first-year SEM has varied over time but has almost always consisted of group or cohort training.

While first-year SEM is delivered to a cohort, continuous SEM provides a more customized, one-on-one solution that "flexes" to the site's needs. As of 2019, PDC staff work individually with continuous SEM participants to help them select opportunities to focus on from those identified previously in an energy management assessment, with a goal of deepening participants' energy-saving practices. PDC staff set up a tailored action plan to determine how much engagement they think they need to have with the site.

Energy Trust plans for new first-year cohorts every fall; at the training's conclusion participants then have a two-month waiting period before entering a continuous SEM engagement, which begins in the winter. In October 2018, 16 industrial customers entered first-year SEM (one typically sized cohort, one small cohort, and two rural customers with one-on-one training) and 16 customers started continuous SEM.

Continuous SEM does not by itself resolve the problem of decreasing SEM cost-effectiveness. Although the goal is to get participants to continue to identify energy savings opportunities, staff anticipated that such opportunities would, on average, be smaller than those resulting from first-year SEM. Therefore, continuous SEM will achieve lower savings per participant over time. To deliver continuous SEM requires making the process as streamlined as possible. See Section 5.3.6 for 2019 Energy Trust efforts regarding streamlining SEM.

⁷ Energy Trust's Diversity, Equity and Inclusion Goals include Goal 1C: "Increase customer participation in Production Efficiency for small and medium businesses in rural territories by 20 percent by the end of 2020." Interviewed contacts did not define small and medium businesses. <https://www.energytrust.org/wp-content/uploads/2019/06/DEI-goals-and-subgoals.pdf>.

Standardizing First-Year SEM Approach

In 2014/2015 Energy Trust started work on developing a standardized set of tools and curriculum, which staff rolled out in fall 2015 when the implementation of SEM moved from a single SEM coach to a pool of SEM coaches. Staff continued to improve the SEM materials and now have 35 SEM items, including the curriculum, a coaching guide, energy modeling guidance, workbooks for customers, and a suite of tools such as an energy map and opportunity register. Energy Trust owns the curriculum (holds the intellectual property), which it developed with the assistance of Cascade Energy. Starting in fall of 2018, Energy Trust moved SEM implementation to the PDCs. According to program staff, “We now can manage expectations, have the same delivery across the state. Of course, the three PDCs provide their own ‘flavor,’ but the content and administration is the same and the customer experience is smooth.”

Program staff explained they have worked to pare down the required site modeling activities to minimize its burden on customers and modelers. According to staff, the requirements are now in line with international standards, national protocols, and ASHRAE guidance. Staff acknowledge, “Top down models are complex. We look for opportunities to make it easier.” See Section 5.3.6 for 2019 Energy Trust efforts regarding the modeling requirements.

Most recently (late 2018), Energy Trust released a PDC SEM guide that succinctly describes Energy Trust’s expectations for PDCs’ recruitment for and implementation of SEM. Program staff explained that SEM “recruitment” was never intended by Energy Trust to mean that the recruited customers would automatically be enrolled in SEM. Instead, it was intended to be an assessment or vetting of the customer’s suitability for SEM; the development of a deeper understanding of why SEM would be a good route for the customer. With the new structure and guidance in place, program staff described the recruitment process as streamlined, simpler, and faster.

Focus on Small and Medium Businesses

With increasing saturation of the largest industrial customers, the program is looking to expand SEM to smaller customers. However, given the program’s time spent per customer under the traditional SEM structure, staff anticipate the amount of savings that could be expected from small and medium businesses likely would not be cost-effective. Therefore, the program is investigating ways to restructure SEM to streamline the process with smaller customers.

5.3.2 Changes to Custom PDC Role

Energy Trust selected three custom PDCs in September 2018 in time for the start of the 2019 program year.⁸ It re-contracted with two of the three prior custom PDCs and selected as the third custom PDC a firm that had previous program experience both in the role of SEM coach and technical analysis study provider. As part of the re-contracting, Energy Trust expanded the role of custom PDCs, assigning them responsibility for 1) SEM coaching, 2) conducting all technical analysis studies, and 3) processing project applications, in addition to their previous responsibilities of encouraging customers to undertake custom projects through marketing and outreach, relationship-building, and the provision of technical services.

⁸ More specifically, Energy Trust signed two contracts with each selected PDC – one was a transition contract covering the fall of 2018 in which the PDCs would take on SEM delivery and engage customers in first-year SEM starting in October 2018, and the other was a contract for 2019 implementation.

Assignment of SEM Engagements to Custom PDCs

Staff reported that the roll-out of continuous SEM revealed some communication and coordination issues among custom PDCs, SEM coaches, and Energy Trust. The continuous offering requires a higher level of interconnectedness among those three parties than does first-year SEM, as the SEM coach's interactions with a site is expected to decrease over time as the custom PDCs' role increases. However, staff reported that under the previous program delivery structure, communications had become burdensome, with many touch points between custom PDCs, SEM coaches, and Energy Trust. Again, according to staff, PDCs did not fully understand their intended roles and were not smoothly following established SEM processes.

Energy Trust therefore decided to restructure the delivery of SEM to ameliorate the problems encountered. SEM coaches are now custom PDC staff or subcontractors, rather than contractors to Energy Trust as they were previously. Incorporating SEM coaches into the custom PDCs creates a single program point of contact, which enables one firm to deliver all the offerings and streamline all customer touch points. As the custom PDCs have been assigned to specific geographic territories since 2013-2014, embedding the SEM coaches meant that the coaches, similarly, work within a specified territory. (Appendix A provides a map of the custom PDC territories.)

Program staff and custom PDCs similarly characterized the previous delivery approach as one that necessitated considerable coordination between Energy Trust, the SEM coaches, and the PDCs. Both groups noted that the quality of SEM reports differed among the SEM coaches, with program staff noting that they were challenged to get the coaches to report consistently: "There had been a lot of back-and-forth, and reviews from different parties." Both groups also noted that the previous delivery approach required Energy Trust to obtain competitive bids from the coaches to conduct an engagement, which was time consuming and challenging. Some contacts further noted that some sites had multiple coaches over time, due to the competitive contracting, which resulted in lost customer momentum. In addition, each PDC needed to work with multiple coaches whose assignments varied with the bid selections.

Program staff reported that the current structure of custom PDC responsibility for SEM implementation has generated alignment in intended approaches to recruitment and implementation among PDC staff, coaches (previously, contractors to Energy Trust) and Energy Trust. Program staff described that, among other problems with the previous delivery approach, custom PDCs would sometimes submit scopes for SEM activity to be undertaken in advance of Energy Trust agreement that the customer was a good fit for SEM. Program staff described taking the long view with customers, believing that SEM engagement leads customers to undertake projects over several years. Staff characterized custom PDCs as sometimes wanting to engage SEM customers in standalone custom O&M projects, for the purpose of capturing those energy savings in the given year, rather than recognizing the benefits of first establishing a strong SEM foundation.

Finally, program staff spoke to a benefit of the new contracting approach to SEM. The previous competitive bid approach to each SEM engagement resulted in a relatively small, not-to-exceed budget, which in practice functioned essentially as a fixed price contract between Energy Trust and the SEM coach. Energy Trust's current contract with PDCs makes it the responsibility of each custom PDC to determine the amount of its total budget it will allocate to SEM, as well as the responsibility to meet savings goals. With this structure, the SEM activity is truly a time-and-materials effort, which provides the PDCs with flexibility needed to right-size services to each customer's needs. Program staff believe that this flexibility will enable the offering to reach more customers and enable Energy Trust to more rapidly evolve the offering. Program staff reported perceiving that ideas for improving SEM have been more free flowing under the current delivery structure.

The custom PDCs expressed high satisfaction with this change in the SEM delivery channel. Interviews with custom PDCs identified the following advantages, from their perspectives:

Clarity for customer. Program participants know who to call. Previously, participants had different contacts for different program activities (such as a custom project and SEM) and they were not always clear on what the different roles were, who held the roles, and how they related and worked together.

“Multiple contacts for the customer create confusion.”

Customer service. The custom PDCs help sites understand opportunities. SEM includes coaching and energy savings modeling, yet PDCs have experienced that sometimes:

“...there is a lot of interpretation that the PDC has to do for the site to understand [the SEM opportunity]. As the owner of the relationship, we can translate what the SEM coach or modeler is saying in terms and scenarios that work for each participant.”

SEM recruitment. The custom PDCs and SEM coaches now recruit customers for a cohort, and coaches have more insight into customer development and can have more appropriate and effective influence.

“[Previously, SEM coaches] just got who we got.”

Quality control. Custom PDCs can ensure the quality of the SEM coaching. Under the previous structure, they did not always agree with the coach, the approach taken, or what they perceived as the quality of services provided.

“Previously, it was hard to have the left hand telling the right what to do when there was no control [available to the left hand].” “If we have feedback, we can walk over to the SEM coach’s desk to provide feedback, just one conversation, more of an ongoing dialogue.”

Cost control. The custom PDCs now manage all of the costs associated with SEM and allocate their budgets across SEM and custom project activities to get reach their savings goals.

“Previously, the SEM coaches had responsibility to engage customers during the [SEM] process, but the PDC had to be more involved after [SEM]. The original [engagement] costs were not borne by the PDC, but then follow-up and follow-through costs were. Over time, SEM wasn’t delivering the savings relative to the effort; in the last few years, it had not been a good cents-per-kWh delivery tool.”

“It’s another entity [the separate SEM coach] for the PDC and Energy Trust to manage in terms of making sure they are responsive, proactive, and doing a good job.”

Savings accountability. The custom PDCs are accountable to deliver energy savings – energy savings are specified in their contracts – and now they have all the resources to do so.

“We are supposed to have control and oversight of each of our sights, which we didn’t have in the past.”

“I think an improvement is there is a requirement for energy savings at the end [of the SEM activity]. In the previous model, coaches estimated energy savings, but there was no energy savings goal – that was on the PDC. Now, energy savings is part of our contract, which I think is important.”

Forecasting savings. The custom PDCs need to forecast energy savings. Previously, there might be large swings in estimated SEM savings as savings from capital projects previously undertaken were not subtracted until the sometime near the end of the SEM modeling process.

“Now we can ensure all projects [capital and SEM O&M] are integrated earlier. Now we have the tools and resources [including access to program tracking data maintained by Energy Trust] to provide a more accurate forecast.”

“We are interacting with these sites continually year after year, so we have the historical knowledge and can ensure the right conditions are captured in the model.”

Communication. SEM changes have led to:

“better internal communication and understanding where we are with the customer.”

Conducting Technical Analysis Studies

In 2016, the program moved from having all TAS done by an Allied Technical Analysis Contractor (ATAC) to having some done by custom PDC staff. Those done by PDC staff were called PDC technical analysis studies (PTAS). Program staff explained that the purpose of the PTAS was to streamline the process by allowing smaller studies (in the \$5,000 to \$6,000 range) to be done by the PDC rather than having them bid on by multiple ATACs.

In 2017-2018, Energy Trust Production Efficiency Technical Manager determined whether a given study was assigned to an ATAC or the custom PDC that served the customer. The manager made that determination based on a review of the study requirements compared to ATAC capabilities identified in a “capability matrix” that each ATAC and PDC completed as part of the ATAC application process. In interviews conducted in summer 2018, contacts reported that the PTAS process is working well and saving time and that the custom PDCs love it.

As of 2019, the custom PDCs are responsible for conducting TAS, using their own or subcontracted staff. The custom PDCs’ contracts cap TAS expenditures, to provide a disincentive for conducting speculative studies – that is, studies for customers unlikely to undertake the recommended efficiency action. The custom PDCs are responsible for budgeting all program efforts to obtain savings goals and are free to reallocate implementation budgets from one activity to another, with TAS expenditures subject to a specified limit.

Program staff and custom PDCs both expressed high satisfaction with the current TAS delivery structure and identified many of the same benefits for the change in TAS delivery as they noted for the change in SEM delivery. These benefits, with representative comments made by program and PDC staff, include:

- Clarity for customer

“Fewer individuals touching a project with a customer makes customer more comfortable and makes process faster.”

- Customer service

“There is one less new or additional party to coordinate from the customer perspective.”

“The process is faster also because we don’t need to get request for bids.”

- Quality control

“[Before] there was one more hand off – one more thing to manage in terms of quality and timeliness of other firms’ work.”

“Previously, there was no metric for what constituted a good study in terms of costs or savings. So now the PDCs have the challenge of ‘what does success look like?’”⁹

- Savings accountability

“It empowers us with greater control – control over our own destiny in terms of developing our own products through these studies, greater control of our energy savings.”

“We as the PDC are supposed to have control and oversight of each of our sites, which we didn’t have in the past.”

- Cost control

“In the past, we would have 15 to 25 revisions. It makes the TAS not cost-effective, eats our time, delays the customer, and possibly strains the [customer] relationship. Now we can get quality reports.”

- Communication

“It limits the number of cooks in the kitchen.”

Processing Project Applications and Reporting

Custom PDCs are now responsible for processing project applications and reporting using Energy Trust’s Project Tracking system. As explained by program staff, Energy Trust handled these activities in the early program years, but as project volume increased, it was increasingly difficult for the assigned staff person to meet demand. In response, in 2018, Energy Trust “peeled off” processing activities for the streamlined track and assigned them to the streamlined PDC and continued to process custom applications. Starting in 2019, the custom PDCs process their applications up to and through getting any checks (typically, customer incentive payments) ready, which Energy Trust then cuts and sends.

Integral to this process, the custom PDCs enter project start and completion dates, associated savings, and related customer information. PDCs develop their energy savings forecasts based on the information entered into Energy Trust’s Project Tracking system.¹⁰ Energy Trust continues to review these project processing and reporting activities and assure quality. In the words of a program staff person,

“[Our staff person] is acting as a resource to the PDCs. We will still have him reviewing, but we want the PDCs to take responsibility for the data they report, especially their forecasts. We hope it improves our data integrity.”

⁹ To support the movement of responsibility for TAS delivery to the PDCs, in 2018, program staff updated and revised documents clarifying what constitutes a good technical analysis study.

¹⁰ The custom PDCs noted that, as previously, they are not forecasting prescriptive measure savings as customers often work directly with trade allies on these projects. Even when customers first reach out to them, the custom PDCs, they refer customers to the streamlined track manager and typically never hear if the project is implemented or remains in the planning stage.

The custom PDCs reported that Energy Trust has provided them with the tools and access to information necessary to fulfill this role. Previously, they received information only in response to specific requests. Custom PDCs can now directly view Energy Trust information in a read-only mode, so as not to threaten data integrity. According to contacts, Energy Trust developed a Power BI tool for their use, as well as dashboards to view information from Energy Trust's CRM system and another (unnamed in the interview) database.

“Now we can easily run reports helpful in day-to-day operations. We can manage things better. For example, sites have a maximum incentive they can receive across all parts of the program. Now we can run a basic report that pulls in data from all tracks and see if the customer is in danger of exceeding the cap.”

Both Energy Trust and custom PDC staff reported some challenges in early 2019 when the PDCs assumed these responsibilities but that these largely had been resolved by the time of the April 2019 interviews by clarifying process flows and the development of additional documentation in support of processing.

According to contacts, the custom PDCs need to provide annual savings forecasts by June of each year. Over time, the forecasting requirements have become increasingly granular. Energy Trust requires forecasts by fuel type (electricity and gas), geographic diversity (urban and rural), and most recently, by utility territory.

5.3.3 Streamlined TAS

In third-quarter 2018, program staff released to PDCs a template for a simpler technical analysis study – termed streamlined TAS – to be used with relatively simple custom projects not exceeding 100,000 kWh or 4,000 therms estimated savings. Included in this target are custom capital and custom O&M projects.

Staff developed streamlined TAS to reduce the time and cost associated with the technical analysis study process and reporting. Smaller projects do not warrant the cost of the standard TAS. It is intended to enable PDCs to more quickly offer incentives to customers.

The streamlined TAS template is Excel-based and includes instructions for use.¹¹ Energy Trust requires custom PDCs to provide their analyses within the streamlined TAS template or in a separate Excel-based file that accompanies the template. Energy Trust Technical Managers review and approve all projects that proceed on the basis of a streamlined TAS.

The PDCs have been enthusiastic. According to one contact,

“I think it's working out great. Energy Trust has been conservative to limit their exposure to just the smallest project. If time proves these estimates are reliable, I'd like to see the cutoff raised.”

5.3.4 Lighting Buy-Down

Energy Trust launched a lighting buy-down that reduces the cost of selected lighting products through approximately 10 distributors. Program staff and lighting PDC contacts clarified several issues regarding the rollout of the lighting buy-down to the industrial sector.

The lighting buy-down, which the program terms a “promotion,” has been in operation with distributors for several years in the commercial and multifamily sectors. To become eligible to participate in the buy-down, distributors must apply and meet certain requirements, such as having been an ally in good standing at least

¹¹ The standard TAS template is MS Word-based.

12 months. Once approved, participating distributors must undergo annual training, which covers any changes in the promotion or its terms. Sometimes program staff will carry out one-on-one, in-house training with specific distributors based on their needs. At present, there are 14 participating distributor companies, with about 80 branches across the state. Some of these companies are more active than others.

One contact clarified that the broad objective of the buy-down is to get greater uptake of energy efficiency measures among smaller customers. Lighting is considered a “gateway” to other efficiency upgrades and program theory postulates that a streamlined lighting upgrade process should increase efficient lighting uptake as a first outcome and increase other measure uptake over time. This contact acknowledged that offering discounts creates a risk of losing the influence that comes with dealing directly with a customer and finding additional opportunities, but it avoids the bigger risk that the program would not reach those customers at all.

Contacts acknowledged that the buy-down has not had as much uptake as in other sectors, one of whom said the uptake across sectors has not been as much as originally had been anticipated. Both contacts noted that the sales tracking requirements are a challenge, which might contribute to the low uptake. For each discounted sale, distributors are required to create an application that includes the customer’s utility account number and an invoice. By contrast, according to one contact, some comparable programs require only that distributors track the discounted sales on a spreadsheet, with no requirement for a utility account number or signature.

The sales tracking requirement may create challenges for distributors’ internal sales accounting. According to a lighting PDC contact, some distributors that track sales by staff credit their staff only for the discounted price until the distributor receives the Energy Trust incentive, at which point the staff are credited for the full sales price. Thus, the more burdensome the tracking requirements, the more burdensome the process for crediting sales to the staff. According to contacts, distributors vary in how well they can handle the tracking requirements. Larger companies have more difficulty than smaller ones, because their accounting processes are less flexible. As the contact explained, large companies that work across multiple program jurisdictions do not see it as an option to create a specific process for each jurisdiction. According to that contact, this is the primary reason that some companies do not participate as much as others.

In addition to the above, one contact indicated that at least part of the reason for low uptake of the buy-down in the industrial sector is that the lighting types it targets are not those seen most often in industrial settings. The buy-down is primarily for lamps that are easy to replace; by contrast, in most industrial sites, upgrades involve changing out high-bays or vapor type fixtures, which may require a contractor. In other words, according to this contact, the buy-down does not offer incentives for equipment that industrial sites would normally retrofit.

One contact suggested that rolling the buy-down out to contractors should help capture smaller projects. This contact clarified that doing so would require getting buy-in from the Existing Buildings and Multifamily programs as well as the Production Efficiency program, as all three programs must agree on the rules. That contact indicated that other cross-program issues currently have higher priority than discussion of rolling the buy-down out to contractors.

See Section 6.4 for a discussion of the lighting buy-down from the perspectives of distributors and contractors. Their comments touch on themes similar to those above.

5.3.5 Diversity, Equity, and Inclusion (DEI) Initiative

When asked about DEI goals, program staff interviewed in summer 2018 described that the goals and target markets were just being developed, with a clearer vision and specific numbers likely available by the fall. The follow-up interviews did not discuss the goals and target markets but did discuss custom PDCs activities in this arena.

In general, Energy Trust as a whole is seeking to extend the diversity, equity, and inclusion of all customers. Its DEI goal for Production Efficiency is to increase participation for small and medium businesses in rural territories.¹² PDCs are keenly aware of this goal, and its corollary to increase program involvement among rural small and medium trade allies.

Custom PDCs described efforts to reach out to all industrial customers in their territories through engaging trade allies to reach those allies' customers, networking, and other marketing and outreach activities (see Section 5.4). The challenges reaching rural small and medium industrial customers, of which both Energy Trust staff and custom PDCs are aware, primarily are:

- Cost to provide small and medium businesses with technical analysis studies relative to the potential savings.
- Cost to engage small and medium businesses in the SEM track relative to the potential savings.
- Cost to engage businesses located rurally, which by definition are geographically dispersed – what one contact termed “the windshield time.”
- Staffing limitations of small and medium businesses – in addition to having fewer staff relative to the scope of their activities than do larger firms (consequently, these firms typically do not employ specialists), PDCs observed that many of these firms and their communities barely weathered the Great Recession; the local labor pool shrank and the firms have had difficulty replacing retirees, those they previously laid off, and those that left as their families relocated for economic reasons.

5.3.6 Program Changes Underway

SEM Changes

According to program staff, “We are always refining SEM – literally; about once a year – based on feedback.” At the time of the April 2019 interviews, program staff reported activities to update the coaches guide and preparations to test some revisions to the SEM offerings in fall 2019. Staff did not identify all the changes underway, but noted that the changes arose from input Energy Trust received from PDCs during several sessions to elicit input on SEM.

At the time of the interviews, Energy Trust was working with the Territory 3 PDC, which exclusively serves rural customers, most of whom are smaller, to offer streamlined SEM for small and medium industrial customers. The Territory 3 PDC was recruiting sites as the time of the last interview, approaching smaller sites that had previously expressed an interest in SEM. According to both program staff and PDCs, a key element necessary for a streamlined, less costly SEM will be putting boundaries on the modeling effort: “We need to go to the next best option sooner.” The next best option would be a bottom-up approach or possibly another alternative to modeling. Both program staff and custom PDCs understand that non-modeling methods have less technical

¹² Energy Trust’s Diversity, Equity and Inclusion Goals include Goal 1C: “Increase customer participation in Production Efficiency for small and medium businesses in rural territories by 20 percent by the end of 2020.” <https://www.energytrust.org/wp-content/uploads/2019/06/DEI-goals-and-subgoals.pdf>

rigor than energy models, but that energy modeling quite often is expensive and on occasion lacks the necessary precision one assumes that technical rigor yields. As one custom PDC explained:

“The difficulty [with claiming SEM savings] is not ‘Is it verifiable?’ but can we do it in a relatively uncomplicated way. Mathematically, it’s not a problem. If we can’t do it with an energy model, we can do it with bottom-up calculations.”

Program staff also have been looking into adding a “cohort” or “community” element to continuous SEM and hope to do so in 2019. In this scenario, participants would attend a workshop with peers, run by SEM coaches. The idea is to develop a group-learning environment in which participants can interact with their peers to develop a “community of practice.” Cohort meetings would be more cost-effective than the one-on-one approach, but do not deliver the same tailored assistance, which reportedly is highly valuable. The idea of adding a “cohort” or “community” element to continuous SEM is still in the “early stages” of development. Program staff are trying to identify details of what it would look like, such as whether it would be optional or the standard delivery mechanism.

Scoping Tool Development

To more efficiently serve its market, and especially small and medium firms, Energy Trust contracted with a third party to develop a scoping tool to be used to quickly identify savings opportunities in walk-through facility visits. The vision was for the tool to identify prescriptive or lighting opportunities as well as custom opportunities at a “high level” and to identify whether a facility is “SEM ready.” It was intended to generate a site scoping report to be used by program and PDC staff and shared with the customer in a timely manner, and to lay the groundwork to feed data collecting through the scoping tool into Energy Trust’s Project Tracking system, facilitating forecasting.

Program staff asked the custom PDCs to pilot the scoping tool with 10 small customers and report back, which two of the three current PDCs did. Based on the debriefing, program staff concluded the piloted tool was not suitable for deployment:

“The overarching theme was we were trying to do too much with the tool – streamline data collection, do energy analysis, have a sales tool, give customer all the information needed while speeding up the process for providing that information. These are all good objectives, but they are complicated and time-consuming to accomplish.”

Among its main shortcomings, per program staff: 1) PDC staff found it hard to simultaneously use the tool and engage with the customer, 2) per design, the tool did not access data from Energy Trust’s internal systems, while the pilot experience suggested such access would be useful, and 3) also per design, the tool generated ranges of likely project costs and savings, rather than specific estimates. With a more formal scoping study still needed, the tool did not reduce the number of steps that smaller customers must go through. Given these shortcomings, program staff received comments that the tool added to PDCs’ workloads.

Program staff are working to determine next steps, ranging from improving its current functionality to reducing its purpose and functionality to deliver the highest value. Possibly the tool can be re-purposed into generating information on potential upgrades that can be given to the customer. Program staff are considering both alternative approaches and likely costs. They noted that the original scoping tool cost more and took longer to develop than anticipated.

Incentive Changes

Finally, program staff reported they are currently (in 2019) examining incentive levels for SEM and for gas savings (a potential change relevant to the program as a whole). Staff are assessing whether increased incentives might increase program savings and, if so, at an acceptable cost.

5.4 Marketing and Outreach

Program participation is largely driven by direct PDC outreach for the custom track and by trade ally outreach for the lighting and standard/streamlined tracks. Commenting on the effectiveness of program awareness strategies, one PDC contact noted that they have rarely met someone who does not know what Energy Trust is, although not everyone understands that Energy Trust coordinates with the investor-owned utilities.

Energy Trust conducts formal marketing for the Production Efficiency program. The PDCs also engage in relatively formal marketing activities, such as attending conferences, trade association meetings, and community events. The custom PDCs engage in extensive one-on-one outreach activities – calling on customers (“just stopping by” or pre-arranged; both cold calls and customers with whom they have a working relationship). The custom PDC for Territory 3, which is rural, described their staff as consistently engaged in outreach activities because “standing in line at the store” can be an opportunity as perhaps the other shoppers has a friend or relative or are themselves involved in a small industrial firm. This PDC contact said that his staff live or have lived in every county save one in his territory and believes the long-standing relationships his staff developed over the years through living in the communities they now serve provides a foundation for their current outreach.

The custom PDCs reported trying to engage all customers, without selecting customers based on size. Yet it can be costly to proactively pursue small customers and with that group their actions are more likely to be reactive/responsive rather than proactive. One PDC stated, “We wouldn’t do a cold call below about 500,000 kWh [of customer load].”

Although participation in the cannabis market is mainly lighting-related and thus prescriptive, the lighting PDC works directly with cannabis producers because “every project is different.” According to the interviewed contact, most cannabis producers have a long history of production that predates legalization, and so “everyone had their own proprietary vision of how to grow the crop.” This has created a challenge in developing best practices or a good set of standards, making more direct program involvement necessary at present.

One program contact commented on having been impressed by collateral that the marketing team, working with a consultant, has put together for the cannabis market as well as the presentations and outreach they have done. That outreach has included evening happy hour presentations at PDC offices, with great attendance by cannabis growers.

5.5 Communication and Coordination

All contacts indicated that communication is generally good within Energy Trust, within the PDCs, and between Energy Trust, the PDCs, and other actors. PDC contacts reported good coordination with other PDCs on projects involving multiple PDCs. The only communication challenges identified were those relating to the roll-out of continuous SEM and the transition in PDC role, discussed above; these challenges appear to have been resolved.

PDCs described informal, easy, and open communication with program staff. The custom PDCs have recurring one-on-one meetings with Energy Trust's Custom Track program manager and described "constant near-daily communication with program staff by phone and email." PDCs feel empowered to provide candid feedback to program staff in working sessions and other venues. According to one custom PDC:

"I don't feel there are any gaps in the program or challenges to overcome, because of that ongoing back-and-forth. If we have recommendations, we voice them in real time. We don't have an ongoing list of ways for program to improve."

5.6 Measure Development

Energy Trust contracted the development of streamlined measures in 2016/2017 to the standard/streamlined PDC and in 2019 that firm became the custom PDC for Territory 1. Energy Trust Planning Engineers work closely with PMCs and PDCs on measure development, serving in advisory and quality assurance/quality control capacities.

PDC staff interviewed described that they have worked with Energy Trust to streamline the measure development process. Contacts thought it could be further streamlined for measures with smaller savings potential but reported that Energy Trust wants a standard, single approach to all measure development.

PDC staff reported conducting measure development work in three phases:

- Initial screening – the PDC is continually attentive to new or evolved technologies and conducts a preliminary review to identify those warranting further investigation;
- Measure development – the PDC conducts in-depth secondary research to determine appropriate applications and identify likely impacts; and
- Cost-effectiveness analysis – the PDC confirms measure cost-effectiveness, rejecting measures that are not currently cost-effective.

The PDC then prepares Measure Approval Documents (MADs) for Energy Trust and develops any savings calculators needed for streamlined measures whose savings depend on simple engineering inputs.

Except for interviews with PDC staff, the responsibilities of the other interviewees (both Energy Trust and all other PDCs) did not include measure development and these interviewees could not speak to the topic. One PDC noted that technologies are always evolving; because program staff are continually updating qualifying technologies, there will always be opportunities for customers to save energy.

Other than these comments, contacts did not elaborate on measure development in response to our questioning.

5.7 Program Challenges

Cost-effectively engaging smaller customers via custom projects continues to challenge the Production Efficiency team. The program now has streamlined TAS for studies of projects anticipated to save no more than 100,000 kWh or 4,000 therms, yet standard TAS remains expensive for small custom projects up to double those cut-offs. Program staff had a vision of a scoping tool that would serve both technical and marketing needs, reducing the effort to identify potential opportunities at sites while engaging customers and strengthening their interest in pursuing identified opportunities. The draft tool proved unsuccessful, but

program staff learned a lot in the process and are investigating possible next steps, including a second attempt at a scoping tool.

Program staff are testing a streamlined SEM engagement to more cost-effectively serve smaller customers; based on that test, they may determine additional evolution is needed. In addition to developing a SEM offering for smaller customers, program staff are engaged in evolving the comparatively recent continuous SEM offering.

Contacts also noted an ongoing challenge to any SEM engagement: It takes time and commitment from the customer. One custom PDC noted that, while SEM has been “one of the more marketed things that we do,” the program would benefit from an increased understanding of how to get decision-makers to invest in, and commit to, involving their facilities teams in a one-year offering. According to this contact, it is important to identify “what really resonates with business owners,” especially small and medium firms – “Is it net energy benefits or something else?” – and incorporate that information into program collateral. Another custom PDC summed it up:

“It’s becoming harder to get SEM savings, but I think still a lot is untapped, especially in smaller but even in larger. The issue is more “does the site have time to commit?””

On a final note, PDCs need to provide more granular forecasts of annual energy savings than previously, now with a breakdown by utility. Contacts noted that the more granular the goals, the harder it is to achieve them all. One contact gave as an example that their goal for Cascade Natural Gas could be met by one or two projects, yet it is much harder to forecast the outcome of individual projects than of a group of projects, whose collective outcomes can be approximated by applying an uncertainty factor.

6. Findings from Lighting Contractors and Distributors

6.1 Summary

The evaluation team interviewed six lighting contractors and three lighting distributors about their experience working with the Production Efficiency program.

Contractors and distributors believe there remains substantial opportunity to increase industrial lighting efficiency. They recognize that some of this opportunity lies in the small/medium-size business sector, which both faces barriers to upgrades not faced by larger firms (such as more limited staffing and financial resources) and are more expensive to serve relative to the opportunity.

Distributors and contractors had noticed little effect on 2018 sales from the lighting buy-down and did not anticipate the appeal of the buy-down among their customers would increase for various reasons, most of which are related to structural, relationship-based aspects of the market. Two distributors described challenges they had with the buy-down paperwork requirements.

Regarding lighting opportunities in the cannabis sector, respondents identified barriers related to self-reliance among growers, existing market relationships, and lack of contractors experienced with the effects of lighting on the performance of other mechanical systems that affect crop quality and yield.

Most contractors and distributors rated themselves as satisfied with the Production Efficiency program overall, as well with various program components. Most explanations of sources of dissatisfaction addressed aspects of the application process, including the time it takes to obtain approval.

6.2 About the Respondents' Companies

Working with data provided by Energy Trust, the evaluation team extracted twenty-three companies that had completed multiple Production Efficiency lighting projects. We conducted interviews in the fall of 2018 with the main contacts of nine firms, six of whom identified themselves as contractors and three as distributors (Table 19). All interviewed distributors offer lighting equipment only. The contractors reported a wide range of proportions in lighting-related sales, with a median of 25%. The number of Oregon employees also varied widely. The distributors on average had conducted more Production Efficiency projects than the contractors, likely owing to having some direct relationships with end-use customers. The contractors reported experience with both the standard/streamlined and custom tracks.

Table 19. Respondents' Company Profiles

	Contractor (n=6)	Distributor (n=3)
Proportion lighting-related sales	5% - 95%, median = 25%	100%
Number of employees in Oregon	3 - 240, median = 36	1 - 250, median = 11
Most common region served in 2018 ^a	At large (5) Willamette Valley (1)	Portland Metro & Hood River (1) Southwest Washington (1) Southern Oregon (1)
Number of program projects 2017-2018 ^a	2 - 38 projects, median = 3	11 - 64, median = 22
PE program track	Prescriptive: 40-90%, median=58% Custom: 10-60%, median=43%	-

^a Regions served, number of Production Efficiency projects, and program track derived from Energy Trust data.

