



Opinion **Dynamics**

Boston | Headquarters

617 492 1400 tel
617 497 7944 fax
800 966 1254 toll free

1000 Winter St
Waltham, MA 02451



2013-2015 Commercial Direct Install Process Evaluation: Phase 2 Report

California Public Utilities Commission, Energy Division
Prepared by Opinion Dynamics
Final Report: April 25, 2017

CALMAC ID: CPU0135.02



Evaluator Contact Information

The study effort is covered under California Public Utilities Commission (CPUC) Contract 12PS5094 between Itron, Inc. and the CPUC. Opinion Dynamics is a subcontractor to Itron, Inc. for this work and the evaluation effort was covered under work order ED_I_Com_2.

Organization	Name	Role	Email	Phone
Energy Division, California Public Utilities Commission	Mona Dzvova	CPUC Project Manager	mona.dzvova@cpuc.ca.gov	415-703-1231
EM&V Advisor to the CPUC	Ralph PrahI	CPUC Advisor	ralph.prahI@gmail.com	608-334-9942
Opinion Dynamics	Hannah Arnold	Study Director	harnold@opiniondynamics.com	510-444-5050

Acknowledgements

This project was a collaborative effort under contract to the CPUC via a subcontract agreement with Itron, Inc. We would like to thank the California Commission Staff, Commission Advisors, Investor-Owned Utilities, and Itron for guidance and input throughout the project planning and execution. Finally, we would like to thank IOU program management staff and program implementation management staff who took the time to support this study.

Legal Notice

This report was prepared as an account of work sponsored by the California Public Utilities Commission. It does not necessarily represent the views of the Commission or any of its employees except to the extent, if any, that it has formally been approved by the Commission at a public meeting. For information regarding any such action, communicate directly with the Commission at 505 Van Ness Avenue, San Francisco, California 94102. Neither the Commission nor the State of California, nor any officer, employee, or any of its contractors or subcontractors makes any warrant, express or implied, or assumes any legal liability whatsoever for the contents of this document.

Table of Contents

1. Executive Summary	1
2. Introduction	4
2.1 Program Description.....	4
2.2 Phase 2 Study Objectives	5
2.3 Summary of Phase 1 Study Findings	6
3. Evaluation Methodology	9
3.1 Literature Review.....	9
3.2 In-Depth Interviews with Program Staff	9
3.3 Conversion Rate Analysis.....	10
3.4 Customer Surveys.....	14
4. Evaluation Findings.....	19
4.1 Program Participation.....	19
4.2 Customer Experience and Satisfaction	25
5. Key Findings and Recommendations	38
A. Appendix: Literature Review Findings.....	40
B. Appendix: Data Collection Instruments	44

Table of Tables

Table 1. DI Programs Included in the 2013-2015 Process Evaluation	5
Table 2. Phase 2 Evaluation Activities	9
Table 3. Completed Interviews by Program	10
Table 4. Implementer Data Availability for Conversion Rate Analysis.....	12
Table 5. Program Attributes and Associated Categories Included in the Conversion Rate Analysis	13
Table 6. Customer Survey Sample Frame and Completed Interviews.....	15
Table 7. Customer Survey Dispositions	16
Table 8. Customer Survey Response and Cooperation Rates.....	16
Table 9. Full Participant Survey Weights.....	16
Table 10. Audit-Only Participant Survey Weights	17
Table 11. Examples of Types of Measures Offered in Direct Install Programs	19
Table 12. Self-Reported Program Goals and Achievements in 2013-2014.....	20
Table 13. Level 1 and Level 2 Conversion Rates by Program	22
Table 14. Program Attributes and Associated Categories Included in the Conversion Rate Analysis	23
Table 15. Level 1 Conversion Rates Before and After Title 24 Changes.....	25
Table 16. Reasons for Participation in the Program or Audit (Multiple Response).....	27
Table 17. Full and Audit-Only Participant Specific Program Satisfaction Scores.....	30
Table 18. Equipment Installation Practices Among Full Participants	32
Table 19. Full Participants’ Reasons for Installing Equipment (Multiple Response)	33
Table 20. Participating Business Types	36
Table 21. Title of Person Familiar with Program, by Participation Status.....	37