6.3 Efficiency Opportunities

Interviewed trade allies¹³ believe there is still substantial opportunity to increase lighting efficiency in the industrial and agricultural sectors over the next two years. The estimated LED upgrade market saturation, among those that provided a response, is about 50% of the industrial sector overall in Oregon. One distributor reported that the total kWh savings through the company's sales in 2018 increased by 100% compared to the previous year.

Although some told us that these opportunities are widespread across geographic locations and company sizes, it appeared that there is a shared assessment that large customers have already made significant investment in energy saving projects, and they have less opportunity remaining. Thus, contacts typically reported more opportunity among smaller and more rural customers.

Some contacts mentioned specific types of old technologies that are still common in the industrial sector: HID fixtures (metal halide, high pressure sodium, etc.), halogen fixtures on exterior of buildings and pole lights, and T12 VHO and HO lighting. Some allies noted that lighting controls and the redesign of lit spaces continue to offer substantial savings opportunities – even among customers that have had LED replacement projects. Ongoing technology improvement and early upgrades that focused on less comprehensive projects also have resulted in continued opportunity.

Two-thirds (6 of 9) of interviewed trade allies reported small customers have bigger barriers to energy efficiency than larger ones, almost singularly due to first cost and more stringent cash constraints. Although two contacts explained that smaller customers are not particularly disadvantaged, as one said, most allies have focused on large customers so far because “it takes almost the same amount of time and effort to convince smaller customers as large ones.”

To overcome the cost barriers for smaller customers, a few contacts suggested offering financing options. Three allies suggested that payback needs to be within 2-3 years. One contact further suggested that custom projects need to be simpler for small customers.

Almost all (8 of 9) trade allies forecasted significant potential savings from lighting controls. Many contacts reported an increasing number of projects that incorporate controls, especially thanks to the sophistication of wireless technology that enables easier retrofit installation and of network systems that prompt remote readjustment capabilities (sensitivity or time-out, etc.). Although the cost of these technologies is still higher than that of wired systems, some contacts mentioned that equipment costs and labor costs (due to easier installation) are declining. Even so, they believe the upfront cost of controls is the main factor limiting installation.

A few allies suggested that the Production Efficiency program is not designed to seize market opportunities and drive control technologies forward. Contractors cited examples of LED projects with dimming controls that achieved greater than 50% energy reduction, yet the program did not support these projects because the savings partially depend on customer behavior. (Although Energy Trust may not be able to change these measure requirements, it may be able to address contractor concerns in its training and outreach activities.)

¹³ Eight of nine interviewed; one respondent indicated they weren't sure if they were a trade ally.

6.4 Lighten Up with LEDs Buy-Down

When asked about awareness of the *Lighten Up with LEDs* buydown,¹⁴ all three interviewed distributors (distributors are the target market) and the two (of six) contractors with lighting-focused businesses were familiar with it.¹⁵

Two of the three distributors reported positive but minor effects. One distributor reported having significantly less sales in 2018 related to the buy-down than in 2016 and 2017. He speculated that declining prices of some bulb types – screws, A19 style lamps, BRR lamps – perhaps led customers to conclude the buy-down application process was not worth their time.

The two contractors who were aware of the buy-down had not noticed any effects on their businesses. One of these contractors, however, mentioned his negative impression about the quality of lighting products available through buy-downs. This contractor also raised a concern about its potential negative effect on their customers because he thinks buy-downs could incentivize “half-baked commodity-grade LED bulb replacement projects” instead of encouraging more comprehensive application-based design projects.

Most contractors (5 of 6), when informed of the buy-down, said they would not recommend the buy-down to their customers. A few of them reasoned that they cannot provide warranties for the products purchased elsewhere even if they install them. One said, “if customers need repairs for materials bought from someone else, they’d have to do all the leg work to get the replacement parts, and they still have to hire people like us to repair them.” Other reasons mentioned were they do not have opportunities to make profits from mark-ups, they may not get to do the installations, and the buy-down could encourage the purchase of low-quality products.

Distributors, when introduced by us to the possibility that Energy Trust may change the rules of the buy-down so that contractors could also buy the discounted lighting from distributors on behalf of their customers, said this rule change would not affect their business-as-usual (2 of 3 distributors). One distributor viewed this potential change positively, saying it would enable his firm to sell a greater volume to contractors.

Contractors similarly said this potential rule change would not affect the way they purchase materials; they will still go through the standard application process (3 of 6 contractors). Two contractors shared that they would buy the discounted LEDs and sell them to customers at full prices. Another contractor mentioned that he would compare the prices between his distributor and the buy-down to choose the lower prices.

When we asked the distributors about any challenges in participating in the buy-down, two distributors discussed similar experiences. One distributor mentioned the amount and redundancy of paperwork for his customers. According to him, the program requires a form (100LZ) completed for each transaction, which forces some customers to fill out the same form multiple times. He requested for the program to require “only one form per location per year.” Another distributor contact, whose company has a wide network of branches and employees across Oregon, said that his company has found it challenging to get employees to consistently conduct proper invoicing and documentation for the buy-down. This company has sought the help of program staff; program staff visit the company’s branches to train sales staff in buy-down related paperwork.

¹⁴ The evaluation team introduced the *Lighten Up with LEDs* buy-down program to the trade allies stating that “Starting in 2016, Energy Trust began offering customers in the industrial and agricultural sectors the opportunity to buy selected lighting products at discounted prices from participating distributors. Energy Trust calls this buy-down promotion ‘Lighten Up with LEDs’. The discount is slightly less than the incentive a customer could get by going through the incentive application process, and customers are not permitted to receive Energy Trust incentives for buying the discounted lighting. Right now, only customers, and not contractors, may buy the discounted lighting from distributors.”

¹⁵ The four remaining interviewed contractors were unfamiliar with the buy-down; lighting is not their primary business.

Most contractors (5 of 6) had a similar response when we asked them their thoughts on why customer participation in the buy-down has fallen short of expectations. They described that most industrial customers have long-term relationships with contractors and look to them for turnkey solutions encompassing everything – from design, purchase, stocking, installation, to maintenance. They offered this as a possible reason for the performance of the buy-down.

6.5 Diversity, Equity, and Inclusion (DEI) Goals

We asked the trade allies whether they have heard about Energy Trust’s Diversity, Equity, and Inclusion (DEI) goals.¹⁶ Two contacts (of nine) said they had heard about it but knew nothing specific, and most contacts (7 of 9) reported they had not heard of it at all. When asked if their company is woman- or minority-owned, one contractor reported the firm is a woman-owned business; the others (eight of nine) replied no.

6.6 Cannabis Industry

Four contractors (of six) and one distributor (of three) contacts reported that their companies have worked with cannabis growers in the past. However, only a few reported sufficient experience to be willing to discuss details.

Regarding special needs of cannabis growers or challenges affecting the uptake of lighting upgrades, one distributor told us that they have learned that the cannabis industry is complex; it has been a difficult market for them to break into because large horticulture distribution companies have had strong relationships with this industry for quite some time and manufacturers often work directly with these companies.

A few allies mentioned that, because the cannabis industry had been in the shadow for a long time, many of them have been self-educating and conduct troubleshooting on their own. These allies found some growers to be skeptical about new technologies and preferring to stick with what they have used before.

Because of its legal status, the cannabis industry operates on a cash-only basis. Financing is not readily available, and this situation limits conventional lighting sales.

One contractor said that lighting contractors in general lack a comprehensive understanding of how lighting upgrades may affect the interdependent systems of heating, cooling, and watering, and that such recommendations offered without such an understanding could potentially harm growers. Consistent with this view, another contractor reported their lack of experience with growers limits their ability to find appropriate LED solutions for them.

These trade allies believe educational pieces are important for the cannabis market. One contractor specifically expressed the view that the Production Efficiency program is not adequately addressing this challenge.

¹⁶ We described the DEI goals as “Energy Trust has established goals to increase program activity with women-owned and minority - owned businesses, as well as companies working with underserved communities.”

6.7 Program Experiences

6.7.1 Incentive levels

When asked if there are any measures for which incentives are higher than needed, most trade allies (seven) said no. Two allies suggested that incentives for tube LEDs and screw-in type bulbs are not needed. When asked which measures had inadequate incentives, perhaps not surprisingly, their responses suggest they would like to see incentive levels raised for all measures.

6.7.2 Program Satisfaction

Most contactors and distributors rated their overall experience with the Production Efficiency program as “satisfied,” as the majority also rated their satisfaction with seven program elements (Table 20). Contacts were least satisfied with Energy Trust’s program trainings and its lighting calculator tool.

Table 20. Satisfaction with Production Efficiency Program Elements

		Dissatisfied	Neutral	Satisfied	Total (Exclusive of “Don’t Know”)
Overall program experience	Contractors	1	0	5	6
	Distributors	0	0	3	3
Interactions with Energy Trust’s staff	Contractors	0	1	5	6
	Distributors	0	0	3	3
Energy Trust’s training about program	Contractors	0	1	5	6
	Distributors	0	1	2	3
Lighting calculator tool for custom	Contractors	0	2	4	6
	Distributors	0	0	2	2
Pre-approval process	Contractors	1	0	5	6
	Distributors	0	0	2	2
Project processes after equipment installation	Contractors	1	0	5	6
	Distributors	0	0	2	2
Lighting calculator tool for prescriptive	Contractors	0	2	3	5
	Distributors	0	1	1	2
The application process for becoming a Production Efficiency program trade ally	Contractors	0	0	3	3
	Distributors	0	0	0	0

Note: We asked the respondents to rate their satisfaction with each program element using a scale from 1 “not at all satisfied” to 5 “completely satisfied”. We recoded 1 and 2 to “Dissatisfied”, 3 to “Neutral”, and 4 and 5 to “Satisfied” categories.

A few contractors expressed dissatisfaction with the time to obtain pre-approval. One contractor, requesting that Energy Trust expedite the process, explained:

“In this industry, it takes three months to get the customers off the fence and now they want it done tomorrow. Otherwise, some customers get hostile. It often takes three weeks to have the 120L signed and by then my customers are ticked.”

Some contractors noted and appreciated recent improvements Energy Trust had made in the lighting calculator tool for prescriptive, such as auto-filling repeated information. One contractor pointed to a problem where the tool sometimes accepted the numbers (e.g., lamp wattage) and allowed submission but the program later rejected applications reasoning that the energy reduction amount did not meet the program's requirements. Another contractor mentioned a similar issue for the lighting calculator tool for custom, saying that a few of his applications had been rejected due the wattage even though he had selected wattages from the list. These contractors said that they sometimes, to meet program requirements, feel forced to use products whose quality or warranties are unknown to them.

Related to the issue of application approval, contractors reported that when the rebate turns out to be less than calculated, the contractors have to absorb the difference to avoid conflicts with their customers. They seldom can increase their invoice to cover the shortfall.

“Even though the rebate amount of the proposal says ‘estimated’ or ‘anticipated,’ customers don’t care. When we give them a quote and the calculated ROI, that’s gospel to them and a legal contract.”

One experienced contractor suggested that both Energy Trust and trade allies would benefit from having isolated meetings for top performers to explore ways to improve the program together. This contractor described that under the current training structure, experienced contractors often end up educating their competitors.

7. Findings from Participants and Nonparticipants

7.1 Summary

The evaluation team surveyed 65 Production Efficiency participants and 31 nonparticipants.

Participants and nonparticipants in the Production Efficiency program responded to surveys requesting their experiences with the program and their experiences with energy management practices. The evaluation team drew samples from participants and from a database on nonparticipant industrial firms and conducted both phone and online surveys. Phone surveys were ineffective in reaching firms, so the evaluation team relied largely on online surveys with an incentive offer. A total of 64 participants and 31 nonparticipants completed surveys. Manufacturing and agricultural firms represent over 50% of both sets of respondents, reflecting the significance of these two sectors in Energy Trust's service territory.

The Production Efficiency program is well known among the industrial sector contacts responding to the survey. Seventy-five percent of participants learned of the program from either their contractor or equipment supplier or from Energy Trust program representatives. Among nonparticipants, 90% were aware of the Energy Trust and three-quarters (75%) had worked for a company that had received Energy Trust incentives. The Lighten Up with LEDs buy-down was less well known; 38% of participants and 29% of nonparticipants reported awareness of the instant rebate, with 28% of participants noting their companies had used the instant rebate when purchasing lighting from a lighting distributor.

Participants not engaging in SEM and nonparticipants were equally likely to report their firms engaged in five of six energy management practices explored in the study;¹⁷ nonparticipants were more likely than participants to report their firms engaged in regular, formal tracking of energy consumption or performance (58% versus 32%). Participants were more likely than nonparticipants to report plans for additional energy savings project or to have small projects still to do, although these differences did not attain statistical significance. About 10% of both groups reported they believe many opportunities still lie ahead.

Finally, among participants, satisfaction is high with a majority of the respondents (81%) providing 'satisfied' ratings to their overall program satisfaction; between roughly 75% and 90% of participants reported satisfaction with each of the 12 program elements explored in the study.

7.2 Methods

The evaluation team conducted participant and nonparticipant surveys by phone and web in late spring 2019. Sixty-four participants spanning the four program delivery tracks (Table 21) and 31 nonparticipants spanning both urban and rural areas (Table 22) responded to the surveys. The participant survey asked customers participating in multiple tracks to respond to questions relating to each track.

Appendix C provides our sampling and data collection methods. We drew study samples from Energy Trust program tracking data and industrial customer contact data. Response rates to both the participant and nonparticipant surveys fell short of expectations laid out in the evaluation plan. The evaluation team worked closely with Energy Trust evaluation staff throughout the data collection process to optimize the distribution of responses across program tracks and customer types. We note that 2% of contacted nonparticipants

¹⁷ The differences in participant and nonparticipant responses did not attain statistical significance.

responded to the survey; thus, it is likely that respondents familiar with Energy Trust self-selected to be surveyed at higher rates than unfamiliar respondents.

Table 21. Participant Survey Respondents

Program Tracks	Sample Frame		Final Sample	
	Count	Percent	Count	Percent
Lighting	1,157	46%	38	59%
Standard/Streamlined	1,035	41%	21	33%
Custom	323	13%	18	34%
SEM	48	2%	4	6%
Total	2,540	105%	64	126%

Note: Totals exceed 100% due to customer participation in multiple program tracks.

Table 22. Nonparticipant Survey Respondents

Stratum	Sample Frame	Final Sample	Confidence / Precision ^a
Urban	700	18	~ 80/16
Rural	800	13	~ 80/18
Total	1500	31	> 80/12

^a Confidence/precision estimates take the finite population correction factor into account.

7.3 Participant Findings

7.3.1 Respondent Characteristics

About equal proportions (just over one-third each) of manufacturing facilities and agricultural related businesses responded to the survey (Table 23).

Table 23. Participants' Market Sectors (n = 64) ^{a, b}

	Percent
Manufacturing:	39%
Fabricated metal products	6%
Food	6%
Plastics and rubber products	5%
Wood products	5%
Electrical equipment and appliances	3%
Transportation equipment	3%
Beverage and tobacco products	2%
Chemicals	2%
Machinery	2%
Petroleum and coal products	2%
Primary metal	2%
Printing and related support activities	2%
Agriculture (other than cannabis), forestry, or related	36%

	Percent
Water and wastewater treatment	9%
Cannabis production	5%
Warehouse/distribution	2%
Utilities, energy production, distribution, or transmission	2%
Other	6%

^a Percentages do not sum to 100% due to rounding error.

^b “Other” comprises one respondent each in Wholesale (NAICS 42), Retail (44), Real Estate Management (53), and Accommodation and Food Services (72).

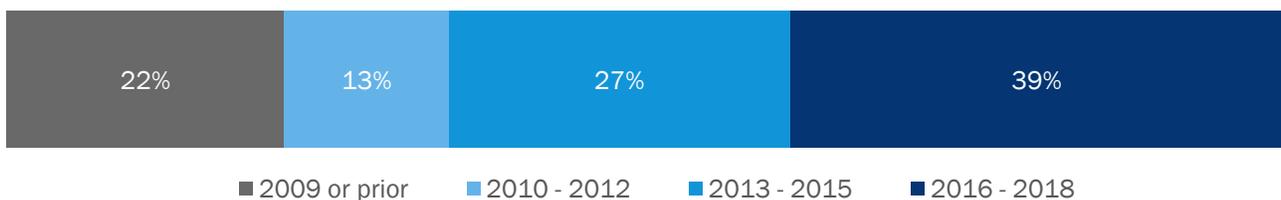
Respondents reported a variety of company sizes (Table 24). The number of employees ranged from one person to over a thousand, and the number of facilities ranged from one facility to 300, although the majority (79%) reported five or less facilities in Oregon. One-fifth of respondents noted their companies are woman-owned businesses, while two respondents (3%) noted their companies are minority-owned businesses.

Table 24. Size of Respondent Participants’ Companies (n = 64)

Company Characteristic	Percent
Number of Employees in Oregon	
Less than 10	33%
10 - 50	30%
51 - 200	22%
More than 200	14%
Don't know	2%
Number of Facilities in Oregon	
One	56%
2 - 5	23%
6 or more	17%
Don't know	3%

These respondent companies started participating in the Production Efficiency as early its launch year (2003), with 22% participating first before 2010 (Figure 3). The largest proportion of the respondent companies (39%), however, participated in the program more recently, between 2016 and 2018.

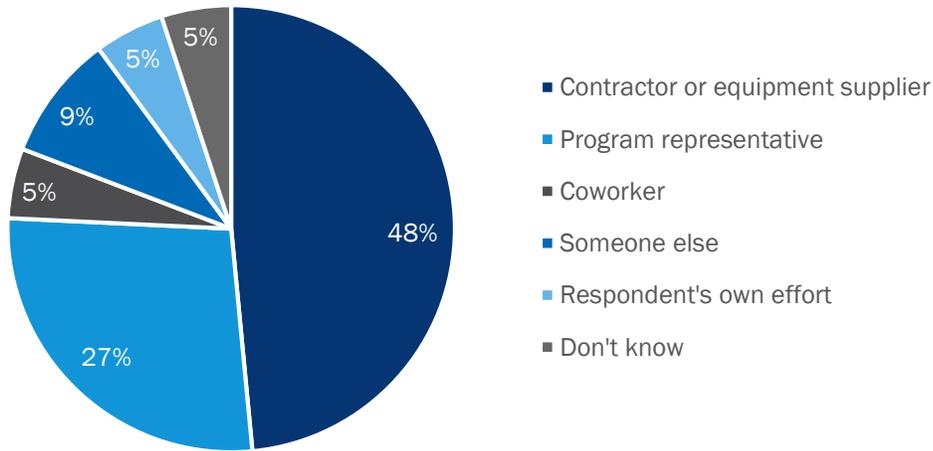
Figure 3. Year Entered Production Efficiency Program (n = 64)



7.3.2 Program Awareness

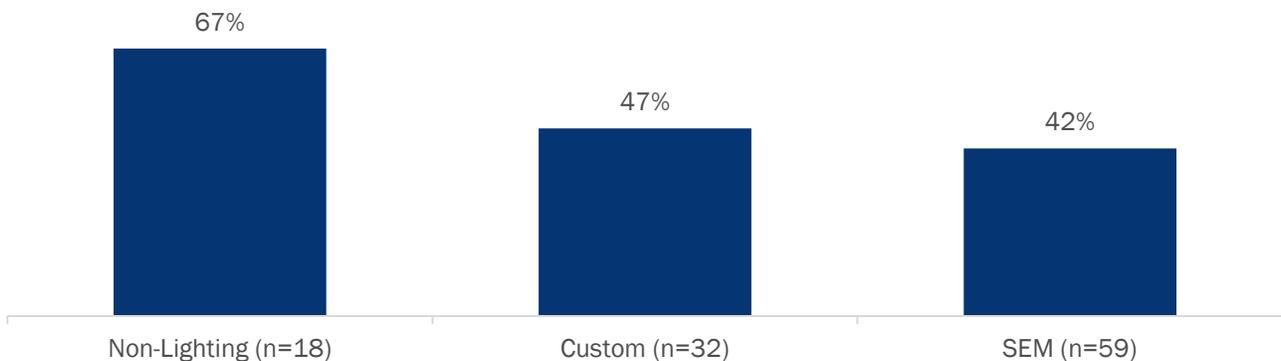
About half of the participants reported they first heard about Production Efficiency program from their contractor or equipment supplier (48%). About a quarter (27%) were informed through direct outreach by program representatives including Energy Trust staff and PDCs. Word-of-mouth also played a role for 14%. A small portion of the participants (5%) reported they found out about the program through their own research (Figure 4).

Figure 4. Source of Program Information (n = 64)



In general, participants appear to have awareness of program tracks other than the track they participated in (Figure 5). Among those who have only done lighting-related projects (n=18), two-thirds (12 of 18) reported they knew Energy Trust offers incentives and technical services for non-lighting efficiency improvements. Of the 32 surveyed participants who had done only lighting or standard/streamlined projects, about half reported awareness of custom incentives or technical services. Similarly, just a little less than half (42%) of the 59 surveyed participants who had done only non-SEM projects reported awareness of SEM. Of those reporting awareness of SEM, about one-third reported they knew a lot about SEM, about one-half said they knew a few details, and the remaining 16% reported they had heard of Energy Trust’s SEM service but didn’t know any details.

Figure 5. Participant Awareness of Other Production Efficiency Offerings



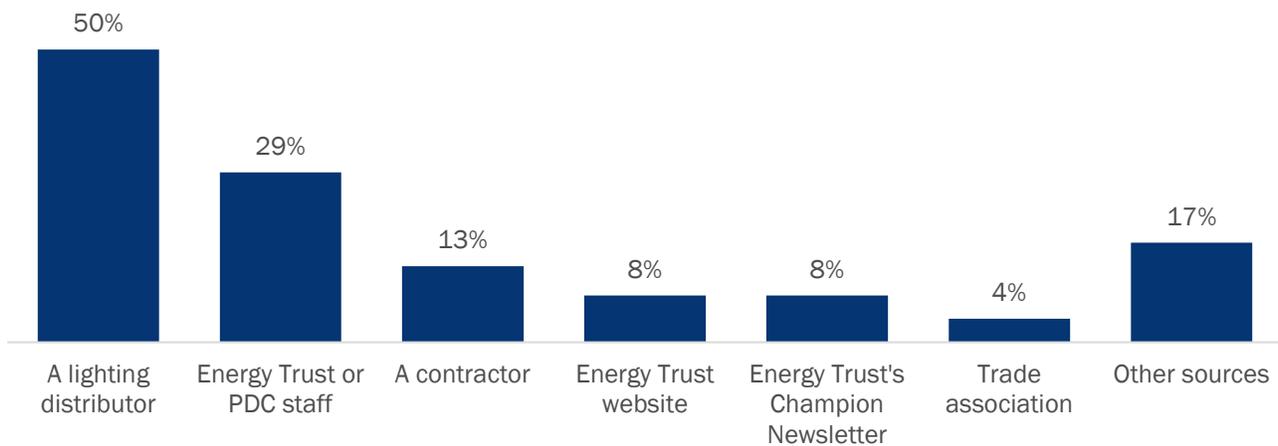
Participants aware of other program offerings gave a variety of reasons for not using these other services.¹⁸ Their response indicated one or more of the following: limited human resources to pursue such services; a lack of capital budget; a lack of knowledge about available programs and services; and having had difficulties with the application paperwork. Among the participants who have not done custom projects, a *lack of knowledge about the program resources* was more frequently mentioned barrier for participation compared with other tracks.

7.3.3 Lighten Up with LED Buy-Down

The Lighten Up with LED buy-down enables industrial customers to obtain an incentive directly from distributors. The survey investigated awareness and experience with the program. When we explained how the buy-down works,¹⁹ more than a third (38%) reported their awareness of the buy-down and slightly more than a quarter (28%) said their companies had already gotten Lighten Up with LED incentives for lighting bought from a distributor.

Among those who were aware of the buy-down, half of them reported they learned about it from a lighting distributor (Figure 6). Energy Trust or PDC staff were the next most frequently mentioned information source about the buy-down. Including through the Energy Trust website or the Champion Newsletter, nearly 45% heard from an Energy Trust source.

Figure 6. Source of Information About Lighting Up with LED (n = 24; Multiple Response)

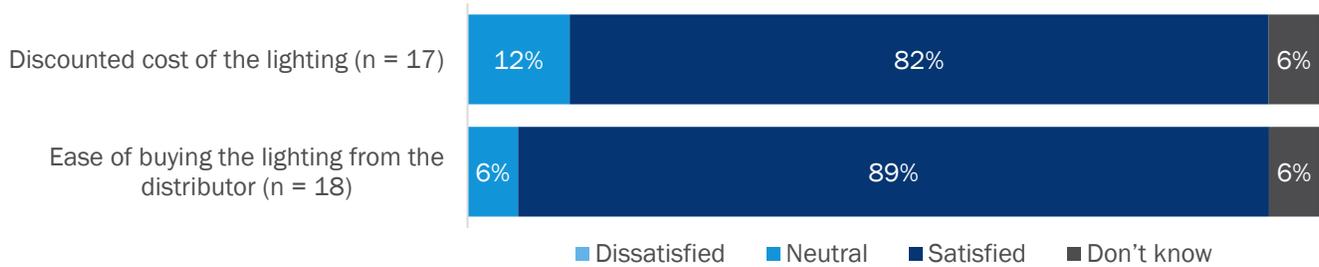


Those who have the experience of receiving incentives through the Lighten Up with LED reported fairly high satisfaction with the ease of buying the lighting from the distributor (89% 'satisfied') as well as with the discounted cost of the light (82% 'satisfied').

¹⁸ This question was asked for non-lighting, lighting, and custom services, and was not asked for SEM.

¹⁹ The buy-down was explained that "Starting in 2016, Energy Trust has made it possible for its industrial customers to get instant incentives on certain kinds of LED lighting when buying directly from distributors. [...] The instant incentives offered are slightly less than the incentives you would get through the application process."

Figure 7. Satisfaction with Lighten Up with LED



Note: Each item was rated using 0-10 scale where 0 is “not at all satisfied” and 10 is “extremely satisfied”. The responses 0-3 were coded as ‘Dissatisfied’, 4-6 as ‘Neutral’, and 7-10 as ‘Satisfied’.

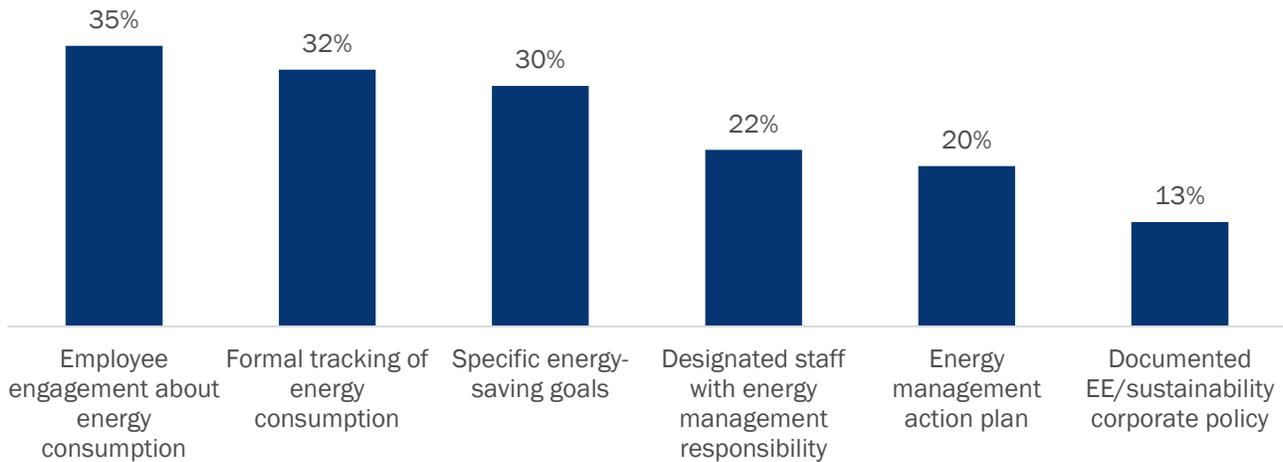
7.3.4 Energy Management Practices Among Non-SEM Participants

SEM offers coaching and training to help companies develop and improve their energy management practices, therefore understanding energy management practices for participants that have not taken part in SEM provides a sense of industry standard practice. The series of questions show that energy management practices are implemented in a minority of industrial firms even though they have participated in various Energy Trust programs.

Overall, 59% of the non-SEM participant companies reported their company is currently doing one or more of the six energy management practices we asked about (Figure 8).²⁰ Companies that completed custom projects or those that achieved large project savings were more likely to report having at least one of the energy management practices in place. More than a third (35%) reported they engage their employees in education and empowerment activities about energy-saving actions. Slightly less than a third reported they track their energy performance (32%) or have established specific energy-saving goals (30%). Designation of energy management staff, developing an energy management action plan or corporate policy are less common practices currently.

²⁰ The survey whether respondents engaged in each of six energy management practices. The survey effort was unable to ascertain whether respondents endorsing an item, such as “energy management action plan,” defined the item comparable to SEM guidelines. The reader should therefore assume that these self-reported endorsements represent an upper-limit estimate of the extent to which non-SEM participants engage in SEM practices.

Figure 8. Non-SEM Participants’ Energy Management Practices (n=60; Multiple Response)



The respondents who reported having specific energy-saving goals (n = 18) most commonly reported having energy savings goals (7 respondents), followed specific (identified) measures they are installing over time (5), cost savings goals (4), best operating practices they’ve adopted (2), and productivity increases (1).²¹ About half of respondents with goals noted they are doing well in meeting those targets; the remaining eight companies reported they have had moderate success in meeting them. Finally, almost two-thirds (63%) of the 19 firms who report their energy consumption or energy performance to internal stakeholders said they communicate this information on a regular or semi-regular basis. The remaining third reported they rarely communicate this information to internal stakeholders.

7.3.5 Strategic Energy Management

Four of the respondent companies had participated in the SEM track.²² We posed the same questions about SEM practices as we asked the non-SEM participant companies (n=60). These energy management practices shown are shown in Table 25, each respondent indicated whether it was in place at their company.

All of them (4 of 4) reported they have energy efficiency or sustainability corporate policy in place; notably this practice was reported least commonly by the non-SEM participants among all the management practices (13%, see Figure 8 above). All of the SEM participants but one (3 of 4) reported having an energy management action plan and designated staff with energy management responsibility, both of which were also practices less commonly reported by non-SEM group (20% and 22% respectively, see Figure 8). Three of the four SEM respondents reported they regularly track energy consumption and performance. The two SEM participants reporting specific energy-savings goals each reported a goal of 3% annual reduction; one reported doing “somewhat well” meeting this goal and the other reported “so-so” accomplishment. Two SEM participants reported that energy consumption or performance data are communicated on a regular basis to internal

²¹ Multiple responses allowed. Three respondents did not report specific goals. Identified measures and best practices included: “solar equipment, lighting, occupancy sensors, and ag equipment;” “compressed air, LEDs;” “renewable power, LEDs, energy saving building upgrades, weatherization, passive lighting and heating methods, energy efficient appliances and equipment.” “replace my fleet to save on fuel; no heaters in warehouse; turn computers off,” and “continue to look for low hanging fruit.”

²² As discussed in Appendix D, the evaluation team worked with Energy Trust evaluation staff throughout the data collection process to optimize the distribution of responses across program tracks and customer types coming from the small response rates. The resulting participant respondent sample included four customers participating in SEM, 8% of the SEM participants in the sample frame. Energy Trust should consider the responses provided by the four SEM participants to be illustrative, but not definitive..

stakeholders such as senior management and operations staff, and one SEM participants said such information was communicated on a semi-regular or irregular basis.

Table 25. Energy Management Practices in Place among SEM Participants (n = 4; Multiple Response)

Practice	Currently in Place	In Place Prior to SEM Involvement	Planned but not In Place Prior
Documented EE or sustainability corporate policy	4	2	0
Energy management action plan	3	1	1
Designated staff with energy management responsibility	3	2	1
Formal tracking of energy consumption/performance	3	1	1
Specific energy-saving goals	2	2	0
Employee engagement about energy consumption or empowerment to take saving actions	2	0	1

All four SEM participants rated the efficacy of their SEM coach in improving their ability to independently identify and address issues related to their company’s energy performance, as a “7” or higher using a 11-point scale where 0 is “not at all” and 10 is “a great deal”. Two of the four specifically mentioned that their coaches helped them identify several small improvement opportunities which cumulatively provided larger than expected savings. They also mentioned their frequent communication with their coach helped them to stay accountable to their energy performance actions.

When asked about the extent to which the energy performance actions made while participating in SEM persisted, three of the four respondents reported “everything” or “most” of what they started during their SEM participation is still in place at their company. One respondent noted that some of the things are still in place.

All four companies indicated they plan to continue energy performance practices identified during their SEM participation. One respondent mentioned that they will continue to use data they collect as they replace their old systems by applying lessons learned during their SEM participation. Another respondent said saving energy is now an integral part of their corporate environmental policy, which will be continuously monitored.

When asked for any suggestions for how to improve the SEM offering, one SEM participant replied, “*With our labor reduction (fewer people in management to oversee projects/programs), a person to check in, verify and make suggestions for improvements.*” The other three participants did not offer any suggestions.

We also asked them about additional SEM services they might find useful to continue their energy management practices. One respondent mentioned that additional training on some energy-using systems that were not covered adequately during their SEM participation might be useful now because those systems are not satisfactorily used due to a lack of training. Another respondent said an expansion of SEM to other facilities within their company is needed.

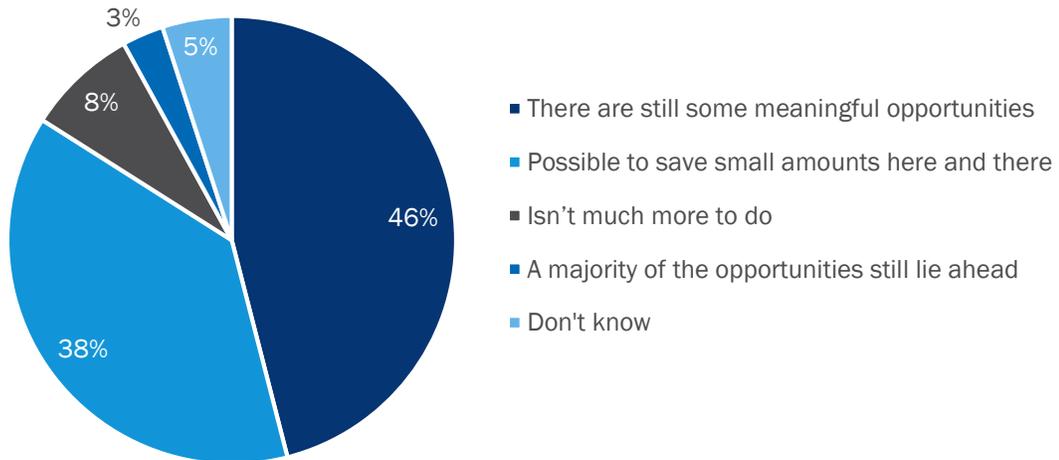
Three of the four SEM respondents reported they would be interested in attending workshops or other events where attendees could interact with other SEM participants to discuss energy management practices. Respondents think it might be optimal to hold such events two to four times a year.

7.3.6 Energy Savings Opportunities and Plans

Participants know that they still have energy savings opportunities left in their company facilities. The evaluation team asked all of the respondents which statement in Figure 9 best described the opportunities to save additional energy in their companies.

Only 8% said there is not much left to do to save energy. The rest reported varying degrees of remaining savings opportunities. More than a third (38%) reported “small amount” of opportunities, and the largest proportion of the respondent companies (46%) reported “some meaningful” opportunities left. There was a very few (3%) that said “a majority of opportunities” untapped.

Figure 9. Participants’ Opportunities to Save Additional Energy (n = 61)

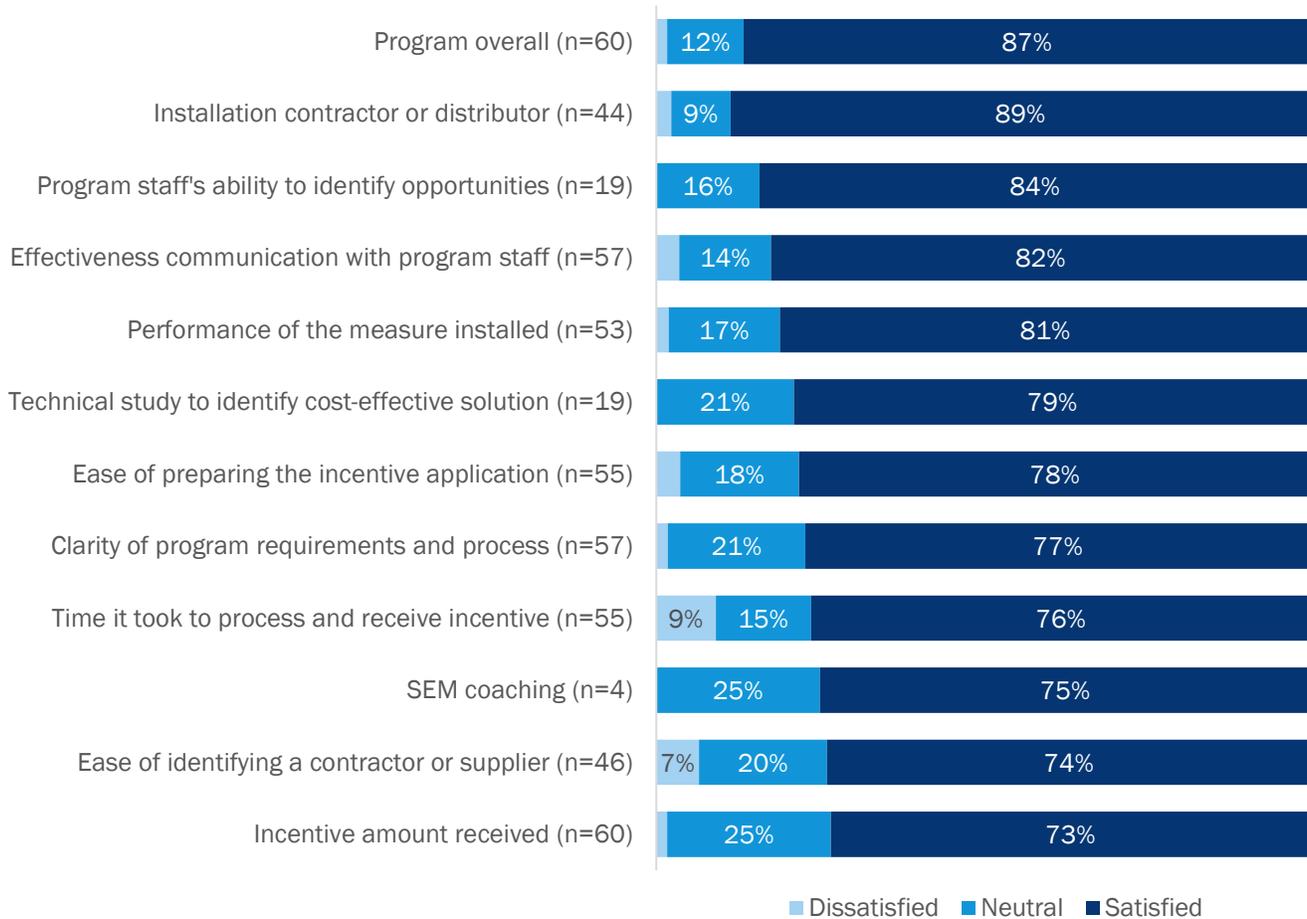


7.3.7 Satisfaction

Overall, satisfaction with the program was fairly high. A majority of the respondents (87%) provided ‘satisfied’ ratings to their overall program satisfaction, and all of the program elements received ‘satisfied’ ratings from more than two-thirds of the respondent companies (Figure 10). Ninety percent of participants reported they would likely recommend the program to others.

Further, program satisfaction does not vary by participation in different program tracks, by project size, or by any other group characteristics.

Figure 10. Participant Satisfaction with Program Elements
 (n = 64, Item Responses Exclusive of “Not Applicable/Don’t Know”)



Note: Each item was rated using 0-10 scale where 0 is “not at all satisfied” and 10 is “extremely satisfied”. The responses 0-3 were coded as ‘Dissatisfied’, 4-6 as ‘Neutral’, and 7-10 as ‘Satisfied’. Some of the items only applied to participants of certain program track(s); each item indicates the number of respondents who provided a response (exclusive of “don’t know”).

For the 2% of responses that provided a dissatisfied rating, we provided an opportunity to describe what was not fully satisfactory, but we received only a few meaningful responses.

One area of stated dissatisfaction was information received or the program processes were more complicated than what they wished. One respondent said he “simply wanted to know how much I’m going to save each month, net savings, etc. [...] it was confusing and could be clearer for people with less experience.” Another stated that “like any government program, it’s more complicated than needed.”

Others indicated a few more areas of confusion with the program requirements and processes, including the timing of material purchase to coordinate with project approvals, frequently changing application rules and forms, and lengthy wait times between program steps. A respondent from a small company added that the program appeared to be designed with larger companies in mind who have internal staff and expertise in energy.

Two respondents also noted their dissatisfaction with the performance of installed measures. One said equipment installed has not performed as well as the respondent was told. Another respondent who installed LED lighting noted that the LED bulbs did not last as long as advertised and had to do earlier replacements.

Three-quarters of surveyed participants did not identify any needs the program is not meeting. Of the 14 that offered comments, nine participants identified equipment, measures, services, and practices they would like addressed:²³

- More energy-efficient welders and ovens;
- Welders, compressors, old huge motors – make these more economical for smaller companies;
- Nut cleaning and drying equipment;
- Wheel-line hose or the supply hose used for linear movers;²⁴
- Methane digester;
- Pulling out and cleaning wells;²⁵
- LEDs for high-lumen applications;²⁶
- Constant real-time power monitoring to include harmonics; and
- Incentives for updating truck fleets.²⁷

Four respondents requested information:

- Help in recommending irrigation pump efficiency;
- Regular savings information that landlord/tenant has received since starting program;
- Information on incentives available for barn ventilation and lighting, [and] large new houses; and
- Savings on truck fleet emissions (comment by respondent interested in truck fleet incentives).

Three respondents would like to see program process and procedure changes:

- Streamline the application process. Make it easier for smaller companies;
- Allow owners to provide labor; and
- Allow bundling of measures with small savings.²⁸

²³ Multiple responses allowed.

²⁴ Respondent continued: “They have given money for gaskets to stop leaks, but the supply hose often times leaks the worse and with no incentive to replace it.”

²⁵ Respondent: “We have deep well areas. Sometimes when they pump out you see a rust – the iron-eating bacteria in water that gives it that rotten egg smell. But what happens overtime the bacteria produces deposits that build up in your deep-water turbine bowls and builds up in the pipes going up. Depending on how bad it is, every decade or so, you have to pull your pump let it dry and beat on it with a sledgehammer and all the buildup comes out. These pipes get beat up and they get holes in them. It is fairly common around here. If ETO can offer a program to look at these wells and provide incentives to pull your well and clean it out that would be great.

²⁶ Respondent: “Our company requires more lumens than ‘standard’ so we have not qualified for programs based on that even while using LED lights. The way I see it, more energy would be saved because we are a high consumer of lighting energy. Our work has a lot of fine detail to it and the material we use is black, so it absorbs light.

²⁷ Respondent added, “Saving on emissions would be useful to know.”

²⁸ Respondent elaborated: “If they [the measures] aren’t [generating] big savings, there are no incentives. Sometimes several small savings can equal the large savings, but you don’t get the credit.”

7.3.8 Other Topics

The survey included a few additional questions about respondents' experiences with interns, contractor-offered discounts, and *The Champion* newsletter.

Four non-SEM participant companies reported they have interns that are helping with energy efficiency. Among the non-SEM participant companies that did not have such interns, we asked them how much they would benefit from having outside help to find energy efficiency interns (Figure 11). About a quarter (27%) reported outside help would be at least "somewhat" helpful, but a majority (54%) indicated outside help would not be needed. Among the four surveyed SEM participants, one reported having interns "at times, but not always;" the other three did not have interns. One SEM participant not having an intern indicated their company would benefit "a lot" from having outside help finding energy efficiency interns; one reported "little or no" benefit, and one was not sure whether such help would be beneficial.

Figure 11. How Much Company Would Benefit from Having Energy Efficiency Interns (n = 57)



Only one company respondent could recall a contractor offering their own discounts on energy efficient equipment in lieu of buying Energy Trust-discounted lighting or applying for Energy Trust incentives for any equipment.

One-quarter (24%) of respondent participants indicated that they use in-house staff to service their major equipment. Most of the remaining participants (64%) reported using a mix of contractors and in-house staff to service their major equipment.

Sixteen percent of participants reported being aware of Energy Trust's quarterly industrial efficiency newsletter, *The Champion*, which informs the industry of best practices, emerging technologies, and technical training opportunities. Though asked, none of them offered suggestions for improvement in the newsletter. The remaining 84% reported they were unaware of the newsletter.

7.4 Nonparticipant Findings

7.4.1 Respondent Characteristics

A total of 31 respondents with an energy-related decision-making role in their company completed the survey. These surveyed nonparticipants held a diversity of decision-making positions such as owners or managers (Table 26). Respondents were also experienced in making decisions about their company's energy management: many (62%) reported being in a decision-making position for at least one decade.

Table 26. Nonparticipants' Work Titles (n = 31)

Title	Percent
Owner	29%
General manager or some other management position	26%
Facilities manager or director	16%
President/CEO/COO	13%
Engineer	10%
Superintendent	6%
VP or division director	3%
Other	6%

Nonparticipants represented a range of industrial business types; with the manufacturing sector comprising 42% of the sample and agriculture 32%.

Table 27. Nonparticipants' Market Sectors (n = 31) ^a

Sector	Percent	Count
Manufacturing, including:	42%	13
Apparel	6%	2
Construction	6%	2
Wood products	6%	2
Chemicals	3%	1
Fabricated metal products	3%	1
Food	3%	1
Paper	3%	1
Plastics and rubber products	3%	1
Primary metal	3%	1
Printing and related support activities	3%	1
Agriculture (other than cannabis), forestry, or related	32%	10
Warehouse/distribution	3%	1
Water and wastewater treatment	3%	1
Other ^b	19%	6

^a Percentages do not sum to 100% due to rounding error.

^b "Other" comprises two respondents in Public Administration (NAICS 91), and one each in Wholesale (NAICS 42), Retail (44), Arts, Entertainment, and Recreation (71), and Real Estate Management (53). Note that the participant sample also included respondents from the Wholesale, Retail, and Real Estate Management sectors, as well as Accommodation and Food Services.

The majority of surveyed nonparticipants have one Oregon facility that employs 20 employees or less (18 of 31; 58%). Five respondents had larger facilities in Oregon, where roughly 50 employees or more worked in a single facility. The remaining quarter (7 of 31) reported multiple Oregon facilities; most of these nonparticipants reported their companies employ at least 100 employees in Oregon.

Over half (18 of 31; 58%) of surveyed nonparticipants had facilities located in an urban area; the remaining 42% (13 of 31) were rural facilities. Five (of thirty-one) respondents noted their companies are woman-owned, and three (of thirty-one) reported they are minority-owned.²⁹

7.4.2 Program Awareness

Surveyed nonparticipants were familiar with Energy Trust of Oregon and its services. The majority (90%) reported they had heard of Energy Trust prior to the survey; three-quarters (75%) also mentioned they have worked for a company before that has received incentives or services from Energy Trust.

Seven nonparticipants reported they have heard of Energy Trust but have not worked for a company that has received incentives, or they were unsure if they had. Despite this, these respondents knew that Energy Trust offers financial incentives and technical services to improve the energy efficiency of equipment, systems, and processes. Further, these respondents have known about Energy Trust for many years – four noted they first heard about Energy Trust at least nine years ago.

These nonparticipants (n=7) first heard about Energy Trust from:

- A contractor or equipment supplier (two mentions)
- An Energy Trust program representative (one mention)
- An Energy Trust mailing (one mention)
- A grant (one mention)

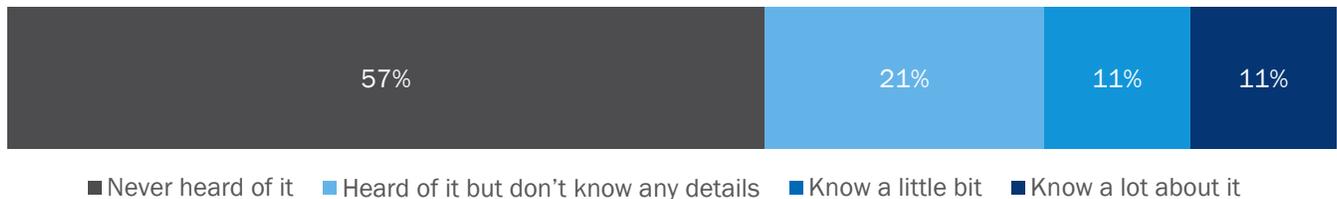
Lighting Buy-Down

Although most nonparticipants reported awareness of Energy Trust, many (71%) were not familiar with the lighting buy-down. Eight nonparticipants reported they were aware of this program, first hearing about it from a contractor, a lighting distributor, or Energy Trust staff.

Strategic Energy Management (SEM)

Many nonparticipants were also unfamiliar with Energy Trust’s SEM program: over half had never heard of it (Figure 12). Six respondents reported they knew a few details about SEM, or they knew a great deal.

Figure 12. Nonparticipants’ Awareness of SEM (n = 28)



²⁹ The survey also asked nonparticipants to select the category of electricity usage that best describes their companies’ annual usage. About half of respondents answered the question. The distribution of responses did not appear to be valid; thus, we do not report them.

Overall, nonparticipants are moderately interested in Energy Trust’s SEM program, with more than half (61%) indicated some to high level of interest in learning more about SEM offering (Figure 13).

Figure 13. Nonparticipants’ Interest in SEM (n = 31)



7.4.3 Energy Management Practices

Many (68%) nonparticipants reported having at least one energy management practice in place at their companies.³⁰ Respondent nonparticipants were significantly more likely than respondent participants to report that their firms engaged in regular, formal tracking of energy consumption or performance (58% of nonparticipants, compared with 32% of non-SEM participants). Nonparticipants did not differ significantly in their endorsement of the five other energy management practices explored in the study.

About two-fifths of nonparticipants mentioned having some type of energy-saving goal within their company; most of these respondents thought their companies were doing well with respect to their goals, which included:

- General, company-wide reductions in electricity and gas consumption (five mentions),
- Upgrade lighting to LEDs to lower electric bills (three mentions),
- Purchase and install solar at facilities (two mentions),
- Practice energy-saving behaviors, such as turning off lights and using preventative maintenance (two mentions), and
- Participate in an energy program (two mentions).³¹

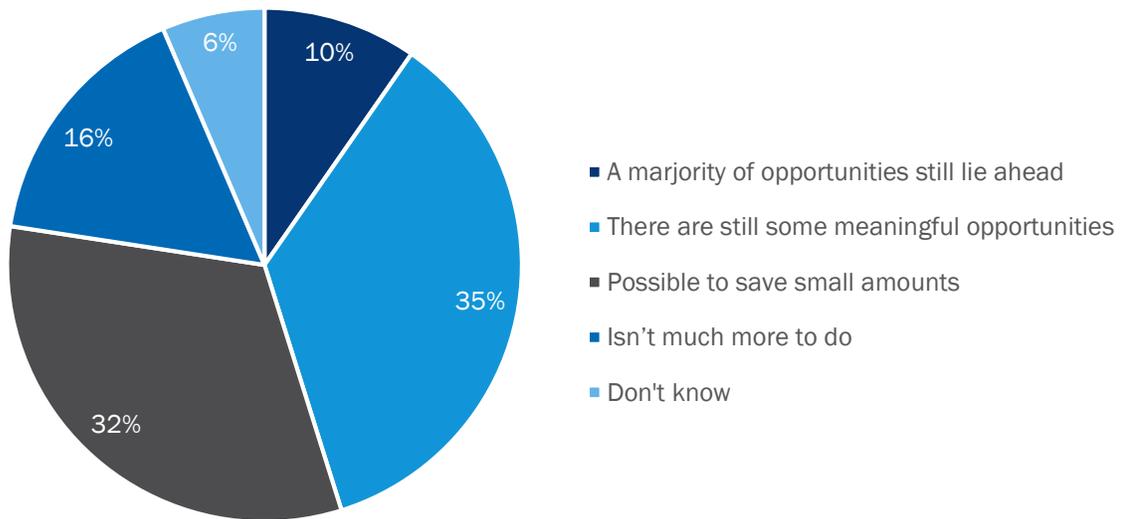
7.4.4 Energy Saving Opportunities and Plans

About three-quarters of nonparticipants reported that there are at least small remaining opportunities to save energy in their facilities (Figure 14).

³⁰ The survey whether respondents engaged in each of six energy management practices. The survey effort was unable to ascertain whether respondents endorsing an item, such as “energy management action plan,” define the item comparable to SEM guidelines. The reader should therefore assume that these self-reported endorsements represent an upper-limit estimate of the extent to which nonparticipants engage in SEM practices.

³¹ One respondent indicated a desire to go onto time-of-use rates; one respondent, aware of SEM, indicated a desire to participate.

Figure 14. Nonparticipants' Opportunities to Save Additional Energy (n = 31)



Nine respondents described the types of Energy Trust's support they need to help their company save energy, such as:

- Financial assistance via incentives to offset the cost of equipment upgrades and purchases, such as lighting and solar (four mentions)
- General, unspecified support to help them save energy (four mentions)
- More notification of and information about Energy Trust programs (one mention)

7.4.5 Other Topics

None of the nonparticipant respondents reported having company interns that help with energy efficiency. The majority of respondents (65%) perceived their company would not benefit from having outside help in finding interns.

One surveyed nonparticipant reported that a contractor has offered to discount energy efficient equipment for the customer in lieu of the customer buying Energy Trust discounted equipment or applying for incentives.

One-fifth (20%) of respondent nonparticipants indicated that have in-house staff to service their major equipment. Just under one-third (30%) reported they exclusively use contractors and the remainder (50%) reported using a mix of contractors and in-house staff to service their major equipment.

8. Conclusions and Recommendations

Energy Trust is interested in insight and recommendations to help it more effectively and efficiently deliver the Production Efficiency program. The evaluation team structured its conclusions to address the study's research questions (Table 1) and offers recommendations for program enhancement.

8.1 Conclusions

8.1.1 Program Performance

The Production Efficiency program in 2017-2018 served roughly the same number of projects and sites (over 2,000 of each) as served in the preceding two years (2015-2016) and saved roughly the same quantities of electricity and natural gas (over 330 million kWh and over 4.3 million therms). Compared to 2013-2014, the 2017-2018 program served more projects and sites, saved the same amount of electricity, and nearly doubled its natural gas savings. The number of technical analysis studies increased from each of the two prior biennia.

The average electricity and natural gas savings per project in 2017-2018 were comparable to those of 2015-2016; compared with 2013-2014, electricity savings per project decreased and natural gas per project savings increased.

8.1.2 SEM – Customer Practices

The Production Efficiency program's SEM track provides benefits beyond those associated with SEM activities. We estimate that SEM participants undertake about one more Production Efficiency capital project (that is, a non-SEM project with claimed energy savings, which includes upgrades and O&M) than non-SEM participants (roughly a 70% increase in average number of projects). Further, average project size in terms of electricity savings is higher for SEM than non-SEM participants. SEM participants had about 159,000 kWh more savings from capital projects in the two years after participating in SEM (roughly a 42% increase in electricity savings) than comparable non-SEM participants. We cannot conclude with confidence that SEM leads to more natural gas savings, neither can we conclude that SEM definitely does not lead to more gas savings.

Although the sample design with its small SEM count precludes the team from drawing definitive conclusions from SEM responses, we infer from survey findings that the SEM track is effective in increasing the uptake of corporate energy management practices among participants.³² SEM participants engage in six energy management behaviors investigated by the study more frequently than other customers, as consistent with SEM activities.

There appears to be an opportunity for Energy Trust to further support SEM participants by holding workshops or other events where attendees could interact with other SEM participants to discuss energy management practices. Respondents think it might be optimal to hold such events two to four times a year.

³² An alternative inference that we reject is that SEM participants differ from all non-SEM participants prior to their engagement in SEM. That is, that these customers already engaged in the six energy management practices at higher rates than other customers and their interest in SEM was an outgrowth of these differing behaviors. While it is true that SEM has attracted larger customers and larger customers are more likely than others to have the resources to support these energy management practices, we reject this inference of no SEM impact due to program self-selection bias because interviewed program staff and custom PDCs described that SEM participating is demanding. If these customers were already doing these six behaviors, we believe they would be unlikely to commit to the time- and resource-intensive SEM. More likely, these customers were already engaged in less comprehensive approaches to these behaviors.

8.1.3 Program Changes, Successes, Opportunities, Challenges

Production Efficiency program staff practices adaptive management and the program is continually evolving. In the years leading up to and including the 2017-2018 evaluation period, and into early 2019, staff made many changes to Production Efficiency, with which interviewees were pleased. Changes are focused on maintaining program savings and cost-effectively expanding its reach to historically underserved customers.

Energy Trust streamlined the first-year SEM approach (delivered to cohorts), including the development of a suite of SEM tools to support standardization and efficiency, launched continuous SEM (typically delivered one-on-one), are investigating modifications to first-year SEM to make delivery to smaller and rural customers feasible and cost-effective, and are deliberating ways to streamline continuous SEM. Interviewees expressed the view that these changes are effective and agree with the need for the change efforts that are underway.

In 2018, Energy Trust restructured the PDC role, making custom PDCs responsible for SEM engagements and technical analysis studies (accompanied by a re-bid of the custom PDC contracts), all PDCs responsible for processing project applications and reporting, and two PDCs responsible for developing standard/streamlined measures. Energy Trust improved its program databases and data access methods to facilitate these changes. Interviewees thought these changes improve the program efficiency. Custom PDCs identified many benefits associated with the changes in their role, including improved customer service, quality control, cost control, and savings accountability.

Energy Trust developed streamlined TAS, a tool for conducting technical analysis studies for smaller projects whose savings do not warrant the expense of a standard TAS. Contacts report this tool works well and hope to see its use expanded to somewhat larger projects, assuming the current application is proven to yield reasonably reliable results.

The lighting buy-down has had less uptake than anticipated. Both the lighting PDC contacts and lighting distributors noted the sales documentation requirements are burdensome and that the discounted lamp types are not a good match for the existing industrial lighting market structure (that is, respective roles of distributors and contractors and their existing relationships with customers). Nonetheless, the lighting track broadly (not restricted to the lighting buy-down) generated nearly 40% more electricity savings in 2017-2018 compared with 2015-2016, and nearly 80% more savings than in 2013-2014.

The program was not successful in its first attempt to develop a project scoping tool. Contacts thought the tool suffered from trying to “be all things to all people,” that is – too many objectives – with the result that it poorly accomplished each of its objectives. Program staff are analyzing options for the scoping tool.

All interviewed/surveyed groups – program staff and PDCs, lighting distributors and contractors, and participating and nonparticipating customers – reported they believe opportunities remain to improve the energy efficiency of the industrial sector. However, the study found that about half of the participants who had done only lighting or standard/streamlined projects reported awareness of customer incentives or technical services.

The greatest challenge facing the program is not new, and both program staff and PDCs are acutely attuned to it: Maintaining program savings while cost-effectively expanding its reach to historically underserved customers. Facets of this challenge include the cost to conduct marketing and project development visits with geographically dispersed customers, the cost of specifying custom projects (which for small/medium businesses are large compared to project savings), and a customer base that has not fully recovered from the Great Recession, lacking both funds and staff to engage in energy efficiency.

Program and PDC staff are addressing this challenge on a number of fronts: increasing the standard/streamlined offerings, offering a lighting buy-down, evolving SEM to cost-effectively serve such customers, conducting cost-effective technical assessments studies of smaller savings opportunities, and improving project scoping.

One of the SEM methodologies used by the study suggests an opportunity to improve the electricity usage data in the UCI database. A program staff person reviewing the draft report noted that the distribution of annual kWh usage among SEM and control sites skewed low.

8.1.4 Program Communication and Coordination

Interviewees thought that program marketing and outreach is effective, and 90% of surveyed nonparticipants reported they had heard of Energy Trust prior to the survey. We note, however, that only 2% of contacted nonparticipants responded to the survey; thus, it is likely that respondents familiar with Energy Trust self-selected to be surveyed at higher rates than unfamiliar respondents.

Interviewees also were pleased with program communication and coordination. PDC contacts described program staff as accessible and responsive.

Interviewees agreed that changes to the PDC roles have substantially improved program communication and coordination.

8.1.5 Measure Development

This study does not support conclusions regarding measure development process effectiveness. Most of the program staff and PDC contacts we interviewed could not speak directly to this topic. The few contacts that were knowledgeable about measure development did not elaborate on the brief responses they offered to our questions related to measure development.

8.1.6 Reaching Underserved Markets and Customers

Energy Trust launched its Diversity, Equity, and Inclusion initiative, which all PDCs reported awareness of and commitment to. The PDCs are actively seeking to serve customers historically underserved by Production Efficiency, but report ongoing challenges with serving them cost-effectively, as program staff are aware.

8.2 Recommendations

The evaluation team offers these recommendations for Energy Trust's consideration regarding the Production Efficiency program, which the study findings suggest is working well and poised to continue to be working well.

8.2.1 Participation by Rural Small and Medium Businesses

- Consider ways to “think outside the box” of the *constraints* limiting participation by rural small and medium businesses.
- Consider whether economic development funds or other non-Energy Trust funds might be coupled with Production Efficiency offerings to defray the costs of serving these customers.

- Consider developing with marketing funds case studies of targeted customers that have common equipment types or processes; provide Production Efficiency services as part of the cost of conducting the case studies.
- Consider developing comparative case studies of similar efficiency upgrades conducted for rural and urban customers where the case studies document the full delivery cycle from initial contact through incentive delivery; use these case studies to inform Energy Trust regulatory and legislative stakeholders of the differential costs to serve rural customers and to appeal for a solution to the cost-effectiveness quandary Energy Trust faces in serving rural customers.

8.2.2 Past Lighting and Standard/Streamlined Participants

- Conduct outreach to customers participating solely in lighting and/or standard/streamlined projects to promote Production Efficiency's additional offerings.

8.2.3 SEM Participant Support

- Offer workshops or other events a few times a year where attendees can interact with other SEM participants to discuss energy management practices.

8.2.4 Lighting Buy-Down

- Simplify the application requirements and processes for the lighting buy-down to address distributor concerns about the amount and redundancy of customer paperwork and a need for distributor staff training on proper invoicing and documentation.
- Improve communication with and training of lighting buy-down distributors.
- Conduct a deeper exploration of the existing market structure to better understand the industrial market potential of the buy-down. Interviewed distributors and contractors suggested barriers that limit the appeal of the buy-down, including a market characterized between long-term relationships between industrial customers and lighting contractors who provide turnkey solutions, and perceptions by contractors that the buy-down offering reduces their opportunities to get the installation work, make profits on mark-ups, and encourage customers to pursue more comprehensive lighting upgrades.

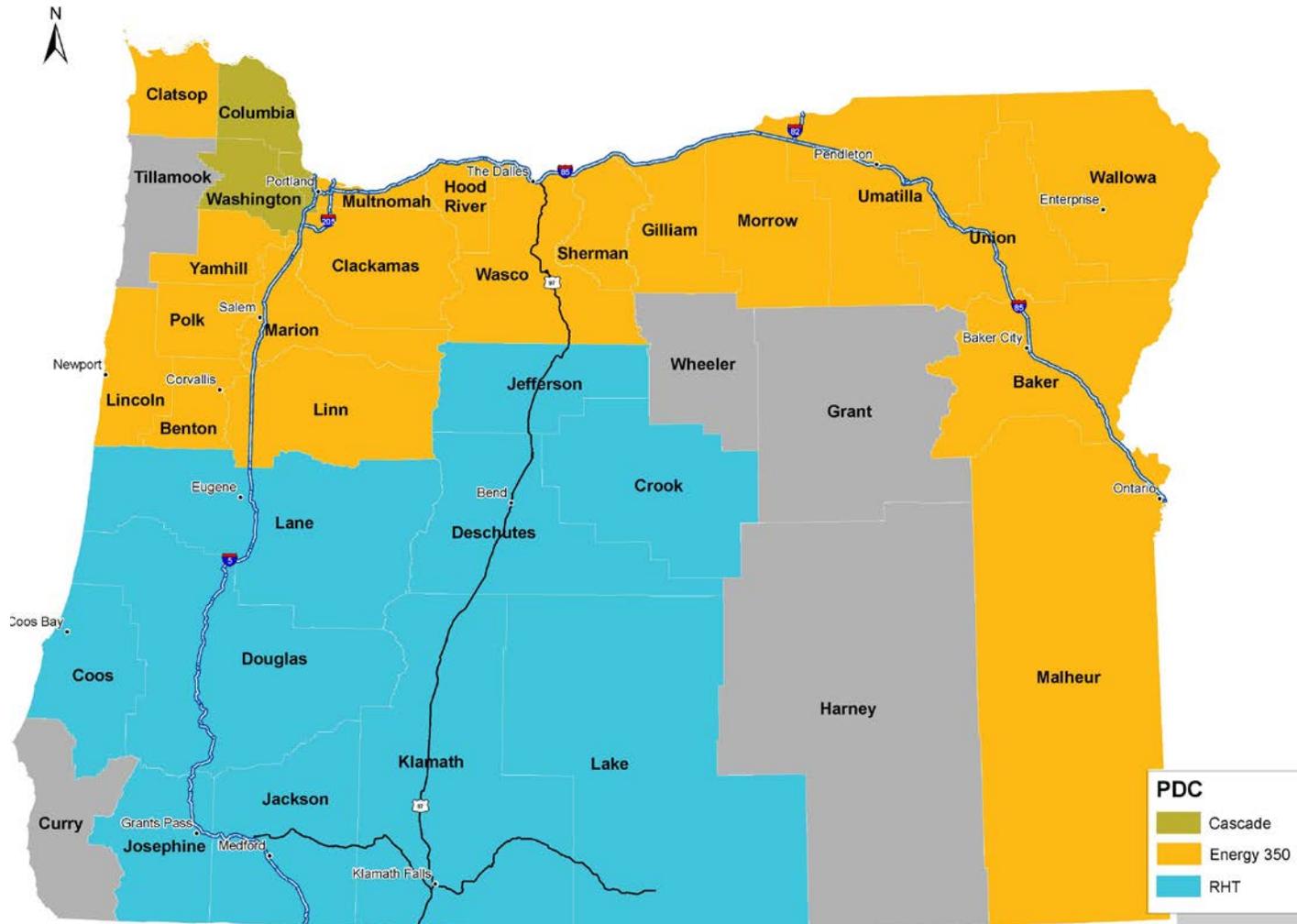
8.2.5 Measure Development

- Assess the PDC's measure development processes and outcomes. This study was not able to adequately address this research question given both the evolution of the study's objectives and the limited responsiveness of knowledgeable PDC contacts.