Table of Figures

Figure 1. Sample Design	15
Figure 2. How did you first hear about the Program?	26
Figure 3. Mean Respondent Ratings of Written Assessments among Those Who Received Them	28
Figure 4. Program Satisfaction Scores for Program Components Experienced by Full and Audit-Only Participants	29
Figure 5. Likelihood to Recommend the Program.....	30
Figure 6. Suggestions for Program Improvement.....	31
Figure 7. Reasons Cited by Full Participants for Not Installing All Recommended Equipment (Multiple Response)	34
Figure 8. Reasons Cited by Audit-Only Participants for Not Installing Recommended Equipment (Multiple Response)	35

1. Executive Summary

This document summarizes the results from Phase 2 of the 2013-2015 Commercial Direct Install (DI) Process Evaluation. The Evaluation Team defines DI programs broadly as those that facilitate the installation of no- or low-cost energy efficiency measures (i.e., a turnkey service) for eligible commercial customers. This evaluation includes 19 California Investor Owned Utility (IOU) Commercial DI programs active from 2013-2015. The 19 programs are administered and/or operated by three of the four California IOUs—Pacific Gas and Electric (PG&E), Southern California Edison (SCE), and San Diego Gas and Electric (SDG&E). The goal of this study was to identify drivers of DI program performance and barriers to participation.

This is the second of two evaluation reports produced by the Evaluation Team covering the 2013-2015 Commercial DI programs. The first report—2013-2015 Commercial Direct Install Process Evaluation: Phase 1—identified and characterized all of the DI programs offered in California during the study period.

Methodology

The findings presented in this report are based upon a combination of qualitative and quantitative research methods. In particular, the Evaluation Team conducted in-depth interviews with IOU program staff, as well as DI program implementation staff for all 19 DI programs. Additionally, the Evaluation Team analyzed conversion rates (e.g., the percentage of audits that result in the installation of at least one recommended piece of equipment) using program-tracking data from program implementers, and conducted quantitative telephone surveys with full participants (i.e., audit and installation of recommended equipment) and audit-only participants in select DI programs. In this study, we refer to customers who choose to install measures as full participants, and those who drop out after the audit as audit-only participants.

Coordination across the DI impact and process evaluation efforts also allowed the Evaluation Team to use initial findings from a CPUC-sponsored Comprehensiveness Study¹ to inform the sample design for the customer surveys. The Comprehensiveness Study developed a single quantitative metric called the DORCE score to assess Commercial and Industrial (C&I) program performance based on measures of cost effectiveness (CE) and depth of retrofit (DOR). As such, the Evaluation Team was able to assess potential differences in the customer experience between programs with different DORCE score ranks with a high rank representing particularly comprehensive or cost effective programs and low scores representing programs on the other side of the comprehensiveness and cost effectiveness spectrum.

Key Findings

The Evaluation Team provides the following key findings and recommendations based on the customer research and conversion rate analysis conducted as part of the Phase 2 DI Process Evaluation. We have organized this section around each of the Phase 2 study's key research objectives.

¹ Itron, Inc. (2016). Comprehensiveness Analysis Report – Phase I. San Francisco: California Public Utilities Commission (CPUC). Available at: http://www.calmac.org/publications/Comprehensiveness_Analysis_Report_-_Phase_I.pdf

How do customers perceive the program, what aspects of the program are working well, and what areas need improvement?

- Full participants report significantly higher levels of satisfaction with the programs' components than audit-only participants do. In particular, mean satisfaction scores for full participants range from 9.01 for the information provided by the program to 9.33 for the representative who conducted the energy assessment. Audit-only participants provided mean satisfaction scores ranging from 6.73 on the program discount to 8.01 on the representative who conducted the energy assessment. Participants are also significantly more likely to recommend the program to other businesses than audit-only participants are (94% and 71% respectively).
- A key barrier to participation on the part of audit-only participants is cost. While this group is significantly more motivated to participate in a DI program to reduce their energy bills (72% compared to 58% for full participants), they are significantly less satisfied with the discounts offered by the program (mean score of 6.73 compared to 9.13 for full participants). DI programs are also having success reaching businesses that lease their facilities, a traditional barrier to participation in energy efficiency programs.
- In terms of program improvements, over half of respondents (52% and 67% for audit-only and full participants respectively) did not offer any suggestions for changing the program. Among those who did, audit-only participants asked for larger discounts and better information, while full participants asked for more follow up, greater publicity of programs like these, and a greater selection of equipment.
- Overall, we found very few significant differences in program satisfaction between customers in high or low DORCE score ranked programs. As such, while various programs offer different levels of comprehensiveness as measured through the DORCE score metric, there is little evidence to suggest the customer experience with the programs differs.