8.2.6 SEM Database Refinement

- Compare customers' annual electricity usage in the UCI database with their usage as gathered through SEM, which is judged to be comprehensive. Investigate the extent to which the UCI database omits some of these SEM customers' meters.

Appendix A. Areas Served by Custom PDCs



Appendix B. SEM Follow-Through Analysis Methodology

SEM Follow-Through Analysis Methodology

The overall approach was a set of linear regression analyses where the primary independent variable was group (SEM or control) and the dependent variables were number of capital projects completed, kWh saved, and therms saved after SEM engagement (the “post-SEM” or “post” period) or in the comparable period for controls, as explained below. The evaluation team used propensity score matching with inverse probability weighting to maximize the degree to which the control population matched the SEM population on key variables that could influence participation or outcomes. Propensity score matching is used to “mimic” the characteristics of a RCT in situations where an RCT is not possible.³³

The evaluation team carried out two separate sets of analyses. The first included all sites with electric usage and investigated the effect of SEM on the number of projects and kWh savings. The second included only those sites with natural gas usage both before and after the SEM year and investigated the effect of SEM on therm savings. As explained below, for SEM sites, the “SEM year” is the first year in which the site engaged in SEM activity (as documented in Project Tracking – specifically, the recognized date field). For non-SEM sites, “SEM year” refers to the SEM year of a group of SEM sites for which the non-SEM site served as a control; this also is explained in detail below. Through the rest of this document, then, references to the “SEM year” should be understood to include non-SEM controls.

Following a brief overview of propensity score matching and how the evaluation team applied it in the current case, this section provides details of data preparation and analysis.

Overview of Propensity Score Matching and Its Current Application

The evaluation team used a version of propensity score matching that uses logistic regression to identify variables (such as energy usage) that are associated with receiving the treatment, and then uses those variables to weight cases in the control population, such that those cases that are most like the treatment cases receive the greatest weight in the comparison of the outcome variables of interest. For each control case, the weight is calculated as

$$\frac{p}{1 - p}$$

where p is the probability that the case would have received the treatment based on the predictor variables in the logistic regression model.³⁴ Treatment cases receive a weight of 1, effectively meaning that those cases are not weighted.

The advantage of this version of propensity score matching is that it takes advantage of all appropriate control data. That is, rather than selecting specific control cases to match to treatment cases on a one-for-one basis,

³³ See, for example, Austin, Peter C. and Elizabeth A. Stuart (2015). “Moving towards best practice when using inverse probability of treatment weighting (IPTW) using the propensity score to estimate causal treatment effects in observational studies.” *Statistics in Medicine*. Wiley Online Library, August 3, 2015. Accessed November 28, 2018, from: <https://onlinelibrary.wiley.com/doi/full/10.1002/sim.6607>.

³⁴ Control weights are capped at 10; however, no control weight exceeded this value and thus no weighting restraints were imposed.

it uses all appropriate control cases but weights them so that the resulting weighted control group represents the best possible comparison to the treatment group.³⁵

In this analysis, propensity score matching identifies variables that are associated with SEM engagement and then weights the non-SEM sites when comparing them with SEM sites on projects completed and savings achieved in the “post” period.

As explained further below, the propensity score matching analyses used site-level data on energy usage and Production Efficiency project activity from the period before each SEM year (the “pre” period).

Data Preparation

Energy Trust provided the evaluation team with three datasets that, collectively, contained the data needed to carry out the analyses:

- **Integrated Dataset:** Organized as one record per site and contains data on annual electricity (kWh) and natural gas (therms) usage, building size, and information about the site's markets and sector. This dataset also identifies industrial sites.
- **Measure Data:** Organized as one record per installed measure, with measure description and reported savings per measure as well as project- and site-level identifiers allowing for savings to be aggregated to the project- or site-level and an identifier indicating whether the measure was associated with a Production Efficiency project.
- **SEM Data:** Organized as one record per SEM project, with SEM engagement type and reported savings as well as a site-level identifier, allowing for savings to be rolled up to the site level.

The evaluation team merged data from the three datasets at the site level and removed records for sites that had no Production Efficiency projects,³⁶ so that only sites with program-related activity remained. There were 160 active SEM sites and 4,750 active non-SEM sites. For each site, we calculated a range of parameters, captured as new variables:

- kWh usage per program year
- Therm usage per program year
- Number of capital projects per program year³⁷
- kWh savings from capital projects per program year
- Therm savings from capital projects per program year
- Earliest date of program participation
- Whether the site had any SEM engagement

³⁵ Austin and Stuart (2015), *op. cit.*

³⁶ PEProgramFlag was used to identify sites with PE-related activity.

³⁷ We calculated number of capital projects and both kWh and therm savings from capital projects each year by subtracting the number of SEM “projects” (engagements) and the SEM-related kWh and therms each year (identified in the SEM Data file) from the total project counts and kWh and therm savings (from the Measure Data file).

- SEM year, defined as the year associated with the “recognized date” field for the earliest SEM engagement³⁸

Table 28 lists the variables that the evaluation team used from the three datasets to merge the datasets and create the above new variables.

Table 28. Dataset Variables Used in Data Preparation

Variable	Dataset(s)	Description / Use
PEProgramFlag	Measure Data	Identify Production Efficiency related activity – used to exclude projects that were not program-related
MinRecognizedDate	Measure Data, SEM	Identify the date each project was completed – used to indicate when each site first participated in Production Efficiency
WorkingkWh	Measure Data, SEM	Identify project-level kWh savings – used to sum each site’s kWh savings per year
WorkingTherms	Measure Data, SEM	Identify the project-level therm savings – used to sum each site’s therm savings per year

Approximately 45% of site-level records did not have building size values, precluding the evaluation team from using building size in the analyses.

Approximately 20% of the site-level records did not contain electricity usage values.³⁹ In such cases, the evaluation team aggregated usage data up to a higher level in the site hierarchy to obtain more complete usage data for a given site.⁴⁰ This reduced the percentage of sites without usage data to about 17.5%.

Identifying “Pre” and “Post” Periods for SEM Participants

As noted above (and explained further below), the propensity score matching analyses used site-level data on energy usage and Production Efficiency project activity from the period before SEM engagement (the “pre” period). The duration of the “pre” period – that is, the amount of time between a site’s first program activity and that site’s SEM engagement – varied among participants. Therefore, for each participant, we calculated the mean annual energy usage and program project activity data in the “pre” period so that data would be comparable across participants. However, to provide an adequate base of “pre” period data for each participant, we included only sites that had first participated with the program at least two years before the year of their initial SEM engagement (their “SEM year”). The evaluation team set this inclusion criterion at two years, as a longer criterion would reduce the sample of sites.

The evaluation team set the “post” period at two years. A shorter interval might not include enough project activity to provide an adequate test of an SEM effect; a longer interval would mean that later cohorts could not be included in the analysis. Setting the “post” period at two years meant that only sites that had initially

³⁸ If a site engaged in SEM in multiple years, whether successively or not, it is only the date associated with the earliest engagement that matters.

³⁹ If a site had kWh usage but was missing therms usage, the evaluation team assumed the therms usage was 0 and assigned that value to the site.

⁴⁰ A given site may be related to other sites with geographic proximity and common ownership or management – for example, buildings on a campus. Each site has a site-specific ID (et_siteID). If that site is linked to others, they will share a common et_parentsitID and et_toplevelsitID. A further variable – SiteHierarchyLevel – indicates where a given site is located within a hierarchy.

engaged in SEM in 2016 or earlier could be included in the sample.⁴¹ As was the case with the “pre” period, the “post” period for each SEM site was based on the SEM year.

The above process left 152 SEM sites.

Identifying “Pre” and “Post” Periods for the Control Population

The question of how to treat non-SEM sites was complicated. If we were examining the effect of SEM engagement in a specific year, then all non-SEM sites with an adequate history of program activity before that year could serve in the control population. Theoretically, we could carry out a separate analysis for each group of participants with a given SEM year, and all non-SEM sites with an adequate program history would serve in the control population for each of those groups. A given non-SEM site could serve in the control population for many of those analyses, in each of which, the site would contribute a different set of “pre” and “post” data.

The small numbers of SEM sites in the various SEM years (ranging from 8 to 30), however, provide insufficient statistical power for such a “year by year” analysis. Thus, the evaluation team included all SEM years within a single analysis. Each non-SEM site could then serve as a control for only one SEM year, as using data from the same non-SEM site multiple times in the same analysis would violate the assumption of independence of observations.

The evaluation team sought a way to systematically allocate non-SEM sites to the control populations for the various SEM years. Suppose, for example, that for SEM sites, the distribution of non-SEM program projects across time differed between sites based on the year of their initial SEM engagement. This might be the case if there were a lot of consistency among sites in how their projects were distributed across time and in the number of years between their first Production Efficiency project and their initial SEM engagement. In that case, we could assign each non-SEM site to the SEM year for which the distribution of non-SEM projects was most similar to the distribution of Production Efficiency projects for that site.

For SEM sites, we examined whether the distribution of non-SEM Production Efficiency projects across time differed based on the year of initial SEM engagement. For each SEM year, we calculated the percentage of SEM sites that had non-SEM program projects each program year. Table 29 shows, for each SEM year, the percentage of SEM sites with non-SEM projects for each program year up to the seven years before the SEM year. There does not seem to be a consistent pattern, from one SEM year to the next, in how projects are distributed across time. For example, for SEM years 2012 through 2014, the percentages appear to increase, the closer the program year gets to the SEM year. For the other SEM years, percentages seem to increase and decrease over time, with no clear pattern. Thus, it would not be possible to allocate non-SEM sites to SEM years based on how the non-SEM sites’ projects were distributed across time.

⁴¹ Since at the time of this analysis, the 2018 program year was not yet completed, the “post” period for the 2016 cohort – the last one included in the analysis – goes to October 2018 for both SEM and control groups. If a site was engaged in SEM in 2017 or 2018, it was not categorized as non-SEM.

Table 29. Percentage of SEM Sites with Program Non-SEM Projects, by Number of Years Before SEM Year

SEM Year	Number of Years Before Initial SEM Engagement (SEM Year)						
	7 Years	6 Years	5 Years	4 Years	3 Years	2 Years	1 Year
2010	0%	31%	44%	19%	19%	19%	31%
2011	33%	27%	13%	27%	47%	40%	67%
2012	23%	15%	31%	38%	46%	85%	85%
2013	18%	24%	26%	29%	50%	62%	56%
2014	20%	27%	20%	27%	50%	47%	63%
2015	27%	30%	47%	40%	33%	50%	47%
2016	27%	27%	33%	20%	27%	27%	27%
2017	63%	50%	63%	25%	50%	50%	88%

Therefore, the evaluation team randomly allocated the non-SEM sites to SEM years, with one constraint: a non-SEM site could not be allocated to any SEM year if that site had first participated in the program less than two years before that SEM year.⁴² This was appropriate since the evaluation team had excluded SEM sites whose first Production Efficiency project had occurred less than two years before their initial SEM participation.

The above process left 2,630 non-SEM, or control, sites.

Excluding Sites without Energy Usage Data and Residential Sites

As explained below, electricity usage was a key variable in the method for matching non-SEM sites to the SEM group. Therefore, the evaluation team excluded sites without electricity usage data from all analysis. This left 127 SEM and 1,898 non-SEM sites.

The evaluation team also noted that Energy Trust had identified certain sites as being in the residential market sector despite being program project sites. Among the 127 SEM and 1,898 non-SEM sites left after the above exclusions, there were 10 sites identified as residential. On average, those sites had much lower electricity usage (mean = 134,101 kWh) than did other sites (mean = 8,421,283 kWh). The evaluation team assumed that those sites were residences that were part of a larger industrial or agricultural complex. The evaluation team excluded those sites to focus the analyses on sites where industrial or agricultural production occurs. This left 127 SEM and 1,888 non-SEM sites for the analysis.

Table 30 shows the total number of SEM and non-SEM (control sites) in the starting population and the numbers left after removing sites with no kWh usage data, sites without at least two years of program activity before the SEM year, and residential sites. Since the evaluation team carried out separate sets of analyses for all sites and for those with natural gas usage, this table includes the number of sites with natural gas usage after the attrition based on kWh usage, length of program activity pre-SEM, and residential site type. As

⁴² For the purpose of determining whether a site met this criterion for allocation to a given SEM cohort, the evaluation team considered any site that had completed a non-SEM Production Efficiency project by the end of March of a given year to have had project activity in that year. Thus, for example, any non-SEM site that completed its first Production Efficiency project on or before March 31, 2010, could be allocated to the control population for the 2012 SEM cohort, but those that completed their first project after that date could not be so allocated.

explained below, some additional sample attrition occurred after the initial propensity score matching analyses.

Table 30. Sample Attrition Prior to Analyses

	SEM	Control
All active sites with program activity	160	4,750
All active sites with ≥ 2 years program activity before SEM year and ≥ 2 years elapsed	152	2,630
All active sites with non-zero electricity usage	127	1,898
All active sites not identified as “residential”	127	1,888
All active sites with non-zero natural gas usage ^a	43	696

^a Applies only to analyses of natural gas savings.

Application of Propensity Score Matching

Once each non-SEM site was allocated to one of the various SEM years, the evaluation team applied the propensity score matching approach to develop weighting schemes for the non-SEM sites. As described above, this involved identifying variables associated with SEM engagement and then using those variables to weight the non-SEM sites to create the best possible comparison with SEM sites.

The evaluation team identified the following variables to include in the analysis: energy usage, number capital projects, kWh and therm savings in the period prior to their assigned cohort year (“pre” period), and a flag indicating the site was industrial (as opposed to agricultural, for example).⁴³ The evaluation team excluded sites without kWh usage. The evaluation team also had considered including building size in the model but decided not to because of excessive missing data.

As noted above, the evaluation team carried out two separate sets of analyses, one with all sites and one excluding sites with no natural gas usage. For each set of analyses, the evaluation team ran several logistic regression models to determine what set of variables generated the most effective weighting scheme to make the control sites a good match to the SEM sites.

Propensity Score Matching to Assess SEM Effect on kWh Savings

The initial sets of analyses did not generate a satisfactory matching scheme. While the best regression solution found that “pre” kWh and therm usage, and number of projects were all associated with SEM treatment (Table 31), the control group still differed markedly from the SEM group on “pre” kWh usage after weighting (Table 32). This large difference indicates the weighted control group is not a good match for the SEM group.

Table 31. Variables in Best Regression Solution to Identify Matching Variables for kWh Analyses – All Sites

Parameter	B	S.E.	Wald	df	Sig.	Exp(β)
Pre_Usage_kWh	0.000	0.000	3.964	1	0.046	1.000
Pre_Usage_Therms	0.000	0.000	4.283	1	0.038	1.000
Pre_Projects	0.712	0.125	32.246	1	0.000	2.038

⁴³ The evaluation team had access to usage data going back to 2011. For the 2010 to 2012 cohorts, the evaluation team estimated prior usage based on the nearest year with available usage data.

Table 32. Comparison of SEM and Control (Weighted and Unweighted) on “Pre” Parameters for kWh Analyses – All Sites

Parameter	SEM	Control	
		Unweighted	Weighted
Pre_Projects	1.66	1.18	1.54
Pre_Usage_kWh	56,206,745	642,677	17,233,361
Pre_Usage_Therms	6,430	2,710	7,086

A review of the data on “pre” period energy usage for the SEM and non-SEM sites suggested a cause of the problem. The distribution of “pre” period kWh consumption differed greatly for the SEM and non-SEM (control) populations (Table 33). It is not surprising that the two groups differed in consumption: that expectation was the reason for using the propensity score matching. However, it appears that the difference was so large that weighting the control population could not make it look like the SEM group.

Table 33. Distribution of Annual “Pre” Period kWh Usage – All Sites

	Group	Annual kWh Usage in “Pre” Period						Total
		1 to 50k	> 50k to 500k	> 500k to 2.5M	> 2.5M to 5M	> 5M to 25M	> 25M	
Number of Sites	SEM	7	16	54	26	20	4	127
	Control	773	748	291	47	24	5	1,888
Percentage of all Sites	SEM	6%	13%	43%	20%	16%	3%	100%
	Control	41%	40%	15%	2%	1%	0%	100%

To address the above problem, the evaluation team focused the analysis on the sites with usage in the most common range for SEM (500k to 25M kWh) and so excluded all sites from both groups that fell outside that range. This still retained a good-sized sample for the analysis (Table 34).

Table 34. Unweighted Sample Size by Group for kWh Analyses – 500k to 25M kWh Usage Sites

Group	Count
SEM	100
Control	362
Total	462

Doing the above greatly improved the match between the SEM and control groups. While pre kWh usage and projects were still associated with SEM treatment (Table 35), the resulting difference between the SEM and the weighted non-SEM means was much smaller – 3% or less, for each parameter (Table 36).

Table 35. Variables in Best Regression Solution to Identify Matching Variables for kWh Analyses – 500k to 25M kWh Usage Sites

Parameter	B	S.E.	Wald	df	Sig.	Exp(β)
Pre_Usage_kWh	0.000	0.000	22.890	1	0.000	1.000
Pre_Projects	0.335	.171	3.831	1	0.050	1.398

Table 36. Comparison of SEM and Control (Weighted and Unweighted) on “Pre” Parameters for kWh Analyses – 500k to 25M kWh Usage Sites

Parameter	SEM	Control	
		Unweighted	Weighted
Pre_Usage_kWh	3,744,996	1,912,345	3,663,303
Pre_Projects	1.50	1.31	1.51

Propensity Score Matching to Assess SEM Effect on Therm Savings – Natural Gas Sites

Production Efficiency is not able to serve certain gas customers – namely, gas transport customers. This analysis is limited to gas customers eligible to participate in Energy Trust programs. To carry out the propensity matching analysis of natural gas sites, the evaluation team started with the population of 127 SEM and the 1,888 non-SEM sites allocated to the various SEM years. The evaluation team then excluded all sites that did not have natural gas usage both before and after the pertinent cohort year. For example, if an SEM site in the 2012 cohort did not have gas usage both before and after 2012, that site was excluded. Similarly, if a non-SEM site that had been allocated to serve in the control population for the 2012 cohort had no gas usage either before or after 2012, that site was excluded. This process left 43 SEM sites and 696 non-SEM sites.

The evaluation team again used logistic regression to identify variables associated with SEM engagement among the natural gas sites. Since those sites also use electricity, the evaluation team included “pre” kWh usage as well as “pre” therm usage among the variables investigated.

As with the kWh analyses, the initial set of logistic regressions generated an unsatisfactory matching scheme. Again, while some “pre” variables were associated with SEM treatment (Table 37), weighting the control sites on the basis of those variables still left large differences between the groups, indicating a poor match (Table 38). Note that “pre” period kWh and therm usage and kWh savings were predictors of SEM participation, but “pre” period therms was not, so the kWh and therm usage variables and kWh savings were used in developing the control group weights for the natural gas sites. This is why kWh and therm usage and kWh savings are referenced in these tables.

Table 37. Variables in Best Regression Solution to Identify Matching Variables for Therm Analyses – All Natural Gas Sites

Parameter	B	S.E.	Wald	df	Sig.	Exp(β)
Pre_Usage_kWh	0.000	0.000	26.508	1	0.000	1.000
Pre_Usage_Therms	0.000	0.000	4.871	1	0.027	1.000
Pre_Savings_kWh	0.000	0.000	13.868	1	0.000	1.000

Table 38. Comparison of SEM and Control (Weighted and Unweighted) on “Pre” Parameters for Therm Analyses – All Natural Gas Sites

Parameter	SEM	Control	
		Unweighted	Weighted
Pre_Usage_kWh	3,015,865	465,735	4,464,005
Pre_Usage_Therms	18,253	6,441	29,560
Pre_Savings_kWh	287,122	69,970	684,232

As noted above, the evaluation team found that the distribution of “pre” period kWh consumption differed greatly for the SEM and non-SEM (control) populations and that this difference seemed to prevent a good propensity score matching result. That difference in distribution of kWh consumption also applies when only the natural gas sites are examined (Table 39). This was the case even when examining only those sites with natural gas usage – that is, kWh usage differentiated between SEM and non-SEM sites among natural gas sites, just as it did in the overall participant population. Although this set of analyses focuses on therm savings, the evaluation team focused the analysis on the sites with kWh usage in the most common range for SEM (for the natural gas sites, this range extended from 50k to 25M kWh) and excluded all sites from both groups that fell outside that range.

Table 39. Distribution of Annual “Pre” Period kWh Usage – All Natural Gas Sites

	Group	Annual kWh Usage in “Pre” Period					Total
		1 to 50k	> 50k to 500k	> 500k to 2.5M	> 2.5M to 5M	> 5M to 25M	
Number of Sites	SEM	1	8	19	9	6	43
	Control	201	347	123	16	9	696
Percentage of all Sites	SEM	2%	19%	44%	21%	14%	100%
	Control	29%	50%	18%	2%	1%	100%

Excluding sites outside of the 50k to 25M kWh usage range reduced the number of SEM sites but left a good-sized number of control sites for the analysis (Table 40).⁴⁴ Doing so changed the “pre” variables that were associated with SEM treatment (Table 41).

Table 40. Unweighted Sample Size by Group for Therm Analyses – Natural Gas Sites with 50k to 25M kWh Usage

Group	Count
SEM	42
Control	495
Total	537

Table 41. Variables in Best Regression Solution to Identify Matching Variables for Therm Analysis – Natural Gas Sites with 50k to 25M kWh Usage

Parameter	B	S.E.	Wald	df	Sig.	Exp(β)
Pre_Usage_kWh	0.000	0.000	20.457	1	0.000	1.000
Pre_Savings_kWh	0.000	0.000	5.376	1	0.020	1.000
Pre_Projects	0.621	0.312	3.968	1	0.046	1.860

However, while the above reduced the resulting difference between the SEM and weighted non-SEM means, the difference remained much larger than in the kWh analysis, particularly for “pre” kWh savings (Table 42).

⁴⁴ Although this set of analyses focuses on therm savings, the evaluation team used the kWh criterion to exclude sites because electricity still represented the majority of these sites’ energy usage. In fact, the evaluation team repeated the analyses with a therm-specific criterion for including sites in the analysis but doing so did not alter any of the results.

Table 42. Revised Comparison of SEM and Control (Weighted and Unweighted) on “Pre” Parameters - Natural Gas Sites with 50k to 25M kWh Usage

Parameter	SEM	Control	
		Unweighted	Weighted
Pre_Usage_kWh	3,087,214	644,737	3,174,933
Pre_Savings_kWh	291,742	88,173	740,113
Pre_Projects	1.49	1.17	1.49

Regression Analysis

The evaluation team carried out a series of linear regression analyses to assess the effect of SEM participation on the following “post” outcomes: number of projects, kWh savings, and therm savings. Each of the regression analyses included sites from all SEM years. The analyses of SEM effects on the number of projects and on kWh savings used all available SEM sites ($n = 100$) and control sites ($n = 362$); the analysis of SEM effects on therm savings used all available SEM sites with natural gas service ($n = 42$) and control sites with natural gas service ($n = 495$). Control sites were weighted based on the results of the propensity score matching – weighted sample sizes are given below.

Each regression analysis was a hierarchical regression model, with either number of projects, kWh savings, or therm savings as the single dependent variable. The independent variables were group (SEM or control); “pre” period usage, savings, and number of projects; and SEM year. The models included the “pre” variables since the weighting of control sites on those variables did not entirely eliminate the differences between the SEM and control groups on them. The evaluation team “forced” those variables into the regression models ahead of the treatment variable (SEM vs. control) and cohort year. This meant that the model examined the effect of treatment and cohort year on the dependent variables *after* any variance associated with the “pre” variables has already been accounted for in the model. While the number of SEM participants in specific years did not provide a high level of statistical power to test for an effect of SEM within specific SEM years, the evaluation team included year as an independent variable in the regression model to examine whether any time-related trends existed.

Appendix C. Free-ridership Analysis Methodology and Detailed Findings

The following subsections summarize how the evaluation team prepared the analysis data and designed and carried out the analyses to answer Energy Trust's research questions.

Free-Ridership Assessment Method

Each month, Energy Trust uses a short phone survey, called Fast Feedback, to gather feedback from participants within two (2) months after project completion.⁴⁵ The survey includes a brief free-ridership battery that takes less than two minutes to complete. The battery consists of two components: 1) a self-report of whether, absent the program, the respondent would have taken the same energy efficient action, done something else with some (but less) energy efficiency impact, or taken no energy efficient action; and 2) a rating of the influence of various program services (including incentives) on the energy efficient action taken. The responses to the free-ridership battery are converted a score, which ranges from 0 (indicating no free-ridership) to 1 (indicating maximum free-ridership for that component). The component scores are given equal weight, and then added, with the combined score ranging from 0 (no free-ridership) to 1 (complete free-ridership).

Datasets for Analysis

Energy Trust provided the evaluation team with three datasets:

1. Production Efficiency projects, going back to 2003, with project-level records showing customer and site identification, project year, project track, and kWh and therms saved.
2. Responses to the free-ridership battery in the Fast Feedback survey, going back to 2011.
3. SEM engagement records going back to 2009, with records showing customer and site identification for each SEM engagement.

As shown in Table 43, below, the first dataset included 12,747 Production Efficiency projects at 4,854 sites. As noted, above, this study focuses on Custom, Lighting, Prescriptive,⁴⁶ and Small Industrial projects; the dataset included 11,763 projects at 4,854 sites. This appendix refers to these project types as the "target project types" or "target types."

The second dataset provided free-ridership rates for 1,311 of those 11,763 projects at 1,058 sites. Of those 1,058 sites, 176 had two or more projects with free-ridership rates.

The third dataset provided data on 217 SEM engagements at 161 sites.

The evaluation team merged the three datasets, de-duplicating on site (using the et_siteid field).

⁴⁵ During 2018, Energy Trust tested the use of a web survey to use in conjunction with the phone survey; beginning in 2019, Energy Trust will continue using the web survey together with the phone survey for the residential sector programs but will use only the phone survey for the nonresidential sector programs.

⁴⁶ Referred to as Streamlined throughout most of this report.

Table 43. Counts of Projects and Project Sites

Group	Projects	Sites
All Production Efficiency	12,747	4,854
Custom, Lighting, Prescriptive, Small Industrial	11,763	4,854
With Free-Ridership Rates	1,311	1,058
With SEM Engagement ^a	217	161

^a Sites with SEM overlap with sites with free-ridership rates: of the 1,058 sites with free-ridership rates, 102 had SEM engagement and 956 did not have SEM engagement.

Analysis Approach

After merging the datasets described above, the evaluation team conducted a series of analyses to answer the following questions:

- Is there a tendency for free-ridership to increase or decrease with repeated participation?
- Is free-ridership higher or lower for sites with repeated participation compared to sites that have participated only once?
- Is free-ridership related to SEM engagement?

One factor that complicated the analyses is that a site may do projects through a mix of the target program tracks, and free-ridership may vary among those tracks. Analysis of project data revealed a tendency for Lighting projects to occur earlier and for Custom projects to occur later, so repetition effects would be confounded with program track differences.⁴⁷ Thus, any analysis of free-ridership differences between earlier and later projects must control for free-ridership differences among program tracks.

The evaluation team controlled for free-ridership differences between program tracks by adjusting free-ridership rates for Lighting and Prescriptive projects to make them comparable to Custom projects. To do this, the evaluation team performed the following:

- Calculated the mean Custom, Lighting, Prescriptive, and Small Industrial free-ridership rates (20%, 18%, 27%, and 22% respectively).
- Calculated the ratios of the mean Lighting, Prescriptive, and Small Industrial free-ridership rates to the mean Custom free-ridership rate (1.11, 0.76, and 0.91, respectively).
- Multiplied the free-ridership rate for all Lighting, Prescriptive, and Small Industrial projects by 1.11, 0.76, or 0.91, respectively, to create an adjusted free-ridership rate.
- Set the adjusted free-ridership score for each Custom project to be equal to the original rate for that project.

All analysis described below used the adjusted free-ridership scores. Note that free-ridership scores range from 0 to 1, where 0 represents no free ridership and 1 represents complete free-ridership.

⁴⁷ Of all sites' first projects, 32% were Lighting, 28% were Prescriptive, and 18% were Custom. By contrast, of later projects, 30% were Custom, 26% were Lighting, and 22% were Prescriptive. 23% of first projects and 22% of later projects were one of several other tracks or SEM.

Analysis of Repeat Participation

Project sites varied widely in how many times they participated. This could complicate analyses of repeated participation if such sites disproportionately contribute to the analysis results. The evaluation team addressed this complicating factor by conducting several analyses in which each site contributes only one observation:

- *Comparison of free-ridership for sites' first versus later projects.*

For this analysis, the evaluation team identified: 1) all projects that were a site's first project, were in the target project types, and had a free-ridership rate and; 2) for each site, all projects, after the first project, that were in the target types and that had a free-ridership rate.⁴⁸

There were 579 sites with projects that met the criteria for selection as the "first project"; in most of those cases, the first project was the only one for which there was a free-ridership rate. There were 525 sites with projects that met the criteria for selection as a "later project"; in most of those cases, there was no free-ridership rate for the site's first project. In all, there were 46 sites with projects that met the criteria for a "first project" and a "later project."

To make full use of all the data, the evaluation team conducted both between-sites and within-sites comparisons. For the between-sites analysis, the "first project" group included all 579 sites with projects that met the "first project" criteria – including the 46 sites with projects that also met the "later project" criteria. However, the "later project" group excluded those 46 sites, as including them in both groups would violate the assumption of independence of observations. The within-sites analysis included only the 46 sites with projects that met both sets of criteria.

- *Assessment of the correlation between each site's most recent free-ridership rate and several indices of project repetition or time.*

For each site, the evaluation team created variables that represented: 1) the most recent project free-ridership rate; 2) the total number of projects that had been completed at that site, regardless of project type or whether or not the project had a free-ridership rate; 3) the date of the project with the most recent free-ridership rate; and 4) the number of days that had lapsed between the site's initial Production Efficiency project and the project with the most recent free-ridership rate.

The evaluation team assessed the correlation between the free-ridership variable and the other three variables. If free-ridership is related to project repetition or timing, we would expect to see at least one positive correlation.

- *Examination of the relationship, within each site, between free-ridership and project sequence.*

For each site, the evaluation team sequentially numbered each project, regardless of track (i.e., project 1, 2, 3, etc.). Then, for each site with at least two projects that were a target type and had free-ridership rates ($n = 175$), the evaluation team calculated the slope of free-ridership regressed on the project's sequence number. Only projects that had free-ridership rates were included in the analysis, regardless of how many projects a site had. For example, if a site had 12 projects and free-ridership was assessed for the third, sixth, and eighth projects completed but not for the others, then the evaluation team calculated the slope of the three free-ridership rates regressed on the values 3, 6, and 8.

⁴⁸ This typically was the site's second project with a free-ridership rate; but it might be a subsequent project if the second project with a free-ridership rate was not a target type.

The evaluation team then examined the distribution and mean of the slopes calculated for those 175 sites. It can be expected that free-ridership may show a positive slope over time for some sites and negative slope for others. While, in most cases, the number of free-ridership rates for a given site is not sufficient to provide a reliable estimate of the relationship between free-ridership and project date for that site, it can still be expected that the slopes will be randomly distributed around the group mean. Across all sites, a mean positive slope would indicate that, on average, free-ridership increases over time, while a mean negative slope would indicate the opposite.

About 90% of projects do not have a free-ridership rate, which reduces the number of cases for which a site's first project has a free-ridership rate. This, in turn, reduces the sample size for comparing the free-ridership of a sites' first and subsequent projects. There is no specific solution to this challenge.

Analysis of Free-Ridership and Single versus Repeat Participation

For this analysis, the evaluation team identified: 1) all sites that had only one project and for which that project had a free-ridership rate ($n = 385$); and 2) all sites that had more than one project and for which the first project had a free-ridership rate ($n = 194$). The evaluation team compared the two groups of sites on the free-ridership rate of those sites' first project (which is the sole project for those sites with only one project). Thus, this comparison assesses whether sites that have done more than one project may have been more or less *inclined* to be free-riders at the time of their first project, compared to sites that have done a single project. In other words, this asks whether a greater or lesser tendency toward free-ridership may pre-exist and possibly lead to repeat participation, rather than the other way around.

One potential concern with the above analysis is that sites that have only one project are likely to be newer to the program, on average, than sites with multiple projects. Thus, the single-versus-repeat-participation variable is potentially confounded with date of participation. The evaluation team controlled for this confound with an analysis of covariance (ANCOVA), where group (single versus repeat participation) was the independent variable, free-ridership of the first project was the dependent variable, and date of the first project was the covariate.

Analysis of Free-Ridership and SEM Engagement

Finally, the evaluation team assessed the relationship between free-ridership and SEM participation by comparing the mean free-ridership values before and after the initial SEM engagement for SEM participants, and all free-ridership values for non-SEM participants. We conducted both between- and within-sites analyses. The between-sites analysis compared the mean free-ridership for non-SEM sites with free-ridership assessments of projects in the target types ($n = 956$) separately with the mean free-ridership assessed on projects in target types before SEM engagement ($n = 47$) and with the mean free-ridership assessed on projects in target types after SEM engagement ($n = 87$). The within-sites analysis compared the mean before- and after-SEM free-ridership values for SEM sites that had free-ridership assessments of projects in target types both before and after SEM engagement ($n = 27$). Again, these analyses used the free-ridership values that adjusted for differences between target types.

Detailed Findings

Repeated Participation over Time

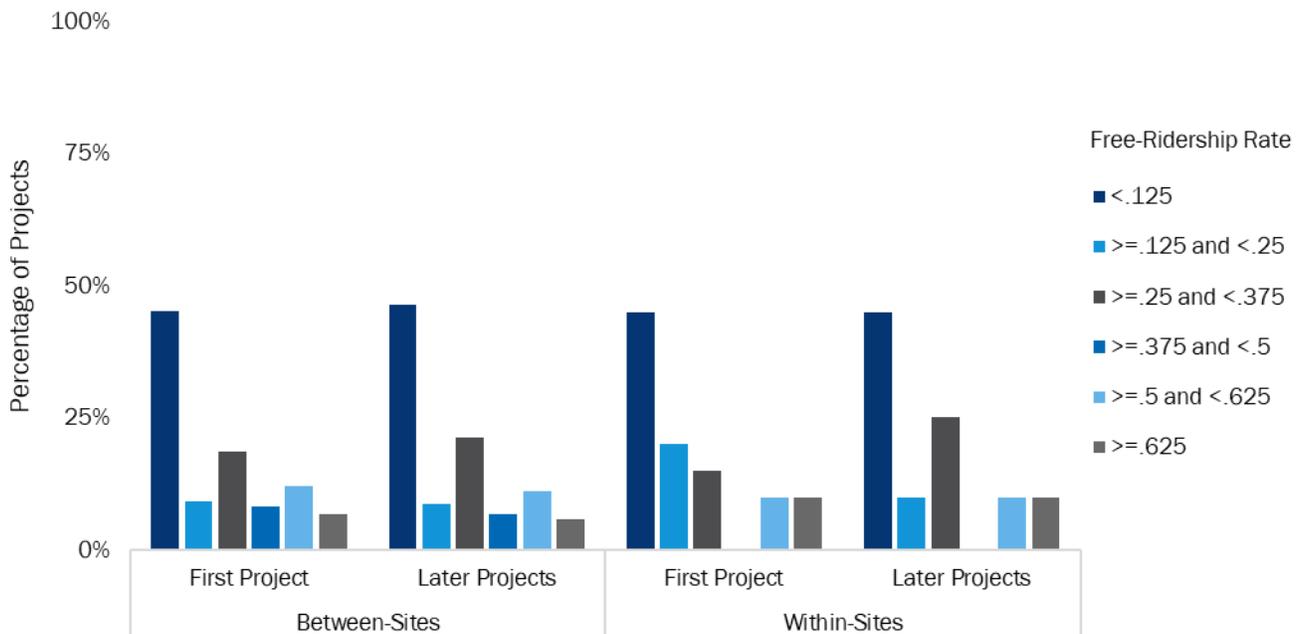
Neither the between-sites or within-sites comparison of the mean free-ridership value of first and later projects showed a statistically significant difference (Table 44).

Table 44. Comparison of Free-Ridership: First Project Versus Later Projects

	Between-Sites Comparison		Within-Sites Comparison	
	First Project	Later Project	First Project	Later Project
Mean	0.22	0.20	0.24	0.20
Std. Deviation	0.24	0.22	0.23	0.21
<i>N</i>	579	479	46	
<i>T</i>	0.14		0.40	

The distributions of free-ridership values were highly similar for “first project” and “later project” in both the between-sites and within-sites comparisons (Figure 1). For example, in both the between-sites and within-sites analyses, just under half of both first and later projects had free-ridership rates less than 0.125 and just under half of first and later projects had free-ridership rates from 0.125 to 0.625.

Figure 15. Distribution of Free-Ridership Rates for First Project and Later Project



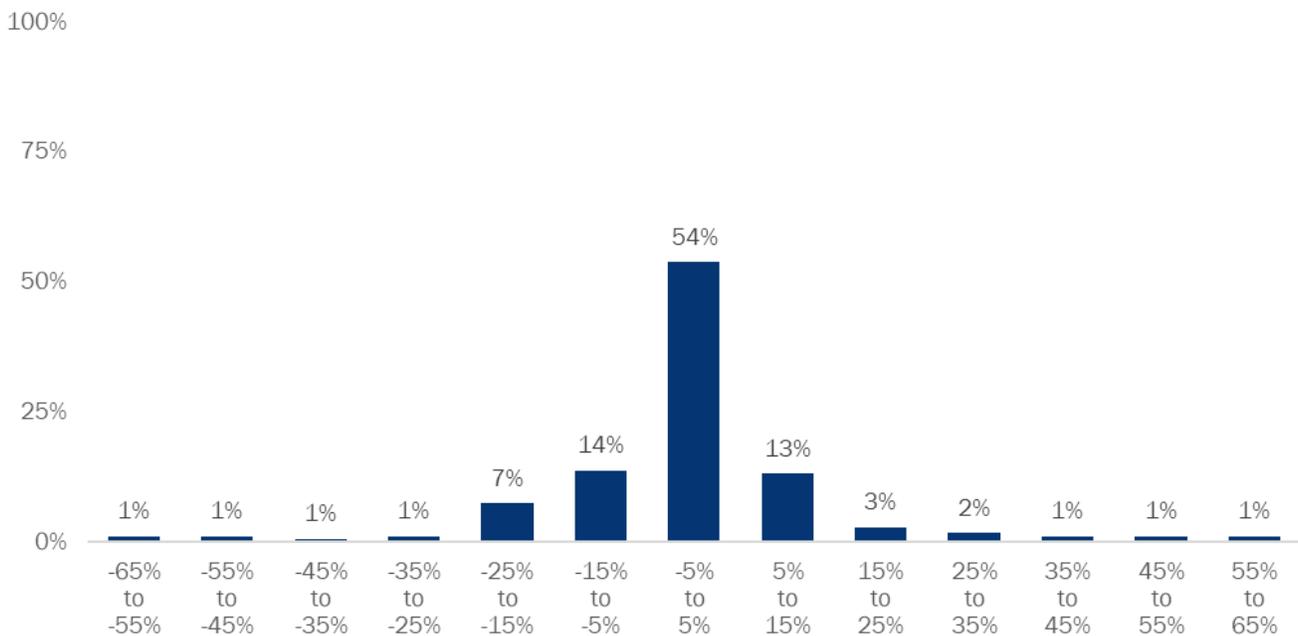
If free-ridership is related to repeated participation over time, we would expect to see a positive correlation between a site’s most recent free-ridership rate and at least one of the three indices of project repetition or timing. Table 45 shows that the correlations were uniformly very weak: none achieved statistical significance.

Table 45. Correlation Between Indices of Project Repetition or Timing and Most Recent Free-Ridership Assessment

Index of Project Repetition or Timing	Correlation (r) with Most Recent Free-Ridership Assessment
Number of projects completed	-0.06
Date of most recent project	-0.01
Number of days since first project	-0.05

Finally, if free-ridership is related to repeated participation over time, we would expect to see that in the findings from statistically regressing free-ridership on project order. Specifically, across the 175 sites with multiple free-ridership assessments, we would expect that the mean slope would be nonzero. The results show no such pattern. The mean slope was -0.011, indicating that, on average, the free-ridership value decreased by about a percentage point for each project completed. A value of zero lies well within the 95% confidence interval around that mean.⁴⁹ Figure 16 shows that the distribution of the site slopes (calculated using free-ridership regressed on project order for each of the 175 sites with more than one project) was very symmetrical and highly peaked, consistent with the small confidence interval.

Figure 16. Distribution of Site Slopes of Regression of Free-Ridership on Project Count (n = 175) ^a



^a The y-axis shows the percent of sites with a given regression slope; the x-axis provides those slopes, grouped into ranges. The furthest left value shown in the figure is interpreted as “One percent of sites (one or two sites) had an estimated slope value between -65% and -55%, indicating that the free-ridership value decreased (*increased free-ridership incidence*) about 50%.” The furthest right value shown in the figure is interpreted as “One percent of sites (one or two sites) had an estimated slope value between 55% and 65%, indicating that the free-ridership value increased (*decreased free-ridership incidence*) about 50%.”

⁴⁹ The standard error of the mean was 0.0151, resulting in a 95% confidence interval of ± 0.03.

Repeated versus Single Participation

The above analyses ask whether free-ridership might be related to a site’s repeated participation over time. There is another way in which free-ridership may be related to repeated participation – that is, if repeat participants tend to have higher or lower free-ridership, on average, than sites that participate only once.

Results of the ANCOVA indicate that the mean free-ridership rates for sites with only one project did not differ, on average, from the mean free-ridership rates of the first projects done by those sites with more than one project (Table 18). This may suggest that sites that have done more than one project may not have been any more inclined to be free-riders at the outset than sites that have done only a single project.

Table 46. Comparison of Free-Ridership: Sole Project Versus First of Repeated Projects

	Sole Project	First of Repeated Projects
Mean	0.23	0.22
Std. Deviation	0.25	0.25
N	385	194
F	0.08	

One caveat to the above is that the analysis took account only of completed projects, and not projects in the pipeline at the time, and so it is possible that some of the “sole project” sites were “repeated projects” sites. Moreover, it is not possible to know whether any of the sites with a “sole” project would do no more projects in the future.

SEM Engagement

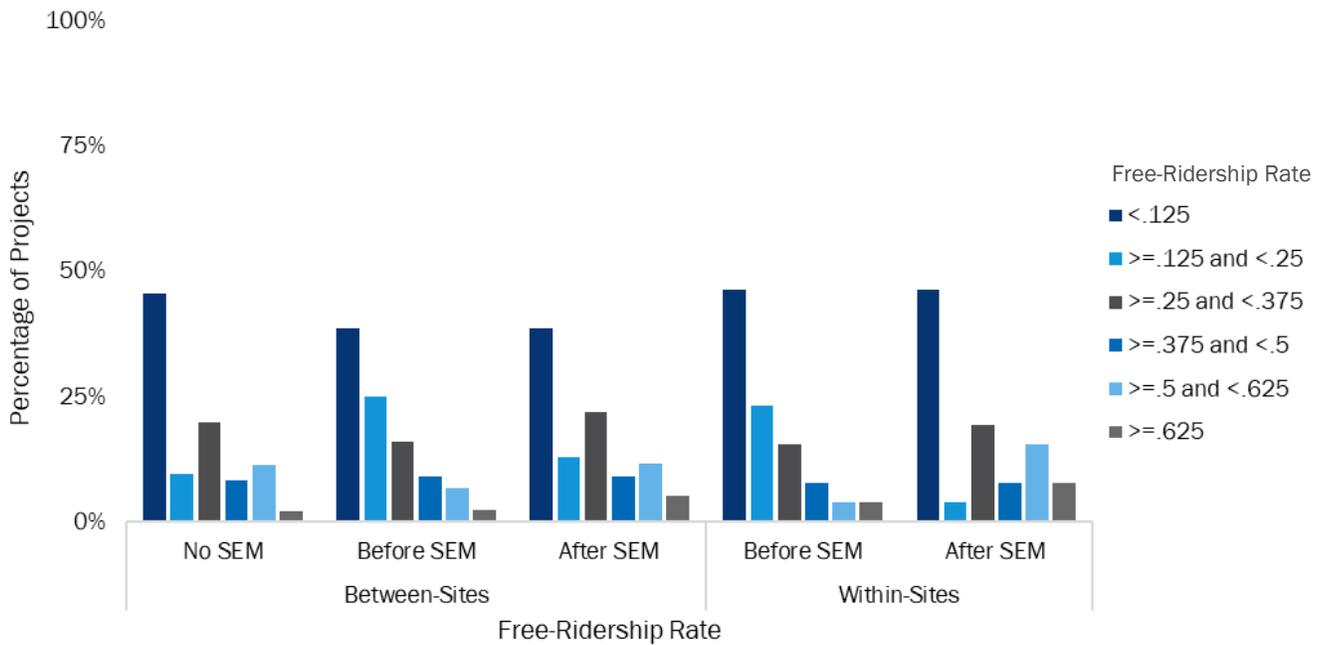
Mean free-ridership values were similar for SEM and non-SEM sites and were similar before and after SEM engagement at SEM sites (Table 47). None of the differences was statistically significant.

Table 47. Comparison of Free-Ridership: Non-SEM / Before SEM and After SEM

	Between-Sites Comparison			Within-Sites Comparison	
	No SEM	Before SEM	After SEM	Before SEM	After SEM
Mean	0.21	0.20	0.22	0.15	0.20
Standard deviation	0.23	0.23	0.20	0.18	0.20
N	956	47	83	27	27
T	No-SEM vs. Before SEM: 0.67 No-SEM vs. After SEM: 0.82			0.31	

The distributions of free-ridership values were similar for “no SEM,” “before SEM,” and “after SEM” in both the between-sites and within-sites comparisons (Figure 17).

Figure 17. Distribution of Free-Ridership Rates for No SEM, Before SEM, and After SEM



Discussion

These findings do not speak to the various arguments that have been made for or against the use of self-report for free-ridership assessment in general (e.g., Bliss et al. 2017; Haeri & Khawaja 2012; Peters & McRae 2008; Ridge et al. 2009). Nor do they suggest that a project’s assessed free-ridership could *never* be related to the project’s timing. For example, if free-ridership were assessed at the end of a program year for projects that occurred throughout that year, it is possible there would be differences in assessed free-ridership between the earlier and later projects *because of the differences in the time interval between project completion and free-ridership assessment*. The longer time interval between the earlier projects and their subsequent free-ridership assessment could result in less accurate recall of prior efficiency plans or of program influence that existed when the project was planned, thus biasing the free-ridership assessment in one direction or the other.

The above scenario is not so applicable to the Energy Trust free-ridership assessments, which are conducted throughout the year, usually about one and two months after project completion.⁵⁰ Therefore, whatever factors may affect the general validity of free-ridership assessment, they seem unlikely to bring into serious question the conclusion that neither repeated program participation nor SEM engagement appears to affect assessed free-ridership.

⁵⁰ The assessment occurs more than two months after project completion in about 30% of the cases; they exceed three months after completion less than 1% of the time.

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Appendix D. Interview and Survey Methodology

Interview Methodology

The evaluation team conducted multiple waves of interviews with Energy Trust’s Production Efficiency program staff and PDC staff. We conducted the first wave of interviews in the summer of 2018. We conducted additional interviewing in winter 2018 and April 2019 to better understand staffs’ experiences with program changes initiated in 2018, including contracting with PDCs for the 2019-2020 program period. Across all waves, we conducted 19 interviews. Roles changed for both Energy Trust program staff and PDCs between the first and third waves of interviewing. We conducted interviews with seven program staff that served in six roles and seven PDC staff working for five organizations (lighting plus custom for three territories).

Table 48. Staff and PDC Positions Interviewed, by Wave

Position	Wave 1	Wave 2	Wave 3
Energy Trust Industrial Sector Lead	✓		
Energy Trust Senior Program Manager – Custom	✓		✓
Energy Trust Senior Program Manager – SEM	✓		✓
Energy Trust Senior Program Manager – Streamlined	✓		
Energy Trust Senior Technical Manager	✓		✓
Energy Trust Operations Analyst	✓		
Lighting PDC, Program Manager	✓		
Lighting PDC, Project Manager Lighting Buy-Down Promotion & Outreach to Cannabis Production Facilities	✓		
Custom PDC through 2018 – Territory 1		✓	
Streamlined Projects PDC through 2018/ Custom PDC 2019 onward – Territory 1, Program Manager	✓		✓
Custom PDC 2019 – Territory 1, SEM Lead			✓
Custom PDC – Territory 2, President		✓	✓
Custom PDC – Territory 3, President		✓	✓
Total	9	3	7

Interviews covered program implementation and delivery; marketing and outreach; communication and coordination within Energy Trust, within the PDCs, and among Energy Trust, PDCs, and others; measure development; and challenges the program faces.

Participant Survey Methodology

Sampling

The evaluation team draw the study participant sample from Energy Trust program tracking data. The sampling goal was to obtain a sufficient number of completed surveys from participants that represented a range of geographic regions in Energy Trust's service territory and program tracks. Based on the program participant data Energy Trust provided the evaluation team randomly extracted participant sample from the participant

sample frame proportionately to the known distribution of program tracks. For this survey, “participant” was defined as a specific site which served as a unit of analysis and sampling.⁵¹

The evaluation team worked with Energy Trust evaluation staff throughout the data collection process to optimize the distribution of responses across program tracks and customer types coming from the small response rates. In the end, 64 participants that participated in a mix of program tracks completed the survey. The final sample is about a split between rural (48%) and urban (52%) geographic locations, which almost mirrors those among the sample frame (52% and 48% respectively). This overall sample size achieves 90% confidence and 10% precision. Table 49 summarizes the sampling frame and final sample of completed surveys.

Table 49. Participant Survey Respondents

Program Tracks	Sample Frame		Final Sample		Final Sample
	Count	Percent	Count	Percent	Percent of Sample Frame
SEM	48	4%	4	6%	8%
Custom	323	27%	18	28%	6%
Lighting	462	40%	38	59%	9%
Streamlined	405	34%	21	33%	5%
Total	1,197	105%	64	127%	5%

Note: Sums of column items exceed value in total row due to customer participation in multiple program tracks.

Data Collection

The evaluation team conducted data collection fielding by telephone and online between February and June of 2019. The contact list of 2,540 included customers who participated in multiple programs, so the final contact of 2,520 was divided into three groups with the intention of determining the best method to effectively reach customers and avoid sending an unnecessary number of survey requests. The first set of surveys were conducted by phone. This Wave 0 did not include an advance email or letter or incentive and resulted in 3 completes. In subsequent waves, each contact was sent an advance email directly from Energy Trust program staff, the evaluation team sent an initial survey invitation and three reminder emails to remaining non-respondents. The invitation requested the person complete the survey online or to call in to take a phone survey. Wave 1 of the online survey group with no incentive resulted in 11 completes. For the second and third waves, the evaluation team added a \$25 instant e-gift card incentive, which was delivered immediately after their survey submission. Finally, as a final attempt to reach Wave 2, before launching Wave 3, the evaluation team attempted to reach participants by phone, which was not very successful. Overall, Wave 2 and 3 added 45 responses for a total response rate of 5% of the 1,197 sampled firms (Table 50).

⁵¹ It is likely some companies have projects at multiple sites but there may be different individuals responsible for project planning, with different motives for and experiences with participating.

Table 50. Participant Survey Disposition by Program Track, Mode, and Wave

Program Track	Population		Sample Frame	Completes		Completes by Wave and Mode						
	Count	Percent		Target	Final	Phone			Web			
						Total Phone completes	Wave 0 (\$0)	Wave 2 (\$25)	Total Web completes	Wave 1 (\$0)	Wave 2 (\$25)	Wave 3 (\$25)
SEM	61	2%	48	15	4	1	1		3	1	2	0
Custom	406	16%	323	18	18	0	0		18	3	11	4
Other	2,053	81%	826	30	42	7	6	1	35	7	16	12
Other_Ag	884		351		17	0			17	6	5	6
Other_nonAg	923		475		19	1		1	18	1	11	6
Other_unknown	246		0		0	0						
Total	2,520	100%	1,197	63	64	8	7	1	56	11	29	16

Nonparticipant Survey Methodology

Sampling

The evaluation team drew the study nonparticipant sample from Energy Trust industrial customer contact data. The evaluation team defined nonparticipant as any unique business entity that either had never participated in Production Efficiency or had last participated more than five years ago (2012 or earlier). We used the integrated dataset, which contained data for all participant and nonparticipant sites for all Energy Trust programs (received October 30, 2018), and Production Efficiency measure-level data to identify the sites that met this definition.

We identified all sites that: 1) were flagged in the integrated dataset as industrial or agricultural and *not* as multifamily or residential and were not flagged as inactive; and were *either* 2a) identified as nonparticipants or 2b) identified as participants with no program participation in 2013 or later. This process identified 22,222 unique active industrial and industrial agriculture sites that had never participated plus 1,337 that had not participated in the past five years, for a total of 23,559 nonparticipant sites in the population.

Table 51 shows the total number of nonparticipant sites and the number remaining after each step in the selection and deduplication process described below. Energy Trust was able to obtain phone numbers from its CRM or from third-party sources (CoStar and InfoUSA) for 7,463 sites. The 7,463 sites did not each represent a unique business entity: more than 1,300 were related to other sites through common ownership or management, and those sites shared a common “top-level” site ID in the Energy Trust integrated dataset. Therefore, we de-duplicated the sample frame so that each top-level site ID (that is, each unique business entity) appears only once in the sample frame. This reduced the sample frame from 7,463 to 6,102 sites.

From the 6,102 sites, we made two further reductions. First, we identified and removed 627 sites that shared the same decision maker as another site, despite having a different top-level site ID; since they had the same decision maker, we did not consider them unique business entities. Second, we identified and removed 181 sites located in areas outside of Energy Trust’s service territory.

Table 51. Nonparticipant Industrial and Agricultural Sites by Participation Type

Participation Type	All Active Sites	Sites with Valid Phone Number Available	Top-Level Sites with Valid Phone Number Available	Final Sample Frame Sites with Unique Decision Makers in Energy Trust Territory
Never participated	22,222	6,179	4,957	4,633
Have not participated in past 5 years	1,337	1,284	1,145	842
Total	23,559	7,463	6,102	5,475

The evaluation team considered stratifying by energy usage, building size, and geographic location. Energy usage and building size were not useable for stratifying the sample because of the high percentage of missing records, but all records had sufficient data to stratify on geographic location. In consultation with Energy Trust staff, we identified urban and rural location as the most appropriate stratification variable. We used zip-code level data collected annually from the Oregon Office of Rural Health to identify each site as either urban or rural. We identified 2,891 (53%) sites as urban and 2,584 (47%) as rural.

We stratified the sample of 5,475 site proportionally between urban and rural sites (Table 52), and randomly ordered each list and drew a sample of 1,500, which we determined was sufficiently large to complete the

survey. The 1,500 were contacted via phone and web and the overall final sample achieved 80% confidence and 12% precision, with 2% response rate.

Table 52. Nonparticipant Survey Respondents

Stratum	Distribution of Nonparticipants in Sample	Final Sample	Confidence / Precision ^a
Urban	700	18	~ 80/16
Rural	800	13	~ 80/18
Total	1,500	31	> 80/12

^a Confidence/precision estimates take the finite population correction factor into account.

Data Collection

The evaluation team conducted data collection fielding by telephone and by web between February and June of 2019. Following a similar approach to the participant survey, the contact list of 1500 was divided into groups so that the survey invitations could be delivered in waves to avoid sending an unnecessary number of survey requests, and to minimize the use of incentives. The total number of contacts made were 554 in five waves.

Table 53 shows the disposition by survey wave. The first wave – Wave 0 was implemented by phone with no web or mail invitation. The second wave was delivered by web, with an advance email sent directly from Energy Trust program staff. After the advance email had been sent, the evaluation team sent an initial survey invitation with three reminder emails to non-respondents asking to complete the survey online or to call in to take a phone survey. Response to the Wave 1 online was low (three responses) so Wave 2 added an incentive of \$25, which did not improve the response rate (n=4). Therefore, for Wave 3 the incentive was increased to \$50. This amount did increase the response rates sufficiently that Wave 4 also used a \$50 incentive. A few phone calls to Wave 3 non-respondents did not substantially improve response, so only online surveys were used for Wave 4.

At the conclusion of the effort, with at least three reminders to nonparticipants, a quarter of the respondents (26%) completed the survey by phone, and the rest (74%) completed it online. The total response rate was 2% across the 1,500 attempted contacts.

Table 53. Nonparticipant Survey Disposition by Group, Mode and Wave

Nonparticipant Group	Percent	Sample	Final Completes	Completes by Wave and Mode							
				Phone			Web				
				Total phone completes	Wave 0 (\$0)	Wave 3 (\$50)	Total web completes	Wave 1 (\$25)	Wave 2 (\$25)	Wave 3 (\$50)	Wave 4 (\$50)
Rural	47%	700	13	3	3		10	1	2	7	0
Urban	53%	800	18	2	0	2	16	2	2	2	10
Total	100%	1,500	31	5	3	2	26	3	4	9	10

Appendix E. Interview Guides

Contractor

Email Advance Notice Script

Dear [NAME]:

I am contacting you on behalf of Energy Trust of Oregon to see if you will be willing to talk about your experience with the Production Efficiency program and in general about what's going on in the lighting world in the industrial and agriculture sector. The information you provide will help improve Energy Trust's services and benefits to its customers.

Research Into Action, Inc., a firm with extensive experience studying the market for clean energy and technology, is conducting these interviews on behalf of Energy Trust. Someone will be calling you in the next few days to a week to schedule a time to talk. If you have any questions about the interview or would like to suggest some good times to talk, please reply to this email or call Ryan Bliss at 503-943-2219.

Your honest feedback is important to Energy Trust. The information collected from this interview will be reported only in the aggregate.

If you have questions about the legitimacy of this study, please contact Erika Kociolek, Energy Trust Evaluation Sr. Project Manager, at 503-445-0578.

Thank you so much for your valuable feedback.

Sincerely,

Ryan Bliss
Director
Research Into Action, Inc.

Phone Script

Hello, my name is _____. I'm calling from Research Into Action, on behalf of Energy Trust of Oregon regarding an evaluation of the Production Efficiency program. Did you receive the email we sent you this past week saying I'd be calling?

[IF DID NOT RECEIVE EMAIL]

As part of the evaluation, Energy Trust has asked us to talk with contractors such as yourself to find out about their experience working with the program. Your opinions are really important to Energy Trust, and your suggestions may help improve the program.

Would this be a convenient time for us to talk? We probably need about 30 minutes. [If not, schedule another time; if so, continue. If they decline entirely, thank them for their time and terminate the call.]

IF ASKS FOR BONA FIDES, PROVIDE: Erika Kociolek at Energy Trust (503-445-0578, erika.kociolek@energytrust.org) if you have any questions about this.

IF RECEIVED EMAIL:

Would this be a convenient time for us to talk? We probably need about 30 minutes. [If not, schedule another time; if so, continue.]

Again, nothing you say will be identified with you or your company in our reports. Do you mind if I record our conversation to ensure the accuracy of my notes? Do you have any questions before we get started?

PRIOR TO STARTING INTERVIEW:

We will not report your specific responses but will only report the aggregate responses. Do you mind if I record our conversation to ensure that my notes are accurate? Do you have any questions before we get started?

Since this interview is to provide feedback for the Production Efficiency program, my questions are about your involvement in that program and your work in the industrial and agricultural sector, unless I specifically ask about other sectors.

Firmographics

I'd like to start with a few questions to make sure we have accurate information about your firm.

[ASK ALL]

Q1. My understanding is that your company is primarily a *[INSERT TYPE FROM ENERGY TRUST FILE]*. Is that correct? *[IF NOT]* How would you describe the type of work your company does? *[PROBE TO CODE; IF DISTRIBUTOR, MANUFACTURER, OR MANUFACTURER REP, SWITCH TO DISTRIBUTOR INTERVIEW]*

1. [OPEN-ENDED RESPONSE]

[IF IDENTIFIED ANY NON-LIGHTING EQUIPMENT]

Q2. About what percentage of your sales are lighting-related?

1. [OPEN-ENDED RESPONSE]

[ASK ALL]

Q3. Approximately how many employees work at all your company locations in Oregon?

1. [OPEN-ENDED RESPONSE]

Program Experience

Now I'd like to talk a little bit about your experience with the program.

[ASK ALL]

Q4. First, about what percentage of your program-related work is done through the Custom track and what percentage is done through the Streamlined track?

1. [OPEN-ENDED RESPONSE]

[ASK ALL]

Q5. Please rate your satisfaction with each of the following aspects of the program using a scale from 1, meaning not at all satisfied, to 5, meaning completely satisfied.

[INSERT 1-5 SCALE WITH DK AND REF; RANDOMIZE FIRST 7 ITEMS; KEEP ITEM 8 AS LAST ITEM]

1. The application process for becoming a Production Efficiency trade ally
2. The training that Energy Trust provides about the PE program
3. The program's lighting savings calculator tool – for prescriptive incentives
4. The program's lighting savings calculator tool – for custom incentives
5. The incentive offer pre-approval process
6. The project processes that occur after equipment installation
7. Your interactions with Energy Trust program staff
8. Your overall program experience

[IF ANY PART OF Q5 < 9]

Q6. You indicated some dissatisfaction with [REVIEW ITEMS]. What has not satisfactory? What would make it better?

1. [OPEN-ENDED RESPONSE]

[ASK ALL]

Q7. Are there any measures for which incentives are higher than they need to be? If so, which ones?

1. [OPEN-ENDED RESPONSE]

[ASK ALL]

Q8. Are there any measures that you could sell a lot more of if incentives were just a little higher? If so, which ones?

1. [OPEN-ENDED RESPONSE]

Lighten Up

In 2014, Energy Trust began offering customers in the commercial and multifamily sectors the opportunity to buy selected lighting products at discounted prices from participating distributors. Energy Trust calls this "Lighten Up with LEDs." Starting in 2016, the discount has been available also to industrial and agricultural customers as well.

The discount is slightly less than the incentive a customer could get by going through the incentive application process, and customers are not permitted to receive Energy Trust incentives for buying the discounted lighting. Right now, only customers, and not contractors, may buy the discounted lighting from distributors.

I have a few questions about how this buy-down might relate to your business.

[ASK ALL]

Q9. Were you aware of this lighting discount, or buy-down, promotion before I mentioned it?

1. [OPEN-ENDED RESPONSE]

[IF WAS AWARE OF BUY-DOWN, ASK Q10 & Q11, ELSE SKIP]

Q10. Since the Lighten Up buy-down first became available to industrial and agricultural customers in 2016, what affects, if any, has it had on your business with industrial and agricultural customers?

1. [OPEN-ENDED RESPONSE]

[PROBES:]

a. Has it changed the proportion of customers who are buying lighting products from your company vs. buying directly from a distributor? If so, how?

[ASK ALL]

Q11. Have you recommended to customers that they buy the discounted lighting rather than go through the application process? Why or why not?

1. [OPEN-ENDED RESPONSE]

[PROBES:]

a. Are there certain customers or types of customers that you are more likely to recommend to buy the discounted lighting rather than go through the application process? Which ones?

[IF WAS AWARE NOT OF BUY-DOWN, ASK Q12, ELSE SKIP]

Q12. Now that you know about the Lighten Up buy-down, would you recommend to customers that they buy the discounted lighting rather than go through the application process? Why or why not?

1. [OPEN-ENDED RESPONSE]

[PROBES:]

a. Are there certain customers or types of customers that you'd be more likely to recommend to buy the discounted lighting rather than go through the application process? Which ones?

[ASK ALL]

Q13. Energy Trust is currently considering changing the rules of the Lighten Up buy-down so that contractors like yourself could buy the discounted lighting from distributors on behalf of your customers. How would this affect your business?

1. [OPEN-ENDED RESPONSE]

[PROBES:]

a. Would you buy discounted lighting on behalf of your customers? Why or why not?