Why is there so little cross-program participation?

- Cross-program promotion is a critical step toward ensuring that customers have full knowledge and access to programs they are eligible to participate in. According to in-depth interviews with program staff, the majority of DI programs are making some effort to promote other programs to their customers. However, most of this promotion is informal in nature and as reported by program implementation staff, involves implementation staff mentioning that other programs are available, but not sharing program details or providing reference materials.

Are there program attributes that appear to influence customer willingness to participate and to install recommended measures?

- Given the small number of DI programs (n=19) and the wide variation between them in terms of program attributes, both the conversion rate analysis and survey analysis were inconclusive in identifying key program attributes driving full participation (i.e., equipment installation).
- We found that the conversion rate results (i.e., comparing, within a given attribute, categories of programs to each other) were largely indeterminate. Overall, there simply were not enough programs (15) to allow us to isolate the influence of one attribute (e.g., administrative model vs. incentive structure) or a category within an attribute (e.g., whether or not the program administrative model was Core, LGP, or 3P) from all the other categories within the same attribute. However, qualitative data from our analysis does suggest that co-pay may play a role in moving

customers from the energy audit to measure installation, a finding that is reinforced by surveys with audit-only participants.

Are there any ramifications associated with performing DI installations “in-house” versus through local contractors?

- As documented in the Phase 1 evaluation report, some DI programs employ their own staff (i.e., “in-house” staff) to conduct energy audits and installations while other programs use a combination of in-house staff and local contractors. In general, we did not find any significant differences in the customer experience or satisfaction with the program between those served by in-house staff compared to a combination of both in-house and local contractors. In addition, we did not see any differences in conversion rates based on this attribute. As a result, there is no evidence to suggest that a consistent approach needs to be adopted across programs.

Recommendations

Based on the key findings presented above, we make the following recommendations to ensure continuation of the positive customer experience currently enjoyed by participants in DI programs:

- **Recommendation #1: Where possible, include the individual responsible for making decisions regarding energy efficiency investments in the energy audit.** Identifying and reaching the key decision maker within a business, especially a small business, can be challenging. However, results from the customer survey indicate that contacts at participating customers were significantly more likely to have personally participated in the energy audit than those at nonparticipating customers. While there are multiple potential explanations for this finding, we hypothesize that this one-on-one interaction may help better educate customers about the benefits of the retrofit and give implementers a greater opportunity to make their case for full participation (i.e., installation of recommended equipment).
- **Consideration #1: The IOUs should consider investing in promotional materials to support the cross-promotion of energy efficiency programs for Commercial customers.** Given that some DI programs have no eligibility requirements in terms of customer size, DI program implementers are conducting outreach and projects for customers that could also participate in a range of other commercial program offerings. Given that many DI program implementers are already informally educating their customers about other program offerings, the IOUs could develop a one or two page brochure on the other energy efficiency programs available to business customers with information about where to go for additional information.
- **Consideration #2: Given the large number of DI programs, and the range of different program attributes among them, the CPUC should consider conducting case study research into the drivers of conversion rates among those at the low and high end of the conversion rate spectrum.** A case study approach would allow researchers to identify and focus in on a smaller number of DI programs for deeper analysis.

2. Introduction

This document presents findings from Phase 2 of the 2013-2015 process evaluation of the California Investor Owned Utilities' (IOU) Commercial Direct Install (DI) programs. The Phase 1 study, completed in September 2016,² leveraged a mix of primary and secondary data to characterize and examine key differences in the design, outreach, and delivery models of various DI programs. As part of the Phase 1 study, the Evaluation Team identified 19 commercial programs that either offer DI as the primary implementation approach or offer a DI component in concert with other implementation approaches, such as custom incentives or traditional retrofit programs. The 19 programs are administered and/or operated by three of the four California IOUs—Pacific Gas and Electric (PG&E), Southern California Edison (SCE), and San Diego Gas and Electric (SDG&E).