- b. Are there certain customers or types of customers for which you'd buy the discounted lighting rather than go through the application process? Which ones?
- c. Would you pass all of the discount on to your customers or would you mark up the discounted price to cover your time?

[ASK ALL]

Q14. We understand that the uptake of the discounted lighting in the industrial and agricultural sector has been low. Do you have any thoughts about why industrial and agricultural customers would not be buying the discounted lighting from distributors?

1. [OPEN-ENDED RESPONSE]

[PROBES:]

- a. Does it have more to do with the type of discounted lighting that is available or with a preference for going through the incentive process?

Efficiency Opportunities

Now I have just a few questions about opportunities to increase lighting efficiency in the next couple of years.

[ASK ALL]

Q15. Based on your experience, how much opportunity exists in the industrial and agricultural sectors to increase lighting efficiency from equipment replacements or upgrades over the next two years and where do those opportunities exist?

1. [OPEN-ENDED RESPONSE]

[PROBES:]

- a. For example, compared to the amount of energy savings that the program has produced in the past two years, how much can it produce in the next two?
- b. What kinds of lighting equipment change-outs will be involved?
- c. With what kinds of industrial/agricultural customers is the opportunity greatest?
- d. Does the opportunity exist more for large customers or small-to-medium ones?
- e. Is there more opportunity in some parts of the state than others? Where and why?

[ASK ALL]

Q16. What role will lighting controls have in achieving lighting-related savings in the next two years?

1. [OPEN-ENDED RESPONSE]

[PROBES:]

- a. What factors might limit the ability to achieve savings through lighting controls? [e.g., cost of the controls compared to the value of the savings they might produce, having staff knowledgeable about controls]

[ASK ALL]

Q17. Many of the large industrial and agricultural customers have already done significant upgrades through the program, and now Energy Trust is looking to reach smaller customers in that segment. What barriers do you think exist to getting smaller customers to participate?

1. [OPEN-ENDED RESPONSE]

[PROBES:]

a. What challenges does *your* company face in working with smaller industrial and agricultural customers?

[IF BARRIERS MENTIONED]

Q18. What can be done to overcome those barriers?

1. [OPEN-ENDED RESPONSE]

Diversity, Equity, and Inclusion (DEI) Goals

Energy Trust has established goals to increase program activity with women-owned and minority -owned businesses, as well as companies working with underserved communities.

[ASK ALL]

Q19. What, if anything, have you heard about such goals?

[If needed: Energy Trust has been using the phrase “Diversity, Equity, and Inclusion” to refer to these goals.]

[SINGLE RESPONSE]

1. [OPEN-ENDED RESPONSE]

[ASK ALL]

Q20. Is your company woman-owned or minority-owned? Which one?

[MULTIPLE RESPONSE]

1. Not woman- or minority-owned
2. Woman-owned
3. Minority-owned
4. Both woman- and minority-owned

[Do not read]

96. Other, please specify: [OPEN-ENDED RESPONSE]
97. Not applicable
98. Don't know
99. Refused

[ASK ALL]

Q21. Of your company's work in the industrial and agricultural sector, about what percentage is with customers located outside the major metropolitan areas?

[If needed: By major metropolitan areas, we mean like the Portland Metro area, Salem, and Eugene]

[MULTIPLE RESPONSE]

1. [OPEN-ENDED RESPONSE]

[ASK ALL]

Q22. And of your company's industrial and agricultural customers, which types have the greatest challenges in participating in Energy Trust?

1. [OPEN-ENDED RESPONSE]

[ASK ALL]

Q23. What types of challenges do these types of customers have in working with Energy Trust?

1. [OPEN-ENDED RESPONSE]

Cannabis Growers

This is my last set of questions. As you may be well aware, the number of recreational cannabis producers, who use a significant amount of energy, has exploded in Oregon in the past year, and Energy Trust has been working to make inroads with this market.

[ASK ALL]

Q24. In what ways, if any, has your company worked with cannabis growers?

1. [OPEN-ENDED RESPONSE]

[ASK IF RESPONDENT REPORTED WORKING WITH CANNABIS GROWERS]

Q25. Do these cannabis growers have any special needs that Energy Trust may not be aware of? If so, what are they?

1. [OPEN-ENDED RESPONSE]

[Do not read]

98. Don't know
99. Refused

[ASK ALL]

Q26. What are the key challenges in increasing participation by and working with this group, if any?

1. [OPEN-ENDED RESPONSE]

[Do not read]

98. Don't know
99. Refused

[ASK IF ANY CHALLENGES NOTED]

Q27. What has worked well in addressing such challenges? What has not worked well?

1. [OPEN-ENDED RESPONSE]

[Do not read]

98. Don't know
99. Refused

Closing

Those are all the questions I have for you today.

[ASK ALL]

Q28. Before closing, are there any topics that you expect us to address that I did not ask you about?

1. [OPEN-ENDED RESPONSE]

[Do not read]

98. Don't know
99. Refused

Thanks again for your time. Please feel free to reach out if you have any questions or additional thoughts you'd like to share.

Distributor

Email Advance Notice Script

Dear [NAME]:

I am contacting you on behalf of Energy Trust of Oregon to see if you will be willing to talk about your experience with the Production Efficiency program and in general about what's going on in the lighting world in the industrial and agriculture sector. The information you provide will help improve Energy Trust's services and benefits to its customers.

Research Into Action, Inc., a firm with extensive experience studying the market for clean energy and technology, is conducting these interviews on behalf of Energy Trust. Someone will be calling you in the next few days to a week to schedule a time to talk. If you have any questions about the interview or would like to suggest some good times to talk, please reply to this email or call Ryan Bliss at 503-943-2219.

Your honest feedback is important to Energy Trust. The information collected from this interview will be reported only in the aggregate.

If you have questions about the legitimacy of this study, please contact Erika Kociolek, Energy Trust Evaluation Sr. Project Manager, at 503-445-0578.

Thank you so much for your valuable feedback.

Sincerely,

Ryan Bliss
Director
Research Into Action, Inc.

Phone Script

Hello, my name is _____. I'm calling from Research Into Action, on behalf of Energy Trust of Oregon regarding an evaluation of the Production Efficiency program. Did you receive the email we sent you this past week saying I'd be calling?

[IF DID NOT RECEIVE EMAIL]

As part of the evaluation, Energy Trust has asked us to talk with distributors such as yourself to find out about their experience working with the program. Your opinions are really important to Energy Trust, and your suggestions may help improve the program.

Would this be a convenient time for us to talk? We probably need about 30 minutes. [If not, schedule another time; if so, continue. If they decline entirely, thank them for their time and terminate the call.]

IF ASKS FOR BONA FIDES, PROVIDE: Erika Kociolek at Energy Trust (503-445-0578, erika.kociolek@energytrust.org) if you have any questions about this.

IF RECEIVED EMAIL:

Would this be a convenient time for us to talk? We probably need about 30 minutes. [If not, schedule another time; if so, continue.]

Again, nothing you say will be identified with you or your company in our reports. Do you mind if I record our conversation to ensure the accuracy of my notes? Do you have any questions before we get started?

PRIOR TO STARTING INTERVIEW:

We will not report your specific responses but will only report the aggregate responses. Do you mind if I record our conversation to ensure that my notes are accurate? Do you have any questions before we get started?

Since this interview is to provide feedback for the Production Efficiency program, my questions are about your involvement in that program and your work in the industrial and agricultural sector, unless I specifically ask about other sectors.

Firmographics

I'd like to start with a few questions to make sure we have accurate information about your firm.

[ASK ALL]

Q1. My understanding is that your company is primarily a *[INSERT TYPE FROM ENERGY TRUST FILE]*. Is that correct? *[IF NOT]* How would you describe the type of work your company does? *[PROBE TO CODE; IF NOT DISTRIBUTOR, MANUFACTURER, OR MANUFACTURER REP, SWITCH TO CONTRACTOR INTERVIEW]*

1. [OPEN-ENDED RESPONSE]

[IF IDENTIFIED ANY NON-LIGHTING EQUIPMENT]

Q2. About what percentage of your sales are lighting-related?

1. [OPEN-ENDED RESPONSE]

[ASK ALL]

Q3. Approximately how many employees work at all your company locations in Oregon?

1. [OPEN-ENDED RESPONSE]

Program Experience

Now I'd like to talk a little bit about your experience with the PE program.

[ASK ALL]

Q4. First, I'd like to confirm my understanding that your company participates in the Energy Trust Lighten Up promotion, which allows customers to buy lighting from you at discounted prices rather than going through the incentive application process – is that correct?

1. Yes
2. No

[Do not read]

96. Other, please specify: [OPEN-ENDED RESPONSE]
97. Not applicable
98. Don't know
99. Refused

[ASK IF Q4=1]

Q5. In addition to selling lighting equipment to contractors and selling to customers through the Lighten Up promotion, do you help industrial and agricultural customers with the incentive application process?

1. Yes
2. No
3. Sometimes

[Do not read]

96. Other, please specify: [OPEN-ENDED RESPONSE]
97. Not applicable
98. Don't know
99. Refused

[ASK ALL]

Q6. Please rate your satisfaction with each of the following aspects of the program using a scale from 0 to 10, where 0 means you are not at all satisfied and 10 means you are completely satisfied.

[INSERT 0-10 SCALE WITH DK AND REF; RANDOMIZE FIRST 7 ITEMS; KEEP ITEM 8 AS LAST ITEM]

1. The application process for becoming a Production Efficiency ally
2. The training that Energy Trust provides about the PE program
3. [IF Q5=1 OR 3] The program's lighting savings calculator tool – for prescriptive incentives
4. [IF Q5=1 OR 3] The program's lighting savings calculator tool – for custom incentives
5. [IF Q5=1 OR 3] The incentive offer pre-approval process
6. [IF Q5=1 OR 3] The project processes that occur after equipment installation
7. Your interactions with Energy Trust program staff
8. Your overall program experience

[IF ANY PART OF Q1 < 9]

Q7. You indicated some dissatisfaction with [REVIEW ITEMS]. What has not satisfactory? What would make it better?

1. [OPEN-ENDED RESPONSE]

[ASK ALL]

Q8. Are there any measures for which incentives are higher than they need to be? If so, which ones?

1. [OPEN-ENDED RESPONSE]

[ASK ALL]

Q9. Are there any measures that you could sell a lot more of if incentives were just a little higher? If so, which ones?

1. [OPEN-ENDED RESPONSE]

Lighten Up

[READ AND ASK IF NOT A PARTICIPATING DISTRIBUTOR]

In 2014, Energy Trust began offering customers in the commercial and multifamily sectors the opportunity to buy selected lighting products at discounted prices from participating distributors. Energy Trust calls this “Lighten Up with LEDs.” Starting in 2016, the discount has been available also to industrial and agricultural customers as well.

The discount is slightly less than the incentive a customer could get by going through the incentive application process, and customers are not permitted to receive Energy Trust incentives for buying the discounted lighting. Right now, only customers, and not contractors, may buy the discounted lighting from distributors.

Q10. Were you aware of this lighting discount, or buy-down, promotion before I mentioned it?

1. [OPEN-ENDED RESPONSE]

[READ TO ALL]

I have a few questions about how the Lighten Up promotion might relate to your business.

[ASK IF PARTICIPATING DISTRIBUTOR OR NON-PARTICIPATING BUT AWARE OF PROMOTION]

Q11. Since the Lighten Up buy-down first became available to industrial and agricultural customers in 2016, what effects, if any, has it had on your business with industrial and ag customers?

1. [OPEN-ENDED RESPONSE]

[PROBES:]

- a. Has it increased or decreased your sales of lighting to contractors or industrial and agricultural customers?

[ASK ALL]

Q12. We understand that the uptake of the discounted lighting in the industrial and agricultural sector has been low. Do you have any thoughts about why industrial and agricultural customers would not be buying the discounted lighting from distributors?

1. [OPEN-ENDED RESPONSE]

[PROBES:]

a. Does it have more to do with the type of discounted lighting that is available or with a preference for going through the incentive process?

[ASK ALL]

Q13. Are there any characteristics of industrial and agricultural end-use customers – such as certain geographic locations, business sizes, or type of ownership – that would particularly benefit from the Lighten Up buy-down?

1. [OPEN-ENDED RESPONSE]

[Do not read]

98. Don't know

99. Refused

[ASK ALL]

Q14. Energy Trust is currently considering changing the rules of the Lighten Up buy-down so that contractors could buy the discounted lighting from distributors on behalf of customers. How might that affect the sales of energy efficient lighting to industrial and agricultural customers?

1. [OPEN-ENDED RESPONSE]

[PROBES:]

a. Would it affect some customers types more than others? Which ones and why?

[ASK ALL]

Q15. What challenges, if any, has your company experienced in participating in the Energy Trust Lighten Up buy-down?

1. [OPEN-ENDED RESPONSE]

[PROBES:]

a. What can be done to address those challenges?

Efficiency Opportunities

Now I have just a few questions about opportunities to increase lighting efficiency in the next couple of years.

[ASK ALL]

Q16. Based on your experience, how much opportunity exists in the industrial and agricultural sectors to increase lighting efficiency from equipment replacements or upgrades over the next two years and where do those opportunities exist?

1. [OPEN-ENDED RESPONSE]

[PROBES:]

- a. For example, compared to the amount of energy savings that the program has produced in the past two years, how much can it produce in the next two?
- b. What kinds of lighting equipment change-outs will be involved?
- c. With what kinds of industrial/agricultural customers is the opportunity greatest?
- d. Does the opportunity exist more for large customers or small-to-medium ones?
- e. Is there more opportunity in some parts of the state than others? Where and why?

[ASK ALL]

Q17. What role will lighting controls have in achieving lighting-related savings in the next two years?

1. [OPEN-ENDED RESPONSE]

[PROBES:]

- a. What factors might limit the ability to achieve savings through lighting controls? [e.g., cost of the controls compared to the value of the savings they might produce, having staff knowledgeable about controls]

[ASK ALL]

Q18. Many of the large industrial and agricultural customers have already done significant upgrades through the program, and now Energy Trust is looking to reach smaller customers in that segment. What barriers do you think exist to getting smaller customers to participate?

1. [OPEN-ENDED RESPONSE]

[PROBES:]

- a. What challenges does *your* company face in working with smaller industrial and ag customers?

[IF BARRIERS MENTIONED]

Q19. What can be done to overcome those barriers?

1. [OPEN-ENDED RESPONSE]

Diversity, Equity, and Inclusion (DEI) Goals

Energy Trust has established goals to increase program activity with women-owned and minority -owned businesses, as well as companies working with underserved communities.

[ASK ALL]

Q20. What, if anything, have you heard about such goals?

[If needed: Energy Trust has been using the phrase “Diversity, Equity, and Inclusion” to refer to these goals.]

[SINGLE RESPONSE]

1. [OPEN-ENDED RESPONSE]

[ASK ALL]

Q21. Is your company woman-owned or minority-owned? Which one?

[MULTIPLE RESPONSE]

1. Not woman- or minority-owned
2. Woman-owned
3. Minority-owned
4. Both woman- and minority-owned

[Do not read]

96. Other, please specify: [OPEN-ENDED RESPONSE]
97. Not applicable
98. Don't know
99. Refused

[ASK ALL]

Q22. Of your company’s work in the industrial and agricultural sector, about what percentage is with customers located outside the major metropolitan areas?

[If needed: By major metropolitan areas, we mean like the Portland Metro area, Salem, and Eugene]

[MULTIPLE RESPONSE]

1. [OPEN-ENDED RESPONSE]

[ASK ALL]

Q23. And of your company’s industrial and agricultural customers, which types have the greatest challenges in participating in Energy Trust?

1. [OPEN-ENDED RESPONSE]

[ASK ALL]

Q24. What types of challenges do these types of customers have in working with Energy Trust?

1. [OPEN-ENDED RESPONSE]

Cannabis Growers

This is my last set of questions. As you may be well aware, the number of recreational cannabis producers, who use a significant amount of energy, has exploded in Oregon in the past year, and Energy Trust has been working to make inroads with this market.

[ASK ALL]

Q25. In what ways, if any, has your company worked with cannabis growers?

1. [OPEN-ENDED RESPONSE]

[ASK IF RESPONDENT REPORTED WORKING WITH CANNABIS GROWERS]

Q26. Do these cannabis growers have any special needs that Energy Trust may not be aware of? If so, what are they?

1. [OPEN-ENDED RESPONSE]

[Do not read]

98. Don't know
99. Refused

[ASK ALL]

Q27. What are the key challenges in increasing participation by and working with this group, if any?

1. [OPEN-ENDED RESPONSE]

[Do not read]

98. Don't know
99. Refused

[ASK IF ANY CHALLENGES NOTED]

Q28. What has worked well in addressing such challenges? What has not worked well?

1. [OPEN-ENDED RESPONSE]

[Do not read]

98. Don't know
99. Refused

Closing

Those are all the questions I have for you today.

[ASK ALL]

Q29. Before closing, are there any topics that you expect us to address that I did not ask you about?

1. [OPEN-ENDED RESPONSE]

[Do not read]

98. Don't know

99. Refused

Thanks again for your time. Please feel free to reach out if you have any questions or additional thoughts you'd like to share.

Custom PDC

Introduction

We would like to ask you some questions about your firm's experiences with Energy Trust's Production Efficiency program. We will discuss the types of activities you perform for the program, people you interact with, and the program's strengths and weaknesses. Your responses will remain anonymous, so please feel free to be as candid as you want when answering our questions today.

First, I just have a few questions about you and your firm. I have a lot of questions to ask you today. For my first three questions, please provide a very brief reply. Perhaps we can knock-out these three questions in just a minute or so.

- Q1. How long has your firm been serving as a PDC for the Energy Trust Production Efficiency program?
- Q2. And what is your role, specifically?
- Q3. How long have you been in this role?

General Implementation, Program Delivery, and Marketing

Now I'd like to get some details about your firm's role in program delivery and how that might be affected by recent program changes.

- Q4. Please tell me your firm's responsibilities as a PDC.

[IF NOT ADDRESSED: Inquire about their forecasting responsibilities, including the difference between project-level and portfolio/yearly forecasts.]

- Q5. I understand your firm is responsible for Energy Trust territory [PGE-CTS: 1, Energy 350: 2, RHT: 3]. Is that correct?

[Say to PGE-CTS: We understand that your term as PDC is up at the end of this program year, so some of the questions in this guide regarding future activities may not be completely relevant to you. However, I will give you an opportunity to offer your input on the program's future activities if you want.]

*[Territory 1 (PGE-CTS) is Washington & Columbia Co. and Multnomah Co. West of I-5.
Territory 2 (Energy 350) is Northern and far Eastern OR, including Portland Metro.
Territory 3 (RHT) is South and Central OR.]*

- Q6. Do the customers in the territory served by your firm have any special needs in terms of energy efficiency or present any challenges for how the PE program might help them?
- Q7. What are your firm's general strategies for delivering and marketing the program?
- Q8. In what ways, if any, do you coordinate with Energy Trust staff in program marketing and outreach?
- Q9. What aspects of program marketing and outreach have been most successful?
- Q10. What strategies, activities, or channels have you learned do not produce the desired effects?

Q11. Does the territory itself present any special challenges or concerns for delivering savings for the PE program? *[If needed: For example, a limited number of companies or geography that makes it difficult to serve them.]*

Q12. We understand that a priority for the program is to reach previously underserved markets. What are the underserved markets in your territory and what are your strategies for reaching them? *[Probe about marketing and delivery.]*

[ASK IF NOT ADDRESSED ABOVE:]

1. What is the minimum size a customer has to be for [PDC] to do outreach to that customer?
2. About what proportion of the customers in your geographic region are smaller than that?
3. What is your strategy for reaching customers smaller than that?
4. What is your firm doing, if anything, to reach customers ...
[E350:] outside of Portland, particularly east of the I-5 corridor?
[RHT:] east of the I-5 corridor?
[PGE-CTS:] outside of the Portland metro area?

Q13. And what are the key challenges in reaching those underserved customers?

[Probe about each type of underserved customer mentioned]

Q14. What particular industries are you addressing and what your firm is doing to reach those markets? *[IF NOT MENTIONED: And what are the key challenges?]*

Q15. Are there any industry types in your region that you are not trying so much to reach? If so, what are they and why haven't you tried as hard to reach them?

Q16. We understand that one of the new changes to the program delivery is that the custom PDCs will be responsible for the completion of technical analysis studies. How, if at all, will that affect how you deliver the program? *[PROBE about role of ATACs (if any)]*

Program Progress Toward Goals

Q17. How has this year been going in terms of meeting your savings and budget goals?

[ASK IF ANTICIPATE 2018 SHORTFALL]

Q18. What might you do to address that shortfall?

Q19. Is there anything the program could do to better support you in achieving the 2018 savings goals?

SEM

The next few questions are specifically about SEM.

Q20. Tell me how you see the role of SEM in the PE program overall.

Q21. How do you allocate resources between SEM and capital projects to get the best outcomes for the program?

- Q22. What kinds of challenges are there, if any, in determining how to do that? How do you address those challenges?
- Q23. We understand that one of the new changes to the program delivery is that the PDCs will be responsible for selecting and assigning the SEM coaches. How, if at all, will that affect how you deliver the program? *[PROBE about changes in coaches, how they are selected, how they will work.]*
- Q24. I learned a bit about continuous SEM from the Energy Trust staff. I'd like your input on how it's working so far. What is or is not working in particular?
- Q25. Energy Trust staff have talked about developing an "SEM Lite" to make SEM more cost effective for delivery to small customers. What might that entail?
- Q26. And how well do you think that might work? What might or might not work in particular?
- Q27. What other changes or additions is the program anticipating in relation to SEM?
- Q28. What are the potential challenges with those changes or additions?
- Q29. What additional suggestions do you have, if any, about changes or improvements to the SEM offering?

Diversity, Equity, and Inclusion

And just a few questions about Energy Trust's Diversity, Equity, and Inclusion initiative.

- Q30. What kinds of direction has Energy Trust given you regarding its Diversity, Equity, and Inclusion Initiative, or DEI, goals?
- Q31. What have you been doing and planning to do relating to diversity, equity, and inclusion? What else might you do?

Communication with Energy Trust

We're getting near the end. I'd like to ask you about communication with Energy Trust.

- Q32. Tell me about your communication with Energy Trust – who do you communicate with, how and how often do you do it?
- Q33. In what ways, if any, could that coordination and communication be changed to make the program more successful? *[PROBE AS NEEDED TO GET SUFFICIENT DETAIL OF CURRENT PRACTICE TO SUPPORT A RECOMMENDATION]*
- Q34. And tell me about your interactions with Energy Trust systems, like its PT and CRM systems.
- Q35. Who do you communicate with outside of Energy Trust in delivering the program, how and how often do you do it?
- Q36. In what ways, if any, could that coordination and communication be changed to make the program more successful? *[PROBE AS NEEDED TO GET SUFFICIENT DETAIL OF CURRENT PRACTICE TO SUPPORT A RECOMMENDATION]*

Market Actors

The next questions are about the market actors you work with, such as equipment contractors and system designers. This could include program trade allies as well as those not affiliated with Energy Trust.

- Q37. Are you aware of any market actors in the region that don't do a lot of projects through the program? If so, why do you think they don't participate?
- Q38. Are there any specific challenges you've encountered in dealing with market actors?
- Q39. Is there anything the program could do to better support you in working with market actors, including those who are program trade allies?
- Q40. Is there any way the program could work more effectively with market actors directly?

Closing

I just have a few questions to wrap up with.

- Q41. What market trends are you seeing that may affect the program in the next five years and what do you think are the program implications?
- Q42. We will be surveying participants and nonparticipants. Are there any questions or topics you want to make sure we include?

[PROBE BY GROUP (contractors, distributors, participants, nonparticipants)]
- Q43. What have you heard, positive and negative, from those groups about the program?
- Q44. Is there anything in particular that you'd like to learn from the program process evaluation?
- Q45. Is there anything else about the program that we have not discussed that you feel should be mentioned?

Lighting/Streamlined PDC

Introduction

We would like to ask you some questions about your firms' experiences with Energy Trust's Production Efficiency program. We will discuss the types of activities you perform for the program, people you interact with, and the program's strengths and weaknesses. Your responses will remain anonymous, so please feel free to be as candid as you want when answering our questions today.

- Q1. How long has your firm been serving as a PDC for the Energy Trust Production Efficiency program?
- Q2. And what is your role, specifically?
- Q3. How long have you been in this role?

Implementation and Program Delivery – General

- Q4. Please tell me about your firm's responsibilities as a PDC.
[PROBE about forecasting, including the difference between project-level and portfolio/yearly forecasts.]
- Q5. How has this year been going in terms of meeting your savings and budget goals?
- Q6. Is there anything the program could do to better support you in achieving these goals?
- Q7. Can you briefly describe your role and responsibilities in managing trade allies in the program?
- Q8. Are there any specific challenges you've encountered in managing trade allies in the program?
- Q9. Do you know if there are any major players in the region that are not trade allies? If so, why do you think they don't participate?
- Q10. Is there anything the program could do to better support you in managing trade allies?
- Q11. Is there any way the program could better support trade allies directly?
- Q12. [LIGHTING PDC] We understand you are trying to get more lighting controls-related project activity. Can you tell me more about that? Do you have any specific goals? If so, are you on track to meet them?
- Q13. I understand you assist in measure development. Can you tell me more about that process? Are there any challenges there? Is there anything Energy Trust can do to improve this process?
- Q14. We understand that starting in 2017, the streamlined and lighting PDCs are now processing applications, which in the past was completed by Energy Trust staff. How has that process been working out for you all? Are there any challenges there? Do you have any suggestions for improving the application process?
- Q15. Cannabis production facilities are a new program market. What has been your experience working with these facilities?

- Q16. We know trust is a key piece with cannabis production facilities – have you been making inroads with the cannabis industry? Are there any challenges there? Is there anything the program can do to improve the cannabis offerings?
- Q17. We understand that many cannabis growers don't know that there are non-lighting incentive opportunities. In your opinion, how can the program better address these non-lighting savings opportunities in cannabis production facilities?
- Q18. What kinds of direction has Energy Trust given you in regard to its Diversity, Equity, and Inclusion Initiative, or DEI, goals?
- Q19. What have you been doing and planning to do to help achieve those DEI goals? What else might you do?

Implementation and Program Delivery – Lighting Buy-Down [Lighting PDC]

- Q20. I'd like to get a deeper understanding about the lighting buy-down. First, can you tell me when that was first rolled out in the industrial and agricultural sector?
- Q21. How many distributors are currently participating? Are they also offering discounted lighting through the Existing Buildings program?
- [PROBE about how many selling only through PE, only through EB, and through both.]*
- Q22. We'd like to get a better understanding of how the lighting buy-down works. What exactly do distributors have to do to participate?
- [PROBES: Is it a challenge for them to track the discounted sales? How do they know whether the sales are going to the industrial/ag or commercial sector?]*
- Q23. Tell me about the distributor requirements for tracking and reporting of discounted lighting sales, including tracking and reporting sales by customer sector.
- Q24. My understanding is that the midstream discount isn't quite as much as the downstream incentive would be for the same equipment. Is that correct? If so, what have you heard from customers about whether the greater ease of buying the discounted lighting offsets its somewhat higher cost?
- Q25. We understand the lighting buy-down doesn't get as much uptake in the industrial and agricultural sector as in the commercial sector. Why do you think that is?
- Q26. Do you have any suggestions for improving how the lighting buy-down is managed or delivered?

Marketing and Outreach

- Q27. Tell me about [Cascade's/Evergreen's] role in marketing and outreach? *[IF NEEDED: What do you do to increase awareness of the program and recruit participants?]*
- [PROBE about minority- and women-owned businesses, small- and medium-sized businesses.]*
- Q28. In what ways, if any, do you coordinate with Energy Trust staff in program marketing?

- Q29. What information do you have, if any, that the program's marketing strategies are driving participation?
[PROBE about minority- and women-owned businesses, small- and medium-sized businesses.]
- Q30. What aspect of program marketing has been most successful?
- Q31. What strategies, activities, or channels, if any, are not producing the desired effects?

Communication with Energy Trust

- Q32. Who from Energy Trust do you need to communicate and coordinate with in delivering the PE program?
- Q33. What kind of communication and coordination do you do with them?
- Q34. How would you characterize the quality of communication and coordination?
[PROBE: What challenges, if any, are there to effective coordination and communication with Energy Trust?]
- Q35. In what ways, if any, could that coordination and communication be changed to make the program more successful?
- Q36. Who else outside of Energy Trust do you need to communicate and coordinate with in delivering the PE program?
- Q37. What kind of communication and coordination do you do with them?
- Q38. How would you characterize the quality of communication and coordination?
[PROBE: What challenges, if any, are there to effective coordination and communication?]
- Q39. In what ways, if any, could that coordination and communication be changed to make the program more successful?
- Q40. Any market trends that you see that may affect the program in the next five years)?
- Q41. Any steps the program should be taking to address these trends?

Closing

- Q42. We will be surveying contractors, distributors, participants, and nonparticipants. Are there any questions or topics you want to make sure we include?
[PROBE BY GROUP (contractors, distributors, participants, nonparticipants)]
- Q43. Is there anything in particular that you'd like to learn from the program evaluation?
- Q44. Is there anything else about the program that we have not discussed that you feel should be mentioned?

ATACs & SEM Coaches

Introduction

We would like to ask you some questions about your firms' experiences with Energy Trust's Production Efficiency program. We will discuss the types of activities you perform for the program, people you interact with, and the program's strengths and weaknesses. Your responses will remain anonymous, so please feel free to be as candid as you want when answering our questions today.

QUESTIONS FOR ATACs

First, I just have a few questions about you and your firm.

- Q1. How long have you been serving as an ATAC for the Energy Trust Production Efficiency program?
- Q2. Did anyone in your firm provide ATAC services earlier than that? If so, how long?
- Q3. And currently, you are working as a subcontractor to [PDC name], right? *[If wrong, ask who they work as subcontractor to]*
- Q4. Did you or your firm work with other PDCs previously? If so, which ones?

Now I'd like to ask some questions about your experience with the Production Efficiency program.

[ASK Q6 IF WORKED FOR OTHER FIRMS]

- Q5. How does working with the current PDC compare to working with those others? Please feel free to comment on any differences you've noticed, good, bad, or neutral.
- Q6. What changes, if any, have you noticed in how technical analysis studies are assigned in the past couple of years? *[PROBE about PTASs]*
- Q7. What effect, if any, have those changes had on the program's ability to identify and deliver energy savings?
- Q8. How, if at all, have those changes affected your firm?
- Q9. How fair is the current process for assigning technical analysis studies to ATACs?
- Q10. What would you change about the process?
- Q11. When you are assigned a technical analysis study, how well does the PDC you work with support your ability to perform that study?
- Q12. What additional support would be useful?
- Q13. What other changes, if any, have you noticed in your work for the Production Efficiency program over the past couple of years? *[PROBE about PTASs]*
- Q14. What effect, if any, have those changes had on the program's ability to identify and deliver energy savings?

- Q15. How, if at all, have those changes affected your firm?
- Q16. What do you think are the key challenges the program is currently facing? [*PROBE about ability to deliver energy savings and reaching underserved groups, including small companies.*]
- Q17. What other new challenges might the program face in the coming years? [*PROBE about ability to deliver energy savings and reaching underserved groups, including small companies.*]

QUESTIONS FOR SEM Coaches

First, I just have a few questions about you and your firm.

- Q18. How long have you been serving as an SEM coach for the Energy Trust Production Efficiency program?
- Q19. Did anyone in your firm provide those services earlier than that? If so, how long?
- Q20. And currently, you are working as a subcontractor to [PDC name], right? [*If wrong, ask who they work as subcontractor to.*]
- Q21. Did you or your firm work with other PDCs previously? If so, which ones?

Now I'd like to ask some questions about your experience with the Production Efficiency program.

[ASK Q23 IF WORKED FOR OTHER FIRMS]

- Q22. How does working with the current PDC compare to working with those others? Please feel free to comment on any differences you've noticed, good, bad, or neutral.

The next few questions are specifically about SEM.

- Q23. Tell me how you see the role of SEM in the PE program overall.
- Q24. One of the challenges of SEM is assigning savings to SEM participation. How, if at all, do you think that might affect the PDC's ability to deliver the program?
- Q25. How might it affect how the PDC prioritizes SEM?
- Q26. We understand that one of the new changes to the program delivery is that the PDCs directly oversee the SEM coaches such as yourself. How, if at all, will that affect how you do your work? [*PROBE about changes in coaches, how they are selected, how they will work.*]
- Q27. Energy Trust staff have talked about developing an "SEM Lite" to make SEM more cost effective for delivery to small customers. From your understanding, what might that entail?
- Q28. And how well do you think that might work? What might or might not work in particular?
- Q29. What suggestions, if any, do you have for providing SEM cost effectively to small customers?
- Q30. Tell me a bit about continuous SEM – what does it entail and how is it working? What is or is not working in particular?
- Q31. What other changes or additions have you heard the program is anticipating in relation to SEM?

- Q32. What are the potential challenges with those changes or additions?
- Q33. What do you think are the key challenges the program is currently facing? [*PROBE about ability to deliver energy savings and reaching underserved groups, including small companies.*]
- Q34. What other new challenges might the program face in the coming years? [*PROBE about ability to deliver energy savings and reaching underserved groups, including small companies.*]

Energy Trust Program Staff

Role and Responsibilities [ALL STAFF]

Q1. Please describe your position at Energy Trust and your role in the Production Efficiency program. IF NEEDED:

What are your principal responsibilities?

What activities do you spend the most time on?

How is your work used by the program?

Q2. How long have you been in this role?

Q3. What are the major tasks or projects you are going to be involved in over the next year?

Custom/SEM Program, Including Changes and Future Plans [SECTOR LEAD AND CUSTOM/SEM PROGRAM MANAGERS]

[SEM] I'd like to start with some general questions about the SEM program track, and then I'll continue with some questions about recent or planned changes to the custom and SEM tracks.

Q4. How do you define the minimal SEM elements or practices?

Q5. How do Energy Trust's SEM definitions differ from other SEM programs?

Q6. Do you/are you considering including demand response in your SEM program?

Q7. What feedback or information have you received on how participating in SEM has changed customers' practices?

Q8. What data have you been collecting to measure the impact of SEM?

Q9. In your opinion, what prevents industrial customers from participating in SEM?

Q10. Is there anything about industrial customers that you currently do not know or have limited understanding of that would help you in providing SEM services?

Probe:

- For example, is there anything you would like to learn about current energy management practices, decision making, or barriers to participation?

[CUSTOM AND SEM] From the RFP and the kick-off meeting, we learned about a number of changes that were made or are in the process of being made to the program. Some of these we think we understand well enough, but I'd like to clarify some others.

Q11. We understand that Energy Trust revised and standardized the approach to first-year SEM and launched continuous SEM. Can you fill me in on that?

Probes:

- What needed to be revised about the approach to first-year SEM? Why did it need to be revised? How was it revised?
- What led to the need for greater standardization? Was it being implemented in different ways with different participants? What concerns or challenges did that lead to?
- Could you describe what's involved with "continuous SEM," which I believe targets prior SEM participations and future first-year SEM participants?

Q12. First, we understand that Energy Trust restructured the program so that the Custom PDCs deliver both the custom and SEM program and that the ATACs and SEM coaches will be subcontractors to them – is that correct?

Q13. What are the goals of rolling SEM projects under custom PDCs? What do you hope to accomplish with this new structure?

Q14. I'd like to clarify the issues around the SEM coaches. The RFP explained that Energy Trust created a pool of SEM coaches to deliver the SEM program, and in the kick-off meeting, we learned that the "pool" would go away after 2019. Can you fill me in on how the pool worked and how the SEM coaches will work in 2019 and after?

Probes:

- Do coaches work across organizations, sectors, and regions? Will that change?
- How much time does a given coach spend working with a given organization? Do they have on-site office space? How will that change?

Q15. Another change I'm aware of is the introduction of PDC technical analysis study (PTAS). Can you tell me more about the purpose of introducing the PTAS?

Probe:

- In what ways are the PTAs meant to replace or augment the current ATAC studies?

Q16. How have PDCs been performing on the PTASs?

Q17. Is there anything about the PTAS process that needs improvement? If so, what?

Q18. Do you have any concerns with PDCs' being responsible for the project studies?

Probe:

- Are there any concerns that the PDCs will award themselves a study even though they may not be the most experienced contractor available?

- Q19. [If concerns noted] How will you deal with those issues?
- Q20. We also understand that Energy Trust released an RFP for a scoping tool that will be used by custom PDCs. Can you give me an update on the process of that tool?
- Q21. I understand the scoping tool will be used to create a prioritized project list and capture information about sites that can be used to drive savings in future years. Who will have access to that information: The customer? The utilities?
- Q22. Other than the above, what additional changes are being made or planned for the custom and SEM track(s)?
- Q23. [If additional changes mentioned] What are you hoping to accomplish with these changes?
- Q24. What issues have you encountered with this the new program roll out?
- Q25. Thinking about SEM services over the next 5-10 years, what changes do you envision?

Codes and Standards [SECTOR LEAD AND CUSTOM/SEM/LIGHTING PROGRAM MANAGERS]

- SECTOR LEAD AND CUSTOM/SEM PM Q26. During the kick-off meeting, the issue of how codes and standards have affected program savings came up. Can you fill me in on how those changes have affected the assessment of program energy savings, including for SEM?
- SECTOR LEAD AND CUSTOM/SEM PM Q27. We understand compressed air has been particularly affected by changes to codes and standards. Can you provide some detail on that? Are there any other measures that have been particularly affected by changes to codes and standards?
- LIGHTING PM Q28. During the kick-off meeting, the issue of how codes and standards have affected program savings came up. Can you fill me in on how those changes have affected the assessment of program energy savings from lighting?
- SECTOR LEAD AND CUSTOM/SEM/LIGHTING PM Q29. What impact will those changes to codes and standards have on the program going forward?

Lighting/Streamlined Program, Including Changes and Future Plans [SECTOR LEAD AND LIGHTING/STREAMLINED PROGRAM MANAGERS]

I'd like to start with some general questions about the streamlined and lighting program tracks, and then I'll continue with some questions about recent or planned changes to those tracks.

STREAMLINED PM Q30. I understand that the streamlined industrial and agricultural track is delivered through contractor trade ally networks, and this track is developed and organized by a single PDC (Cascade Energy). Can you tell me more about Cascade's responsibilities and role?

STREAMLINED PM Q31. How has Cascade been performing in its role? What has been its greatest strengths and weaknesses?

LIGHTING PM Q32. I understand that a single PDC, Evergreen Consulting Group, delivers the lighting track. Can you tell me more about Evergreen's responsibilities and role?

LIGHTING PM Q33. How has Evergreen been performing in its role? What have been its greatest strengths and weaknesses?

From the RFP and the kick-off meeting, we learned about a number of changes that were made or are in the process of being made to the program. Some of these we think we understand well enough, but I'd like to clarify some others.

LIGHTING PM Q34. Other than allowing contractors access to the lighting buy-down program, are there any other changes that have been made or are planned for the lighting track?

LIGHTING PM Q35. Considering the new contractor component of the lighting buy-down, what has been the uptake so far?

LIGHTING PM Q36. What feedback have you received from contractors so far about their ability to participate in the buy-down? Do contractors feel there is a good trade-off between reduced incentives and easier participation?

LIGHTING PM & TECH. MANAGER Q37. I understand that the streamlined and lighting PDCs are now processing applications (instead of Energy Trust staff). How has that transition been going? Is there anything about the application process that needs improvement?

- LIGHTING & STD. PM Q38. Other than the above, what additional changes are being made or planned for the streamlined and lighting track(s)?
- LIGHTING & STD. PM Q39. [If additional changes mentioned] What are you hoping to accomplish with these changes?
- LIGHTING & STD. PM Q40. I know cannabis is a big new opportunity. How has the cannabis work been going this year? What have been the greatest strengths and challenges in that market?

General Marketing [SECTOR LEAD, PROGRAM AND MARKETING MANAGERS]

- Q41. How is the program marketed to potential participants?
- Probes:
- What activities and channels are you using?
 - Do you use different activities or channels to drive different types of participation, for example, participation in different tracks or by different segments?
- Q42. What proportion of the marketing efforts are carried out by Energy Trust vs. PDCs?
- Q43. In what ways, if any, are marketing efforts coordinated utilities' efforts?
- Q44. How do you know if your marketing strategies are driving participation?
- Q45. [If specific efforts are targeted to types of participation] How do you know if your strategies are driving the targeted types of participation?
- Q46. What aspect of program marketing has been most successful?
- Q47. What strategies, activities, or channels, if any, are not producing the desired effects?
- Q48. [If anything not producing the desired effects] What might be done to improve the effectiveness of that/those aspect(s) of marketing?
- Q49. What changes to marketing strategies, activities, or channels might you make to adjust to recent program structure changes?

Reaching Underserved Markets and Customers [SECTOR LEAD, PROGRAM AND MARKETING MANAGERS]

- Q50. During the kick-off meeting, there were four categories of underserved markets discussed: those outside of Portland, Small customers with less than 100,000 kWh, those east of the Cascades, and specific industries like food processing. Are those the underserved markets the program is targeting? Are there any others?
- Q51. How big are these markets?

Q52. What do you think has kept the program from reaching those markets and customers in the past?

[Probe about size or type of business, location, how they make decisions (including their company organization and the types of inputs or considerations that are important).]

Q53. What, if anything, is the program doing or planning to do to reach such markets and customers? If so, do your efforts vary by markets or customers, and have the efforts been successful?

Q54. What have you found prevents participation in the PE program?

Q55. What plans do you have for increasing participation in the PE program?

Reaching Small- and Medium-Sized Customers [SECTOR LEAD, PROGRAM AND MARKETING MANAGERS]

Q56. We understand the program seeks to reach more small- and medium-sized customers. Can you tell me a bit about the challenges with reaching these customers?

Q57. How do you define “small or medium” sized customers? For example, is there a particular sizes or business types you consider to be small or medium sized customers?

Q58. Are there particular measures/energy saving practices that are more appropriate for small and medium-sized customers?

Q59. What kinds of marketing and outreach do you do to reach small and medium-sized customers?

Q60. How does the program plan to better reach them?

Q61. Have you had to scale the amount of effort you put into small and medium-sized customers to make the program cost-effective? If so, how?

Q62. What other changes have you made to adapt to these types of customers to make the program cost-effective?

Communication and Coordination [ALL STAFF EXCEPT WHERE INDICATED]

ALL STAFF Q63. In managing the PE program, what other Energy Trust programs, initiatives, or departments do you need to communicate and coordinate with?

ALL STAFF Q64. What kind of communication and coordination do you do with them?

ALL STAFF Q65. What, if anything, prevents effective coordination and communication internally?

ALL STAFF Q66. In what ways, if any, could that coordination and communication be changed to make the program more successful?

- PMs ONLY Q67. Could you briefly describe the external communication and coordination process with PDCs, SEM coaches, ATACs, distributors, contractors, and utility account managers? What key meetings take place?
- PMs ONLY Q68. How effective is coordination between Energy Trust staff and PDCs, SEM coaches, ATACs, distributors, contractors, and utility account managers?
- PMs ONLY Q69. What, if anything, prevents effective coordination and communication externally?
- PMs ONLY Q70. What could be changed to improve that coordination and communication?

Measure Development [PROGRAM AND TECHNICAL MANAGERS]

- Q71. We understand that measure development has been transitioned from ETOs Planning and Engineering team to specific programs, how does that process work and how does it differ from the previous process? Have there been any challenges with that transition?
- Q72. How has the new measure development process been working for the program? Have there been any challenges with that transition?
- Q73. Are there any bottlenecks in the measure development process? If so, what are they? How could they be fixed?
- Q74. Are there any measures that have had less uptake than anticipated? Why do you think that is?
- Q75. Are there any measures that are currently not in development that you are considering for the future? If so, what are those measures? What has led you to consider those measures?

Program Successes, Opportunities, and Challenges [SECTOR LEAD AND PROGRAM MANAGERS]

- Q76. How have the recent changes to the program been going so far?
- Q77. Are there any initial challenges that you have experienced? If so, what are those challenges and how do you plan to address them?
- Probe:
- Any challenges with having geography-based PDCs that cover all vertical markets?
- Q78. What challenges does the program expect to encounter over the next several years?
- Q79. What do you see at the primary challenges you might face in meeting energy savings goals?
- Q80. How might you address these challenges?
- Q81. [STREAMLINED STAFF ONLY] Have there been any changes to the Trade Ally Network and recruitment?

Q82. [STREAMLINED STAFF ONLY] How well are Trade Allies doing in delivering projects and savings? Are there any concerns?

Wrap Up [ALL STAFF]

Q83. Can you tell me more about the PDC round table on June 12th? Who will be there? What will they focus on? What are the expected outcomes?

Q84. We will be surveying PDCs. Are there any questions or topics you want to make sure we include?

Q85. Is there anything in particular that you'd like to learn from the program evaluation?

Q86. Is there anything else about the program that we have not discussed that you feel should be mentioned?

Energy Trust Marketing Staff

Role and Responsibilities [ALL STAFF]

Q1. Please describe your position at Energy Trust and your role in the Production Efficiency program. IF NEEDED:

What are your principal responsibilities?

What activities do you spend the most time on?

How is your work used by the program?

Q2. How long have you been in this role?

Q3. What are the major tasks or projects you are going to be involved in over the next year?

General Marketing [SECTOR LEAD, PROGRAM AND MARKETING MANAGERS]

Q4. How is the program marketed to potential participants?

Probes:

- What activities and channels are you using?
- Do you use different activities or channels to drive different types of participation, for example, participation in different tracks or by different segments?

Q5. What proportion of the marketing efforts are carried out by Energy Trust vs. PDCs?

Q6. In what ways, if any, are marketing efforts coordinated utilities' efforts?

Q7. How do you know if your marketing strategies are driving participation?

Q8. [If specific efforts are targeted to types of participation] How do you know if your strategies are driving the targeted types of participation?

Q9. What aspect of program marketing has been most successful?

Q10. What strategies, activities, or channels, if any, are not producing the desired effects?

Q11. [If anything not producing the desired effects] What might be done to improve the effectiveness of that/those aspect(s) of marketing?

Q12. What changes to marketing strategies, activities, or channels might you make to adjust to recent program structure changes?

Reaching Underserved Markets and Customers [SECTOR LEAD, PROGRAM AND MARKETING MANAGERS]

- Q13. During the kick-off meeting, there were four categories of underserved markets discussed: those outside of Portland, Small customers with less than 100,000 kWh, those east of the Cascades, and specific industries like food processing. Are those the underserved markets the program is targeting? Are there any others?
- Q14. How big are these markets?
- Q15. What do you think has kept the program from reaching those markets and customers in the past?

[Probe about size or type of business, location, how they make decisions (including their company organization and the types of inputs or considerations that are important).

- Q16. What, if anything, is the program doing or planning to do to reach such markets and customers? If so, do your efforts vary by markets or customers, and have the efforts been successful?
- Q17. What have you found prevents participation in the PE program?
- Q18. What plans do you have for increasing participation in the PE program?

Reaching Small- and Medium-Sized Customers [SECTOR LEAD, PROGRAM AND MARKETING MANAGERS]

- Q19. We understand the program seeks to reach more small- and medium-sized customers. Can you tell me a bit about the challenges with reaching these customers?
- Q20. How do you define “small or medium” sized customers? For example, is there a particular sizes or business types you consider to be small or medium sized customers?
- Q21. Are there particular measures/energy saving practices that are more appropriate for small and medium-sized customers?
- Q22. What kinds of marketing and outreach do you do to reach small and medium-sized customers?
- Q23. How does the program plan to better reach them?
- Q24. Have you had to scale the amount of effort you put into small and medium-sized customers to make the program cost-effective? If so, how?
- Q25. What other have changes have you made to adapt to these types of customers to make the program cost-effective?

Communication and Coordination [ALL STAFF EXCEPT WHERE INDICATED]

- | | | |
|-----------|------|--|
| ALL STAFF | Q26. | In managing the PE program, what other Energy Trust programs, initiatives, or departments do you need to communicate and coordinate with? |
| ALL STAFF | Q27. | What kind of communication and coordination do you do with them? |
| ALL STAFF | Q28. | What, if anything, prevents effective coordination and communication internally? |
| ALL STAFF | Q29. | In what ways, if any, could that coordination and communication be changed to make the program more successful? |
| PMs ONLY | Q30. | Could you briefly describe the external communication and coordination process with PDCs, SEM coaches, ATACs, distributors, contractors, and utility account managers? What key meetings take place? |
| PMs ONLY | Q31. | How effective is coordination between Energy Trust staff and PDCs, SEM coaches, ATACs, distributors, contractors, and utility account managers? |
| PMs ONLY | Q32. | What, if anything, prevents effective coordination and communication externally? |
| PMs ONLY | Q33. | What could be changed to improve that coordination and communication? |

Wrap Up [ALL STAFF]

- Q34. Can you tell me more about the PDC round table on June 12th? Who will be there? What will they focus on? What are the expected outcomes?
- Q35. We will be surveying PDCs. Are there any questions or topics you want to make sure we include?
- Q36. Is there anything in particular that you'd like to learn from the program evaluation?
- Q37. Is there anything else about the program that we have not discussed that you feel should be mentioned?

Wave 3 Interview Guide for Program Staff and Custom PDCs

As a follow-up to the interviews my team conducted with your firm in 2018, I'd like to understand how some of the recent program changes are working.

[NOTE TO INTERVIEWER: CASCADE ENERGY IS A NEW CUSTOM PDC AS OF 2019. THEY WERE NOT INTERVIEWED FOR THE 2018 MEMO. ADDITIONAL PROBING WILL BE USEFUL, ESPECIALLY AS PART OF Q22.]

SEM [ASK ALL]

- Q1. I'd like to start with getting an update about SEM. We understand that Energy Trust revised and standardized the approach to first-year SEM, launched continuous SEM, and changed how SEM is delivered. What experience have you had to date that suggests the changes are heading in the right direction?
- Q2. What have been the pain-points, if any?
- Q3. Do you have any experiences that suggest additional refinements to the design or process might be needed?
- Q4. Are any additional changes under consideration?
- Q5. [ENERGY TRUST SEM LEAD AND CUSTOM PDCs] Tell me about how SEM is delivered. I've read that perhaps SEM coaches are subcontractors to the custom PDCs, but I'm not clear on that. And how many SEM coaches there are for each PDC?
- Q6. In the interviews my team conducted in 2018, custom PDCs expressed differing views on the extent that claimable savings from SEM will be large and on the difficulty of quantifying SEM savings. Will you please give me your views on these topics?

PTAS [ASK ALL]

- Q7. Now let's talk about the change to have custom PDCs do all technical analysis studies. What experience have you had to date that suggests this change is heading in the right direction?
- Q8. What have been the pain-points, if any?
- Q9. Do you have any experiences that suggest additional refinements to the process might be needed?
- Q10. Are any additional changes under consideration?

Scoping Tool – Ask Energy Trust Manager of Custom and Technical Lead

- Q11. [ENERGY TRUST SECTOR LEAD] Moving on to the new scoping tool. Is that finalized and in use by PDCs?
- Q12. What experience have you had to date that suggests this change is heading in the right direction?
- Q13. What have been the pain-points, if any?
- Q14. Any experiences that suggest additional refinements to the tool might be needed?

Q15. Are any additional changes under consideration?

Q16. [ASK ENERGY TRUST TECHNICAL LEAD] I understand the tool was pilot tested. How many PDCs tested it, and for what type and how many customers each?

Other Changes [ASK ALL]

Q17. There have been several other changes we haven't discussed yet, such as the launch of the lighting buy-down, PDC processing of applications, and outreach to smaller and rural customers. What experience have you had to date that suggests these changes are working well both procedurally and in attracting projects?

Q18. What have been the pain-points, if any?

Q19. Do you have any experiences that suggest additional refinement to these might be needed?

Q20. Are any additional changes under consideration?

Wrap Up [ASK ALL]

Q21. To wrap up, is there any other good news you would like to share? Evidence that things are heading in a good direction for 2019?

Q22. Any pain-points that have emerged in 2019 that we haven't discussed? [ESPECIALLY IMPORTANT FOR CASCADE ENERGY, A NEW PDC FOR 2019]

Q23. Anything else I should know?

Q24. [ASK ENERGY TRUST MANAGERS OF CUSTOM and SEM] Can you send me a diagram for Production Efficiency that summarizes the current program delivery structure? Perhaps an organization chart?
RESPONSE:

Appendix F. Customer Surveys

Participant Survey

Introduction

Advance Email (sent by Energy Trust)

Hello [CONTACT NAME],

Energy Trust of Oregon is reaching out to people who participated in our Production Efficiency program to gather feedback and insights. We are hoping you might be willing to speak to someone from our research firm, Research Into Action, regarding your experiences with the program, how you're using the program services, and your future plan of energy efficiency upgrades.

A representative from Research Into Action will contact you in the coming couple of weeks to request and schedule an interview. The interview should take about 15 minutes of your time, depending on the extent of your comments, and we will use your feedback to enhance our program to better meet your needs.

Research Into Action will summarize findings from this research in a report. Please note, Research Into Action will protect your identity throughout this process and any comments in the report will remain anonymous to Energy Trust and other readers.

If you have any questions or concerns, please let me know. Thank you in advance for your time and input on this research.

Thank you,

[ENERGY TRUST REPRESENTATIVE]

Phone Intro Script

[IF CONTACT NAME IS AVAILABLE]

Hi, my name is _____ calling from Research Into Action on behalf of Energy Trust of Oregon. Is this [CONTACT'S NAME]?

When reached:

According to our records, your company participated in Energy Trust's Production Efficiency program and you are the point of contact. We're working with Energy Trust to obtain feedback about your program experience, how you're using the program services, and your future plans for energy efficiency upgrades. Energy Trust will use your feedback to improve the program. I estimate that this will take about 15 minutes. Are you available to speak with me now or would you like to schedule this at later date?

1. Survey now
4. Schedule at later date _____
5. Declined

[IF CONTACT NAME IS NOT AVAILABLE]

Hi, my name is _____ calling from Research Into Action on behalf of Energy Trust of Oregon. I'm calling regarding your company's participation in the Energy Trust Production Efficiency program. May I speak with the person who would know most about your company's participation in that program?

When reached:

Hi, my name is _____ calling from Research Into Action on behalf of Energy Trust of Oregon. I'm calling regarding your company's participation in the Energy Trust Production Efficiency program. We're working with Energy Trust to obtain feedback about your program experience, how you're utilizing the program services, and your future plan of energy efficiency upgrades. Energy Trust will use your feedback to improve the program. I estimate that this will take about 15 minutes. Are you available to speak with me now or would you like to schedule this at later date?

1. Survey now
6. Schedule at later date _____
7. Declined

Initial Program Awareness

[ASK ALL]

- Q1. In what year did you first become involved in projects that received Energy Trust Production Efficiency incentives or technical services?⁵²
1. [YEAR]
 96. Other, please specify: [OPEN-ENDED RESPONSE]
 98. Don't know
 99. Refused

[ASK ALL]

- Q2. How did you first learn about the Production Efficiency program?⁵³

[Do not read. Probe to code. If someone says, "from earlier participation" or "I've known about it a long time," note that we are asking how they first learned about it. If they don't recall, that's ok. If the program was already known when they joined the company or first became responsible for equipment upgrade projects and they found out from someone at the company, select option 3.]

1. A contractor or equipment supplier (e.g., distributor, manufacturer)
2. A program representative (Energy Trust, PGE-CTS, Energy 350, RHT, Cascade, Evergreen)
3. A coworker or supervisor
4. Someone else, please specify: [OPEN-ENDED RESPONSE]
5. Respondent's own efforts (e.g., did web search or other research)
96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know

⁵² Data reported in Figure 3.

⁵³ Data reported in Figure 4.

99. Refused

Awareness of Production Efficiency Offerings

[ASK IF SEM_STATUS = 0, NOT SEM PARTICIPANT]

Q3. In addition to offering incentives and technical services to improve the energy efficiency of equipment, systems, and processes, Energy Trust offers Strategic Energy Management services, or SEM. SEM provides coaching to help participating companies develop and implement plans to save energy by changing the procedures and behaviors of building staff and occupants. Had you heard of this service before I described it to you just now?⁵⁴

[Read items 1-4]

1. Yes
2. No

[Do not read]

96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

[ASK IF Q3=1 (YES, RESPONDENT HAS HEARD OF ETO'S SEM)]

Q4. Would you say you...⁵⁵

[Read items 1-4]

1. Had heard of Energy Trust's SEM service but didn't know any details
2. Knew a few details, or
3. Knew a lot

[Do not read]

96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

[ASK IF LIGHTING=1 AND CUSTOM=0 AND PRESCRIPTIVE=0, **ONLY LIGHTING INCENTIVES**]

Q5. Did you know that Energy Trust offers incentives and technical services for efficiency improvements other than installing efficient lighting?⁵⁶

1. Yes
2. No
96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know

⁵⁴ Data reported in Figure 5.

⁵⁵ Data reported in paragraph preceding Figure 5.

⁵⁶ Data reported in Figure 5.

- 99. Refused

[ASK IF LIGHTING=1 AND CUSTOM=0 AND PRESCRIPTIVE=0, *ONLY LIGHTING INCENTIVES*]

Q6. What has kept your company from using Energy Trust incentives and technical services for making efficiency improvements other than installing efficient lighting?⁵⁷

- 1. [OPEN-ENDED RESPONSE]
- 98. Don't know
- 99. Refused

[ASK IF (CUSTOM=1 OR PRESCRIPTIVE=1) AND LIGHTING=0, *ONLY NON-LIGHTING INCENTIVES*]

Q7. What has kept your company from using Energy Trust incentives and technical services to install more efficient lighting?⁵⁸

- 1. [OPEN-ENDED RESPONSE]
- 98. Don't know
- 99. Refused

[ASK IF (LIGHTING=1 OR PRESCRIPTIVE=1) AND CUSTOM=0, *ONLY LIGHTING/PRESCRIPTIVE INCENTIVES*]

Q8. Did you know that, in addition to offering set incentives for specific types of equipment, Energy Trust offers incentives and technical services for customized efficiency projects?⁵⁹

- 1. Yes
- 2. No
- 96. Other, please specify: [OPEN-ENDED RESPONSE]
- 98. Don't know
- 99. Refused

[ASK IF (LIGHTING=1 OR PRESCRIPTIVE=1) AND CUSTOM=0, *ONLY LIGHTING/PRESCRIPTIVE INCENTIVES*]

Q9. What has kept your company from using Energy Trust incentives and technical services to carry out a customized efficiency project?⁶⁰

- 1. [OPEN-ENDED RESPONSE]
- 98. Don't know
- 99. Refused

Lighting Buy-Down

Starting in 2016, Energy Trust has made it possible for its industrial customers to get instant incentives on certain kinds of LED lighting when buying directly from distributors. Energy Trust calls this “Lighten Up with LEDs.” The instant incentives offered are slightly less than the incentives you would get through the application process.

⁵⁷ Data reported in last paragraph of Section 7.3.2.

⁵⁸ Data reported in last paragraph of Section 7.3.2.

⁵⁹ Data reported in Figure 5.

⁶⁰ Data reported in last paragraph of Section 7.3.2.

[ASK IF LIGHTEN_UP = NULL, **THE DATABASE DOES NOT INDICATE WHETHER OR NOT THE PARTICIPANT HAS GOTTEN LIGHTEN UP INSTANT INCENTIVES**]

Q10. Has your company gotten Lighten Up with LEDs instant incentives for lighting bought from a distributor?⁶¹

[If needed: The discounted lighting types are all LED and include various lamp types to replace incandescent, halogen, and HID recessed, track head, standard, and decorative lamps. It also includes LED tube lamps to replace T8 fluorescent tubes.]

1. Yes
2. No
96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

[ASK IF LIGHTEN_UP= NULL, **THE DATABASE DOES NOT INDICATE WHETHER OR NOT THE PARTICIPANT HAS GOTTEN LIGHTEN UP INSTANT INCENTIVES**]

Q11. Before I mentioned it just now, were you aware that you could get Energy Trust instant incentives for LED lighting that you bought directly from a distributor?⁶²

1. Yes
2. No
96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

[ASK IF LIGHTEN_UP=1 OR Q11=1, **BOUGHT LIGHTING THROUGH LIGHTEN UP OR KNOWS ABOUT IT**]

Q12. How did you learn about the Energy Trust instant incentives for LED lighting that is bought directly from distributors?⁶³

[Do not read. Probe to code.]

1. A contractor
2. A lighting distributor
3. Energy Trust or PDC staff (e.g., PGE-CTS, Energy 350, RHT, Cascade, Evergreen)
4. Energy Trust website
5. Energy Trust's Champion Newsletter
6. Utility, please specify: [OPEN-ENDED RESPONSE]
7. Trade association, please specify: [OPEN-ENDED RESPONSE]
8. A coworker or colleague
96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

⁶¹ Data reported in first paragraph of Section 7.3.3.

⁶² Data reported in first paragraph of Section 7.3.3.

⁶³ Data reported in Figure 6.

Energy Management [ASK IF SEM_STATUS = 0]

[ASK IF SEM_STATUS = 0, *NOT SEM PARTICIPANT*]

Q13. Next, I'd like to ask about your company's energy management practices. For each of the following, please let me know if your company has this management practice in place.⁶⁴

[MATRIX QUESTION: USE FOLLOWING OPTIONS WITH ITEMS A THROUGH E BELOW]

1. Yes (has in place)
2. No (does not have in place)
3. Don't know

[Do not read]

96. Other, please specify: [OPEN-ENDED RESPONSE]
99. Refused

- a. Specific energy-saving goals
- b. A documented corporate energy efficiency or sustainability policy
- c. An energy management action plan that details specific, potential energy-saving actions
- d. Designated staff or an energy champion with responsibility and accountability for energy management in the company
- e. Regular, formal tracking of energy consumption or performance
- f. Engagement with employees to educate them about energy consumption or empower them to take energy-saving actions

[ASK IF Q13A IS SELECTED, *HAS ENERGY-SAVING GOALS*]

Q14. What are those goals?⁶⁵

[If needed: Is it to save a certain number of kWh or therms per year?]

1. [OPEN-ENDED ITEM]
98. Don't know
99. Refused

[ASK IF Q13A IS SELECTED, *HAS ENERGY-SAVING GOALS*]

Q15. How is your company doing in meeting those goals? Would you say...?⁶⁶

[Read first five responses]

1. Very well
2. Somewhat well
3. So-so
4. Somewhat poorly
5. Very poorly

⁶⁴ Data reported in Figure 8.

⁶⁵ Data reported in paragraph following Figure 8.

⁶⁶ Data reported in last paragraph of Section 7.3.4.

[Do not read]

- 98. Don't know
- 99. Refused

[ASK IF Q13E IS SELECTED, **HAS REGULAR, FORMAL TRACKING OF CONSUMPTION OR PERFORMANCE**]

Q16. Does your company regularly communicate energy consumption or performance data to internal stakeholders, such as senior management and operations staff?⁶⁷

[Do not read responses. If response is a simple "yes," record option 1. If response makes it unclear, probe to code.]

- 1. Yes, communicates energy consumption or performance on a regular basis
- 2. Communicates it on a semi-regular or irregular basis
- 3. Rarely or never communicates it

[Do not read]

- 98. Don't know
- 99. Refused

[ASK IF SEM_STATUS = 0, **NOT SEM PARTICIPANT**]

Q17. Does your company have interns that help with energy efficiency?⁶⁸

- 1. Yes
- 2. No
- 3. Don't know

[Do not read]

- 96. Other, please specify: [OPEN-ENDED RESPONSE]
- 99. Refused

[ASK IF Q17 = 2,3, OR 99, **NO INTERNS**]

Q18. How much would your company benefit from having outside help finding energy efficiency interns? Would you say...⁶⁹

[Read first three options]

- 1. A lot
- 2. Somewhat
- 3. Little or not at all

[Do not read]

- 96. Other, please specify: [OPEN-ENDED RESPONSE]

⁶⁷ Data reported in last paragraph of Section 7.3.4.

⁶⁸ Data reported in second paragraph of Section 7.3.8

⁶⁹ Data reported in Figure 11.

99. Refused

Strategic Energy Management (SEM) [ASK IF SEM_STATUS <> 0]

According to our records, your company has participated in Energy Trust's Strategic Energy Management offering.

[ASK IF SEM_STATUS <> 0, **SEM PARTICIPANT**]

Q19. I'd like to ask about your company's energy management practices. For each of the following, please let me know if your company has this management practice in place.⁷⁰

[MATRIX QUESTION: USE FOLLOWING OPTIONS WITH ITEMS A THROUGH E BELOW]

1. Yes, has in place
2. No, does not have in place
3. Don't know

[Do not read]

96. Other, please specify: [OPEN-ENDED RESPONSE]
99. Refused

- a. Specific energy-saving goals
- b. A documented corporate energy efficiency or sustainability policy
- c. An energy management action plan that details specific, potential energy-saving actions
- d. Designated staff or an energy champion with responsibility and accountability for energy management in the company
- e. Regular, formal tracking of energy consumption or performance
- f. Engagement with employees to educate them about energy consumption or empower them to take energy-saving actions

[ASK IF Q19A IS SELECTED, **HAS ENERGY-SAVING GOALS**]

Q20. What are those goals?⁷¹

[If needed: Is it to save a certain number of kWh or therms per year?]

1. [OPEN-ENDED ITEM]
98. Don't know
99. Refused

[ASK IF Q19A IS SELECTED, **HAS ENERGY-SAVING GOALS**]

Q21. How is your company doing in meeting those goals? Would you say...?⁷²

⁷⁰ Data reported in Table 25.

⁷¹ Data reported in paragraph preceding Table 25.

⁷² Data reported in paragraph preceding Table 25.