While the Phase 1 study focused on identifying and characterizing DI programs, this Phase 2 study delves deeper—toward the goal of understanding key drivers of DI program performance and barriers to participation.

2.1 Program Description

The Evaluation Team defines DI programs broadly as those that facilitate the installation of no- or low-cost energy efficiency measures (i.e., a turnkey service) for eligible commercial customers. These programs traditionally targeted hard-to-reach customers, such as small businesses, that had not participated in energy efficiency programs. However, as documented through this study, DI programs have expanded in California to reach medium and in some cases, large commercial customers.

Consistent with the Phase 1 study, the evaluation team explored 19 commercial DI programs in this Phase 2 study. Table 1 shows the full program names and identification numbers for each program included in the study, as well as the abbreviated program name.

² http://www.calmac.org/publications/Commercial_DI_Process_Evaluation_Phase_1_Final_Report_2016-10-17.pdf

Table 1. DI Programs Included in the 2013-2015 Process Evaluation

#	Program ID	Program Name in Monthly EE Program Report	Program Abbreviated Name in this Document
PG&E (16 programs)			
1	PGE210115	RightLights	RightLights
2	PGE210113	Energy Fitness Program	Energy Fitness
3	PGE210118	Furniture Store Energy Efficiency	Furniture Store EE
4	PGE210126	K-12 Private Schools and Colleges Energy Audit Retro	K-12 Private Schools
5	PGE210111	LodgingSavers	LodgingSavers
6	PGE210122	Casino Green	Casino Green
7	PGE210114	The Energy Alliance Association	TEAA
8	PGE211011*	Kern Energy Watch*	Kern EW*
9	PGE211020*	Santa Barbara Energy Watch*	Santa Barbara EW*
10	PGE211018*	San Luis Obispo Energy Watch*	San Luis Obispo EW*
11	PGE2110051*	Valley Innovative Energy Watch*	Valley Innovative EW*
12	PGE211009	East Bay Energy Watch	East Bay EW
13	PGE211013	Marin County Energy Watch	Marin County EW
14	PGE211016	Redwood Coast Energy Watch	Redwood Coast EW
15	PGE211021	Sierra Nevada Energy Watch	Sierra Nevada EW
16	PGE211024	San Francisco Energy Watch	San Francisco EW
SCE (2 programs)			
17	SCE-13-SW-002D	Commercial Direct Install Program	Direct Install (SCE)
18	SCE-13-TP-018	School Energy Efficiency Program	School EE
SDG&E (1 program)			
19	SDGE3226	SW-COM Direct Install	Direct Install (SDG&E)

* These four Energy Watch Programs can also be collectively referred to as the Staples Energy Efficiency Program. Implementation is the same in all four territories and performed by Staples Energy.

As discussed within the report, these programs offer eligible customers lighting, refrigeration, HVAC, and hot water equipment, although the most frequently installed equipment is lighting.

2.2 Phase 2 Study Objectives

As previously mentioned, this Phase 2 study builds upon the Phase 1 study by gathering additional program information and explores customer experiences with the program. The primary Phase 2 objectives include:

- Determine if there are program attributes that appear to influence customer willingness to participate and, ultimately, customer willingness to install (either through the program or on their own) recommended measures
- Determine if there are advantages or disadvantages associated with performing DI installations “in-house” versus through local contractors

Introduction

- Determine how customers perceive the program, what aspects of the program are working well, and what areas need improvement
- Determine why there is so little cross-program participation

In addition to the four main research objectives initially outlined for this study, the evaluation team sought to collaborate with the DI impact evaluation team lead by Itron by leveraging preliminary findings from their Comprehensiveness Analysis in this research. In particular, we sought to determine whether there are differences between DI programs that perform well or poorly based on conversion rates and/or Depth of Retrofit and Cost Effectiveness (DORCE) score.³ This effort supplements the team's high-level qualitative exploration of audit comprehensiveness and lost savings opportunities through in-depth interviews and review of existing literature.