[Read first five responses]

1. Very well
2. Somewhat well
3. So-so
4. Somewhat poorly
5. Very poorly

[Do not read]

98. Don't know
99. Refused

[NOTE: EACH PERSON WILL GET EITHER Q22, Q23, Q24, Q25, Q26, Q27, OR Q28.]

[ASK IF AT LEAST TWO OF Q19A-F ARE SELECTED, **HAS AT LEAST TWO OF THE IDENTIFIED ENERGY MANAGEMENT PRACTICES**]

Q22. Which of your company's energy management practices did you have in place before you received Energy Trust's SEM services? [If any were not already in place]⁷³

Which of your company's energy management practices were you planning before you received Energy Trust's SEM services even if they were not yet in place?

[MATRIX QUESTION: SHOW "IN PLACE", "PLANNING BUT NOT IN PLACE", DK, AND REF FOR EACH PRACTICE IDENTIFIED]

- a. [IF Q19A IS SELECTED] Specific energy-saving goals
- b. [IF Q19B IS SELECTED] A documented corporate energy efficiency or sustainability policy
- c. [IF Q19C IS SELECTED] An energy management action plan that details specific, potential energy-saving actions
- d. [IF Q19D IS SELECTED] Designated staff or an energy champion with responsibility and accountability for energy management in the company
- e. [IF Q19E IS SELECTED] Regular, formal tracking of energy consumption or performance
- f. [IF Q19F IS SELECTED] Engagement with employees to educate them about energy consumption or empower them to take energy-saving actions

[ASK IF Q19A IS SELECTED AND Q19B-F ARE NOT SELECTED, **ONLY HAS ENERGY SAVINGS GOALS**]

Q23. Were your company's energy savings goals in place before you received Energy Trust's SEM services, were they planned but not yet in place, or were they not yet planned?⁷⁴

1. In place before SEM
2. Planning but not yet in place before SEM
3. Not planned before SEM
98. Don't know
99. Refused

⁷³ Data reported in Table 25.

⁷⁴ Data reported in Table 25.

[ASK IF Q19B IS SELECTED AND Q19A,C,D,E,F ARE NOT SELECTED, **ONLY A DOCUMENTED CORPORATE ENERGY EFFICIENCY OR SUSTAINABILITY POLICY**]

Q24. Was your company's corporate energy efficiency or sustainability policy in place before you received Energy Trust's SEM services, was it planned but not yet in place, or was it not yet planned?⁷⁵

1. In place before SEM
2. Planning but not yet in place before SEM
3. Not planned before SEM
98. Don't know
99. Refused

[ASK IF Q19C IS SELECTED AND Q19A,B,D,E,F ARE NOT SELECTED, **ONLY AN ENERGY MANAGEMENT ACTION PLAN**]

Q25. Was your company's energy management action plan in place before you received Energy Trust's SEM services, was it planned but not yet in place, or was it not yet planned?⁷⁶

1. In place before SEM
2. Planning but not yet in place before SEM
3. Not planned before SEM
98. Don't know
99. Refused

[ASK IF Q19D IS SELECTED AND Q19A,B,C,E,F ARE NOT SELECTED, **ONLY DESIGNATED STAFF OR AN ENERGY CHAMPION**]

Q26. Was your company designated energy management staff or energy champion in place before you received Energy Trust's SEM services, was that being planned, or was it not yet being planned?⁷⁷

1. In place before SEM
2. Planning but not yet in place before SEM
3. Not planned before SEM
98. Don't know
99. Refused

[ASK IF Q19E IS SELECTED AND Q19A-D,F ARE NOT SELECTED, **ONLY REGULAR, FORMAL TRACKING OF ENERGY CONSUMPTION OR PERFORMANCE**]

Q27. Was your company's regular, formal tracking of energy consumption or performance in place before you received Energy Trust's SEM services, was it planned but not yet in place, or was it not yet planned?⁷⁸

1. In place before SEM
2. Planning but not yet in place before SEM
3. Not planned before SEM
98. Don't know

⁷⁵ Data reported in Table 25.

⁷⁶ Data reported in Table 25.

⁷⁷ Data reported in Table 25.

⁷⁸ Data reported in Table 25.

99. Refused

[ASK IF Q19F IS SELECTED AND Q19A-E ARE NOT SELECTED, **ONLY EMPLOYEE ENGAGEMENT**]

Q28. Was your company's employee engagement on energy consumption or savings in place before you received Energy Trust's SEM services, was it planned but not yet in place, or was it not yet planned?⁷⁹

1. In place before SEM
2. Planning but not yet in place before SEM
3. Not planned before SEM
98. Don't know
99. Refused

[ASK IF Q19E IS SELECTED, **HAS REGULAR, FORMAL TRACKING OF CONSUMPTION OR PERFORMANCE**]

Q29. Does your company regularly communicate energy consumption or performance data to internal stakeholders, such as senior management and operations staff? [Do not read responses. If response is a simple "yes," record option 1. If response makes it unclear, probe to code.]⁸⁰

1. Yes, communicates energy consumption or performance on a regular basis
2. Communicates it on a semi-regular or irregular basis
3. Rarely or never communicates it

[Do not read]

98. Don't know
99. Refused

[ASK IF SEM_STATUS <> 0, **SEM PARTICIPANT**]

Q30. On a scale of 0, meaning not at all, to 10, meaning to a great degree, how much did your SEM coach improve your and your staff's ability to independently identify and address issues related to your company's energy performance?⁸¹

[SINGLE RESPONSE]

1. [INSERT 0-10 SCALE WITH DK AND REF]

[ASK IF Q30>0, **SEM COACH HELPED IMPROVE ABILITY TO IDENTIFY & ADDRESS ENERGY PERF ISSUES**]

Q31. As briefly as you can, can you name 2 or 3 things that illustrate how your SEM coach improved your and your staff's ability to independently identify and address issues related to your company's energy performance?⁸²

1. [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

⁷⁹ Data reported in Table 25.

⁸⁰ Data reported in paragraph preceding Table 25.

⁸¹ Data reported in paragraph following Table 25.

⁸² Data reported in paragraph following Table 25.

[ASK IF SEM_STATUS <> 0, **SEM PARTICIPANT**]

Q32. To what extent have the energy performance actions you made while participating in SEM persisted? [If needed: I'm not talking about specific capital upgrades but about improvements to energy performance practices, like establishing savings goals, tracking energy performance.]⁸³

[SINGLE RESPONSE]

1. Everything we have started is still in place
2. Most of what we started is still in place
3. Some of the things we started are still in place
4. Very little of what we started is still in place

[Do not read]

98. Don't know
99. Refused

[ASK IF Q32 = 2 OR 3 OR 4, **NOT EVERYTHING STILL IN PLACE**]

Q33. What has kept your company from persisting with the energy performance actions you started while participating in SEM? [If needed: I understand you did not necessarily discontinue all energy performance actions. I'm just asking about those you did discontinue.]⁸⁴

1. [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

[ASK IF SEM_STATUS <> 0, **SEM PARTICIPANT**]

Q34. What plans does your company have for continuing or expanding on the energy performance practices and actions identified during SEM?⁸⁵

1. [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

[ASK IF SEM_STATUS <> 0, **SEM PARTICIPANT**]

Q35. What types of additional SEM services, if any, would help your company continue to implement and sustain energy management practices identified during SEM?⁸⁶

1. [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

⁸³ Data reported in second paragraph following Table 25.

⁸⁴ Data reported in second paragraph following Table 25.

⁸⁵ Data reported in third paragraph following Table 25.

⁸⁶ Data reported in penultimate paragraph of Section 7.3.5

[ASK IF SEM_STATUS <> 0, **SEM PARTICIPANT**]

Q36. Would you be interested in attending workshops or other events where you could interact with your peers to discuss energy management practices?⁸⁷

1. Yes
2. No

[Do not read]

98. Don't know
99. Refused

[ASK IF Q36 = 1]

Q37. How frequently do you think you'd be interested in attending that kind of event? [If needed: For example, once a month or less often? How many times a year? (Probe for enough detail to code)]⁸⁸

1. [OPEN-ENDED RESPONSE]

[Do not read]

98. Don't know
99. Refused

[ASK IF SEM_STATUS <> 0, **SEM PARTICIPANT**]

Q38. What suggestions do you have on how to improve the SEM offering?⁸⁹

1. [OPEN-ENDED RESPONSE]

[Do not read]

98. Don't know
99. Refused

[ASK IF SEM_STATUS <> 0, **SEM PARTICIPANT**]

Q39. Does your company have interns that help with energy efficiency?⁹⁰

1. Yes
2. No
3. Don't know

[Do not read]

96. Other, please specify: [OPEN-ENDED RESPONSE]
99. Refused

⁸⁷ Data reported in last paragraph of Section 7.3.5.

⁸⁸ Data reported in last paragraph of Section 7.3.5.

⁸⁹ Data reported in fourth paragraph following Table 25.

⁹⁰ Data reported in paragraph preceding Figure 11.

[ASK IF Q39 = 2, 3, OR 99, **NO INTERNS**]

Q40. How much would your company benefit from having outside help finding energy efficiency interns?
Would you say...⁹¹

[Read first three options]

1. A lot
2. Somewhat
3. Little or not at all

[Do not read]

96. Other, please specify: [OPEN-ENDED RESPONSE]
99. Refused

Energy Savings Opportunities and Plans

[ASK ALL]

Q41. Which of the following do you think best describes the opportunities to save additional energy in your company?⁹²

[Read options 1-4]

[SINGLE RESPONSE]

1. There isn't much more to do.
2. It's possible to save some small amounts of energy here and there.
3. There are some meaningful energy saving opportunities that have not been prioritized yet.
4. A majority of the energy saving opportunities still lie ahead.

[Do not read]

96. Other, please specify: [OPEN-ENDED RESPONSE]
97. Not applicable
98. Don't know
99. Refused

⁹¹ Data reported in paragraph preceding Figure 11.

⁹² Data reported in Figure 9.

Satisfaction

[ASK ALL]

Q42. Now I'd like to ask your satisfaction with the experience you had in several areas of your Production Efficiency program participation. On a scale of 0, meaning "not at all satisfied" to 10, meaning "extremely satisfied," how satisfied were you with . . . ⁹³

[MATRIX QUESTION: 0-10 SCALE WITH DK AND REF]

[RANDOMIZE A-I, KEEP J AS LAST ITEM]

- a. The clarity of the program requirements and processes
- b. The effectiveness of communication with program staff
- c. [IF CUSTOM=1] The program staff's ability to identify energy and cost saving opportunities
- d. [IF CUSTOM=1] The technical analysis study to identify the most cost-effective solution
- e. [IF CUSTOM=1 OR PRESCRIPTIVE=1 OR LIGHTING=1] The ease of identifying a contractor or product supplier
- f. [IF CUSTOM=1 OR PRESCRIPTIVE=1 OR LIGHTING=1] The installation contractor or vendor/distributor that you worked with
- g. The ease of preparing the incentive application
- h. The time it took to process and receive your incentive
- i. The performance of the measure(s) for which you received the incentive
- j. The incentive amount you received
- k. [IF SEM_STATUS <> 0] The SEM coaching
- l. The program overall

[FOR ANY ITEMS IN Q40 RATED 7 OR BELOW]

Q43. Please tell me anything that was not fully satisfactory about [Q43_ITEM]?⁹⁴

1. [a. OPEN-ENDED RESPONSE]
2. [b. OPEN-ENDED RESPONSE]
3. [c. OPEN-ENDED RESPONSE]
4. [d. OPEN-ENDED RESPONSE]
5. [e. OPEN-ENDED RESPONSE]
6. [f. OPEN-ENDED RESPONSE]
7. [g. OPEN-ENDED RESPONSE]
8. [h. OPEN-ENDED RESPONSE]
9. [i. OPEN-ENDED RESPONSE]
10. [j. OPEN-ENDED RESPONSE]

[Do not read]

98. Don't know
99. Refused

⁹³ Data reported in Figure 10.

⁹⁴ Data reported following Figure 10.

[ASK IF Q10=1, **BOUGHT DISCOUNTED LIGHTING FROM DISTRIBUTOR**]

Q44. I'd also like to know how satisfied you were with your experience in buying Energy-Trust-discounted lighting from a distributor. On a scale of 0, meaning not at all satisfied, to 10, meaning extremely satisfied, how satisfied were you with . . .?⁹⁵

[SINGLE RESPONSE; INSERT 0-10 SCALE WITH DK AND REF]

1. The ease of buying the discounted efficient lighting from the distributor
2. The discounted cost of the efficient lighting

[ASK ALL]

Q45. Considering your overall experience with the program, how likely would you be to recommend the program to your colleagues and other businesses, using a scale from 0, meaning "not at all likely," to 10, meaning "very likely?"⁹⁶

[SINGLE RESPONSE]

1. [INSERT 0-10 SCALE WITH DK AND REF]

Other

[ASK ALL]

Q46. Has any contractor offered you their own discounts on energy efficient equipment in lieu of buying Energy-Trust-discounted lighting or applying for Energy Trust incentives for any equipment?⁹⁷

1. Yes
2. No

[Do not read]

96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

[ASK ALL]

Q47. Energy Trust issues a quarterly industrial efficiency newsletter, called The Champion, which contains information on best practices, emerging technologies, and technical training opportunities. Are you aware of this newsletter?⁹⁸

[SINGLE RESPONSE]

1. Yes
2. No

⁹⁵ Data reported in Figure 7

⁹⁶ Data reported in first paragraph of Section 7.3.7

⁹⁷ Data reported in paragraph following Figure 11.

⁹⁸ Data reported in last paragraph of Section 7.3.8.

[Do not read]

96. Other, please specify: [OPEN-ENDED RESPONSE]
97. Not applicable
98. Don't know
99. Refused

[ASK IF Q47=1]

Q48. Do you have any suggestions for how that newsletter could be improved? If so, what are they?⁹⁹

1. [OPEN-ENDED RESPONSE]
2. No suggestions
99. Refused

[ASK ALL]

Q49. Are there any needs that the program is not meeting, such as specific technologies your company could get more help on or any other types of support that would have been useful that Energy Trust might consider providing to increase your production efficiency?¹⁰⁰

1. [OPEN-ENDED RESPONSE]

[Do not read]

98. Don't know
99. Refused

Firmographics

I'd like to close with just a few questions about your company.

Q50. First, what type of work does your company do? [Probe to code]¹⁰¹

[SELECT ONE]

1. Manufacturing, including food
2. Agriculture, forestry, or related, other than cannabis production
3. Cannabis production
4. Mining, quarrying, or related
5. Refrigerated warehousing, or related
6. Waste management or related
7. Utilities, energy production, distribution, or transmission
8. Water and wastewater treatment
9. Other – please specify: [OPEN-ENDED RESPONSE]

⁹⁹ Data reported in last paragraph of Section 7.3.8.

¹⁰⁰ Data reported at the end of Section 7.3.7.

¹⁰¹ Data reported in Table 23.

[Do not read]

- 98. Don't know
- 99. Refused

[ASK IF Q50=1 "MANUFACTURING"]

Q51. And what types of products does your company manufacture? [Probe to code; do not need to ask if they already specified product in response to Q50]¹⁰²

[SELECT ALL THAT APPLY]

- 1. Wood products
- 2. Food
- 3. Fabricated metal products
- 4. Beverage and tobacco products
- 5. Machinery
- 6. Computer and electronic products
- 7. Transportation equipment
- 8. Nonmetallic mineral products
- 9. Printing and related support activities
- 10. Plastics and rubber products
- 11. Primary metal
- 12. Chemicals
- 13. Furniture and related products
- 14. Paper
- 15. Electrical equipment and appliances
- 16. Apparel
- 17. Textile mills
- 18. Petroleum and coal products
- 19. Leather and allied products
- 20. Other – please specify: [OPEN-ENDED RESPONSE]

[Do not read]

- 98. Don't know
- 99. Refused

[ASK ALL]

Q52. How many employees does your company have in Oregon?¹⁰³

- 1. [OPEN-ENDED RESPONSE]

[Do not read]

- 98. Don't know
- 99. Refused

¹⁰² Data reported in Table 23.

¹⁰³ Data reported in Table 24.

[ASK ALL]

Q53. And how many facilities does your company have in Oregon?¹⁰⁴

1. [OPEN-ENDED RESPONSE]

[Do not read]

98. Don't know
99. Refused

[ASK ALL]

Q54. Is your company owned by a woman or a member of a minority group, even if it doesn't have an official registration as woman- or minority-owned?¹⁰⁵

[Probe to code whether woman-owned, minority-owned, or both]

[SELECT 1 OR 2 OR BOTH; SELECTION OF 3, 98, OR 99 IS EXCLUSIVE]

1. Woman-owned
2. Minority-owned
3. Neither

[Do not read]

98. Don't know
99. Refused

[ASK ALL]

Q55. Who services your major equipment: in-house staff, a contractor, or a mix?¹⁰⁶

1. In-house staff only
2. Contractor only
3. Both
96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

That's all the questions I have. Thank you for your time.

[If they ask about the use of this survey or "what happens next?": We will prepare a report for Energy Trust based on the results of this survey as well as on information collected from companies that did not receive program incentives or services and from contractors and distributors that did program-related work. In that report, we will highlight program strengths and weaknesses and will make recommendations about how the program can best serve industrial and agricultural customers.]

¹⁰⁴ Data reported in Table 24.

¹⁰⁵ Data reported in paragraph preceding Table 24.

¹⁰⁶ Data reported in second paragraph following Figure 11.

Nonparticipant Survey

Introduction

Advance Email (sent by Energy Trust)

Hello [CONTACT NAME],

Energy Trust of Oregon is reaching out to industrial customers of Oregon's investor-owned utilities to learn about the current state of energy management practices among industrial customers and to assess what indirect impact, if any, Energy Trust's activities have had. We are hoping you might be willing to speak to someone from our research firm, Research Into Action, regarding these topics.

A representative from Research Into Action will contact you in the coming couple of weeks to request and schedule an interview. The interview should take about 15 minutes of your time, depending on the extent of your comments, and we will use your feedback to enhance our program to better meet your needs.

Research Into Action will summarize findings from this research in a report. Please note, Research Into Action will protect your identity throughout this process and any comments in the report will remain anonymous to Energy Trust and other readers.

If you have any questions or concerns, please let me know. And if you are not involved in making decisions about your company's energy management, please let us know by responding to this email – or when we call – who would be an appropriate person to speak to.

Thank you in advance for your time and input on this research.

Thank you,

[ENERGY TRUST REPRESENTATIVE]

Phone Intro Script

[IF CONTACT NAME IS AVAILABLE]

Hi, my name is _____ calling from Research Into Action on behalf of Energy Trust of Oregon. Is this [CONTACT'S NAME]?

When reached:

We're working with Energy Trust to obtain feedback about your energy management practices and to assess what indirect impact, if any, Energy Trust's activities have had on them. Energy Trust will use your feedback to improve the services it offers companies like yours. I estimate that this will take about 15 minutes. Are you available to speak with me now or would you like to schedule this at later date?

1. Survey now
8. Schedule at later date _____
9. Declined

[IF CONTACT NAME IS NOT AVAILABLE]

Hi, my name is _____ calling from Research Into Action on behalf of Energy Trust of Oregon. Energy Trust would like to learn about the current state of energy management practices among industrial customers and to assess what indirect impact, if any, Energy Trust's activities have had. May I speak with the person who would know most about your company's energy management practices?

When reached:

Hi, my name is _____ calling from Research Into Action on behalf of Energy Trust of Oregon. Energy Trust would like to learn about the current state of energy management practices among industrial customers. Energy Trust will use your feedback to improve the services it offers companies like yours. I estimate that this will take about 15 minutes. Are you available to speak with me now or would you like to schedule this at later date?

1. Survey now

10. Schedule at later date _____

11. Declined

Screening

Before we go any further, I want to ask about your role in your company's energy management. And by energy management, I mean any decisions that affect the amount of energy your company uses, including decisions about purchase or upgrade of energy-using equipment.

[ASK ALL]

S1. Would you say that you make or are involved in making the decisions about energy use at your company?

[Probe to code. Does not have to be sole decision maker. Looking for anyone who is involved in making decisions. Anyone who has a "voice" or a "vote" in the decisions.]

1. Yes
2. No
96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

IF S1<>1, READ FOLLOWING AND GO TO END:

We need to talk to someone who is involved in making decisions about energy management.

Can you provide me the name and contact information for someone who is involved in those decisions?

Name:

Phone:

Thank you for your time.

Respondent Characteristics

First, I'd like to get some information about you.

[ASK ALL]

Q1. What is your work title?¹⁰⁷

[Record verbatim and select item that most closely fits response]

1. [VERBATIM]
2. Owner
3. President/CEO/COO
4. CFO/Comptroller
5. Controller, accounting manager, or related
6. VP or division director
7. Facilities or building manager or director
8. Manager, other than above
98. Don't know
99. Refused

[ASK ALL]

Q2. About how long have you been in a position where you have been involved in making decisions about your company's energy management?¹⁰⁸

1. [NUMBER OF YEARS]
96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

Initial Program Awareness

[ASK ALL]

Q3. Before I contacted you, had you heard of Energy Trust of Oregon?¹⁰⁹

1. Yes
2. No
96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

[ASK IF Q3=1 (YES)]

¹⁰⁷ Data reported in Table 26.

¹⁰⁸ Data reported in paragraph prior to Table 26.

¹⁰⁹ Data reported in first paragraph of Section 7.4.2.

Q4. Have you ever worked for a company that received incentives or technical service from Energy Trust of Oregon?¹¹⁰

1. Yes
2. No
96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

[ASK IF Q3=1 AND (Q4=2 OR 98 OR 99)]

Q5. What have you heard about what Energy Trust of Oregon does?

1. Provides financial incentives and technical services to improve the energy efficiency of equipment, systems, and processes
96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Nothing/Don't know
99. Refused

[ASK IF Q5=1, **RESPONDENT WAS AWARE OF INCENTIVES AND SERVICES**]

Q6. About how long ago did you first hear about Energy Trust energy efficiency incentives and technical services?

1. [NUMBER OF YEARS]
96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

[ASK IF Q5=1, **RESPONDENT WAS AWARE OF INCENTIVES AND SERVICES**]

Q7. How did you first learn about Energy Trust energy efficiency incentives and technical services?

[Do not read. Probe to code. If someone says they learned about it through past participation, ask about how they originally learned about it, before they participated.]

1. A contractor or equipment supplier (e.g., distributor, manufacturer)
2. A program representative (Energy Trust, PGE-CTS, Energy 350, RHT, Cascade, Evergreen)
3. A coworker in the same company
4. Someone else, please specify: [OPEN-ENDED RESPONSE]
5. Respondent's own efforts (e.g., did web search or other research)
96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

[ASK IF Q5=1, **RESPONDENT WAS AWARE OF INCENTIVES**]

Q8. What has kept your company from using Energy Trust incentives and technical services [IF PAST_PARTICIPANT=1: lately]?

¹¹⁰ Data reported in first paragraph of Section 7.4.2.

1. [OPEN-ENDED RESPONSE]
96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

Lighting Buy-Down

Starting in 2016, Energy Trust has made it possible for its industrial customers to get instant incentives on certain kinds of LED lighting when buying directly from distributors. Energy Trust calls this “Lighten Up with LEDs.” The instant incentives are slightly less than the incentives you would get through the application process.

[ASK IF Q3<>2]

- Q9. Before I mentioned it just now, were you aware that you could get Energy Trust instant incentives for buying lighting directly from a distributor?¹¹¹

[If needed: The discounted lighting types are all LED and include various lamp types to replace incandescent, halogen, and HID recessed, track head, standard, and decorative lamps. It also includes LED tube lamps to replace T8 fluorescent tubes.]

1. Yes
2. No
96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

[ASK IF Q9=1, ***KNOWS ABOUT LIGHTEN UP***]

- Q10. How did you learn about the Energy Trust Lighten Up with LEDs instant incentives?¹¹²

[Do not read. Probe to code.]

1. A contractor
2. A lighting distributor
3. Energy Trust or PDC staff (e.g., PGE-CTS, Energy 350, RHT, Cascade, Evergreen)
4. Energy Trust website
5. Energy Trust's Champion Newsletter
6. Utility, please specify: [OPEN-ENDED RESPONSE]
7. Trade association, please specify: [OPEN-ENDED RESPONSE]
8. A coworker or colleague
96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

¹¹¹ Reported in section “Lighting Buy-Down,” in Section 7.4.2.

¹¹² Reported in section “Lighting Buy-Down,” in Section 7.4.2.

Awareness of SEM

In addition to offering incentives and technical services to improve the efficiency of equipment and processes, Energy Trust offers something called Strategic Energy Management services, or SEM. SEM provides coaching to help companies develop and implement plans to save energy, including by changing the procedures and behaviors of building staff and occupants.

[ASK IF Q3=1]

Q11. Before I described it to you just now, would you say you...¹¹³

[Read items 1-4]

1. Had never heard of SEM
2. Had heard of it but didn't know any details
3. Knew a few details, or
4. Knew a lot about SEM

[Do not read]

96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

[ASK ALL]

Q12. How interested would you be in learning more about Energy Trust's SEM offering? Would you say you are...¹¹⁴

[Read items 1-3]

1. Not at all interested
2. Somewhat interested, or
3. Very interested

[Do not read]

96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

Energy Management

[ASK ALL]

Q13. Next, I'd like to ask about your company's energy management practices. For each of the following, please let me know if your company has this management practice in place.¹¹⁵

¹¹³ Data reported in Figure 12.

¹¹⁴ Data reported in Figure 13.

¹¹⁵ Data reported in **Error! Reference source not found.**

[MATRIX QUESTION: USE FOLLOWING OPTIONS WITH ITEMS A THROUGH E BELOW]

1. Yes (has in place)
2. No (does not have in place)
3. Don't know

[Do not read]

96. Other, please specify: [OPEN-ENDED RESPONSE]
99. Refused

- a. Specific energy-saving goals
- b. A documented corporate energy efficiency or sustainability policy
- c. An energy management action plan that details specific, potential energy-saving actions
- d. Designated staff or an energy champion with responsibility and accountability for energy management in the company
- e. Regular, formal tracking of energy consumption or performance
- f. Engagement with employees to educate them about energy consumption or empower them to take energy-saving actions

[ASK IF Q13A IS SELECTED, **HAS ENERGY-SAVING GOALS**]

Q14. What are those goals?¹¹⁶

[If needed: Is it to save a certain number of kWh or therms per year?]

1. [OPEN-ENDED ITEM]
98. Don't know
99. Refused

[ASK IF Q13A IS SELECTED, **HAS ENERGY-SAVING GOALS**]

Q15. How is your company doing in meeting those goals? Would you say...?¹¹⁷

[Read first five responses]

1. Very well
2. Somewhat well
3. So-so
4. Somewhat poorly
5. Very poorly

[Do not read]

98. Don't know
99. Refused

[ASK IF Q13E IS SELECTED, **HAS REGULAR, FORMAL TRACKING OF CONSUMPTION OR PERFORMANCE**]

¹¹⁶ Data reported in paragraph following **Error! Reference source not found..**

¹¹⁷ Data reported in paragraph following **Error! Reference source not found..**

Q16. Does your company regularly communicate energy consumption or performance data to internal stakeholders, such as senior management and operations staff?¹¹⁸

[Do not read responses. If response is a simple “yes,” record option 1. If response makes it unclear, probe to code.]

1. Yes, communicates energy consumption or performance on a regular basis
2. Communicates it on a semi-regular or irregular basis
3. Rarely or never communicates it

[Do not read]

98. Don't know
99. Refused

[ASK ALL]

Q17. Does your company have interns that help with energy efficiency?¹¹⁹

1. Yes
2. No
3. Don't know

[Do not read]

96. Other, please specify: [OPEN-ENDED RESPONSE]
99. Refused

[ASK ALL]

Q18. How much would your company benefit from having outside help finding energy efficiency interns? Would you say...¹²⁰

[Read first three options]

1. A lot
2. Somewhat
3. Little or not at all

[Do not read]

96. Other, please specify: [OPEN-ENDED RESPONSE]
99. Refused

Energy Savings Opportunities and Plans

[ASK ALL]

¹¹⁸ Data reported in first paragraph of Section 7.4.3.

¹¹⁹ Data reported in last paragraph of Section 7.4.3.

¹²⁰ Data reported in last paragraph of Section 7.4.3.

Q19. Which of the following do you think best describes the opportunities to save additional energy in your company?¹²¹

[SINGLE RESPONSE]

1. There isn't much more we could do.
2. It's possible to save some small amounts of energy here and there.
3. There are some meaningful energy saving opportunities that have not been prioritized yet.
4. A majority of the energy saving opportunities still lie ahead.

[Do not read]

96. Other, please specify: [OPEN-ENDED RESPONSE]
97. Not applicable
98. Don't know
99. Refused

Other

[ASK IF Q3<>2]

Q20. Has any contractor offered you their own discounts on energy efficient equipment in lieu of buying Energy-Trust-discounted equipment or applying for Energy Trust incentives for any equipment?¹²²

1. Yes
2. No

[Do not read]

96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

[ASK ALL]

Q21. Is there any type of support you would like to get from Energy Trust of Oregon to help your company save energy, such as assistance with any specific technologies/processes or equipment?¹²³

1. [OPEN-ENDED RESPONSE]

[Do not read]

98. Don't know
99. Refused

¹²¹ Data reported in Figure 14.

¹²² Data in Section 7.4.5.

¹²³ Data reported in the paragraph following Figure 14.

Firmographics

I'd like to close with just a few questions about your company.

[ASK ALL]

Q22. First, what type of work does your company do? [Probe to code]¹²⁴

[SELECT ONE]

1. Manufacturing, including food
2. Agriculture, forestry, or related, other than cannabis production
3. Cannabis production
4. Mining, quarrying, or related
5. Refrigerated warehousing, or related
6. Waste management or related
7. Utilities, energy production, distribution, or transmission
8. Water and wastewater treatment
9. Other – please specify: [OPEN-ENDED RESPONSE]

[Do not read]

98. Don't know
99. Refused

[ASK IF Q22=1 “MANUFACTURING”]

Q23. And what types of products does your company manufacture? [Probe to code; do not need to ask if they already specified product in response to Q22]¹²⁵

[SELECT ALL THAT APPLY]

1. Wood products
2. Food
3. Fabricated metal products
4. Beverage and tobacco products
5. Machinery
6. Computer and electronic products
7. Transportation equipment
8. Nonmetallic mineral products
9. Printing and related support activities
10. Plastics and rubber products
11. Primary metal
12. Chemicals
13. Furniture and related products
14. Paper
15. Electrical equipment and appliances
16. Apparel

¹²⁴ Data reported in Table 27.

¹²⁵ Data reported in Table 27.

17. Textile mills
18. Petroleum and coal products
19. Leather and allied products
20. Other – please specify: [OPEN-ENDED RESPONSE]

[Do not read]

98. Don't know
99. Refused

Q24. How many employees does your company have in Oregon?¹²⁶

1. [OPEN-ENDED RESPONSE]

[Do not read]

98. Don't know
99. Refused

Q25. And how many facilities does your company have in Oregon?¹²⁷

1. [OPEN-ENDED RESPONSE]

[Do not read]

98. Don't know
99. Refused

[ASK ALL]

Q26. And approximately how much electricity do your facilities in Oregon use annually?¹²⁸

1. Up to 2,500 kWh
2. >2,500 up to 5,000
3. >5,000 up to 7,500
4. >7,500 up to 10,000
5. >10,000 up to 15,000
6. >15,000 up to 20,000
7. >20,000 up to 25,000
8. >25,000 up to 50,000
9. >50,000 up to 75,000
10. >75,000 up to 100,000
11. >100,000 up to 150,000
12. More than 150,000 kWh

[Do not read]

98. Don't know
99. Refused

¹²⁶ Data reported in paragraph following Table 27.

¹²⁷ Data reported in paragraph following Table 27.

¹²⁸ Data reported in Table 28.

[ASK ALL]

Q27. Is your company owned by a woman or a member of a minority group, even if it doesn't have an official registration as woman- or minority-owned?¹²⁹

[Probe to code whether woman-owned, minority-owned, or both]

[SELECT 1 OR 2 OR BOTH; SELECTION OF 3, 98, OR 99 IS EXCLUSIVE]

1. Woman-owned
2. Minority-owned
3. Neither

[Do not read]

98. Don't know
99. Refused

[ASK ALL]

Q28. Who services your major equipment: in-house staff, a contractor, or a mix?¹³⁰

1. In-house staff only
2. Contractor only
3. Both
96. Other, please specify: [OPEN-ENDED RESPONSE]
98. Don't know
99. Refused

[ASK ALL]

Q29. Finally, would you like someone from Energy Trust to contact you with information about energy efficiency incentives and services?

1. Yes – ask for contact information: [OPEN-ENDED RESPONSE]
2. No

[Do not read]

98. Don't know
99. Refused

That's all the questions I have. Thank you for your time.

¹²⁹ The reported in Section 7.4.5.

¹³⁰ Data not reported in Section 7.4. 50% of nonparticipants reported that both contractors and in-house staff service their major equipment, 30% reported that only contractors service their major equipment, and 20% reported they only have in-house staff service their major equipment.

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