2.3 Summary of Phase 1 Study Findings

Phase 1 of the DI Process Evaluation focused on identifying and categorizing DI programs offered to commercial customers between 2013 and 2015. Phase 1 objectives included:

- Identify and compare various approaches to commercial DI program delivery, including program design, outreach, target participants, measure mix, uptake, and each measure's performance.
- Map how programs interact within the portfolio of California commercial programs and identify areas of overlap or synergies.
- Identify which characteristics or features of these programs may contribute to program performance and should be explored in detail through the Phase 2 study and, associated with this, propose key overarching performance criteria for assessing the success of commercial DI programs.
- Identify other process-related questions to explore through the Phase 2 study.

Phase 1 found wide variations between DI programs in terms of the measures and incentives offered, eligibility criteria, types of customers served, and the implementation strategies employed. However, all programs follow a similar participation process from the customers' perspective. Specifically, most programs provide (1) assistance to help identify potential upgrades; (2) a list of measure recommendations, including cost and payback information; and (3) the direct installation of select measures. Program administrators and implementers universally agree that this approach has been effective in overcoming barriers to the installation of energy efficiency measures within this customer population. According to these same administrators and implementers, it is highly unlikely that projects completed through the program would move forward in absence of DI programs.

Key findings from the Phase 1 study include:

- **DI programs provide turnkey services that hard-to-reach customers need.** According to DI program implementers, DI programs target customers who require assistance in identifying energy efficiency

³ DORCE, developed by Itron as part of its Comprehensiveness Study, considers two ways of measuring a program: depth of retrofit (DOR) and cost-effectiveness (CE) and produces a single DORCE score per program.

measures, determining total cost and payback, and installing selected measures. As such, the turnkey services provided by DI programs help customers overcome barriers to participation and follow through with energy saving projects.

- **PG&E relies on Third Party (3P) or Local Government Partnership (LGP) administration to oversee 16 DI programs. In contrast, SCE and SDG&E each offer a single IOU-run DI program (referred to as Core).** In addition, SCE offers a 3P administered School Energy Efficiency Program.
- **There is a large amount of variation across DI programs in terms of the incentives offered, size and types of customers served, number of customers served, marketing and outreach strategies, collaboration with outside entities, and reliance on IOUs for customer leads.** Both SCE and SDG&E Core DI programs are offered territory wide to all businesses meeting the size requirements while PG&E offerings tend to be more geographically limited or targeted to specific market segments (e.g., schools, furniture stores, casinos). SCE and SDG&E programs provide free measures while PG&E programs predominantly include a co-pay⁴ (though a few programs are free).
- **For installations, some programs use in-house staff while others utilize local contractors.** The Evaluation Team observed that there might be some differences in conversion rates (as reported by program implementers) between programs using in-house staff to install measures versus those using local contractors.
- **Program-reported conversion rates may decline with increases in co-pay.** There is some evidence that conversion rates (as reported by program implementers) may vary between programs that are free vs. those that require co-pays.
- **The majority of DI programs rely on the IOUs to some extent for leads.** While DI program implementation staff for most programs mentioned receiving some support from the IOUs in terms of customer recruitment, there was wide variation across program administrators. For example, most programs administered by the LGPs typically do not receive this type of support from the IOUs. The exceptions are San Francisco Energy Watch and Sierra Nevada Energy Watch, which report collaboration with PG&E on customer recruitment.
- **There is variation across the 19 programs in terms of energy savings goals reached; not all programs met goals for the 2013-14 program cycle.** According to self-reported values, five of the 19 programs reached or exceeded their 2013-14 program cycle energy savings (kWh) goal. Among the other 14 programs, two reached less than 50% of their savings goal, four reached 50 to 70% of their goal, and eight reached 81% to 97% of their goal.

It is also important to note that there were program changes in 2016 that have the potential to alter the environment in which DI programs operate. Changes made in 2015 include the addition of co-pays for the previously free SCE and SDG&E programs, the continued transition to a regional implementation approach for PG&E, and several administrative augmentations to measure offerings, savings calculations, and Title 24

⁴ For the purposes of DI program implementation, a co-pay is the portion of energy efficiency project cost that the customer pays. Co-pays can range from a small percentage of the project cost (e.g., 10% for Santa Barbara Energy Watch) to a large percentage of the project cost (e.g., 75% for Marin County Energy Watch) depending on how much the program sponsor wants to subsidize participation.

Introduction

baseline regulations. Program staff suggest that in 2016, there will also be a greater emphasis on seeking out hard-to-reach (HTR) customers, including a standard definition of what constitutes a HTR customer.

3. Evaluation Methodology

For the Phase 2 study, the Evaluation Team conducted four research tasks as described in Table 2. We describe each task in detail below the table.

Table 2. Phase 2 Evaluation Activities

Evaluation Activity	Description
Literature Review	<ul style="list-style-type: none"> Reviewed literature to: (1) determine the level of comprehensiveness of DI programs in the small business sector, (2) understand barriers to program comprehensiveness, and (3) identify lost opportunities.
In-Depth Interviews with Program Staff	<ul style="list-style-type: none"> Conducted four interviews with IOU staff and 15 interviews with program implementation staff for all 19 programs between March and June of 2016. Interviews focused on understanding the environment/incentives that IOUs and implementers perceive themselves operating within and how this impacts audit comprehensiveness, targeting, and cross-program promotion.
Conversion Rate Analysis	<ul style="list-style-type: none"> Conducted interviews with implementers to determine the level of data availability to support conversion rate analyses for each of the 19 programs. Conducted a conversion rate analysis to determine program conversion rates on two levels: the percentage of energy audits that resulted in at least one installed program measure (Level 1) and the percentage of measures recommended that were ultimately installed (Level 2).
Customer Surveys	<ul style="list-style-type: none"> Administered surveys to a sample of full participants and audit-only participants to understand program satisfaction, motivations for participating, and levels of cross promotion.

3.1 Literature Review

The Evaluation Team conducted a literature review to ascertain levels of comprehensiveness and explore lost opportunities within small and medium businesses. Specifically, we reviewed secondary literature to determine the level of comprehensiveness of DI programs in the small business sector, understand barriers to program comprehensiveness, and identify lost opportunities. The results are available in Section A.1, and a full bibliography of reviewed reports is available in Appendix A.2.

3.2 In-Depth Interviews with Program Staff

The Evaluation Team completed in-depth interviews with IOU program managers (PMs) and DI program implementers between March and June 2016. In all, we conducted four in-depth interviews with IOU PMs, and 15 in-depth interviews with DI program implementers for all 19 DI programs.

IOU and implementation staff interviews were conducted to gain important insight into two of the five research questions. In particular: (1) why audit recommendations lack comprehensiveness and how this translates (or not) into lost opportunities, and (2) why there is so little cross-program marketing. In these interviews, we focused on the environment and incentives that IOUs and implementers perceive themselves operating within and how this impacts comprehensiveness, targeting, and cross program marketing. We also solicited ideas on what aspects of the programs (and the corresponding incentive structure in which they operate) would need to change in order for them to put more emphasis on these outcomes.

Table 3 indicates the interviews conducted by program.

Table 3. Completed Interviews by Program

IOU	IOU Interview Conducted	Program Name	Implementer	Implementer Interview Conducted
PG&E	✓	RightLights	Ecology Action	✓
		LodgingSavers		
		Casino Green		
		Energy Fitness Program	Richard Heath & Associates (RHA)	✓
		Redwood Coast EW	Redwood Coast Energy Authority	✓
		San Francisco EW	SF Department of the Environment	✓
		Marin County EW	California Energy Services Corporation (CESC)	✓
		East Bay Energy Watch		✓
		TEAA Program	The Energy Alliance Association (TEAA)	✓
		Sierra Nevada EW	Sierra Business Council	✓
		Kern EW	Staples Energy	✓
		Santa Barbara EW		
	San Luis Obispo EW			
	Valley Innovative EW			
	✓	Furniture Store EE	Matrix Energy	✓
	K-12 Private Schools and Colleges			
SCE	✓	Direct Install (SCE)	California Retrofit Incorporation (CRI)	✓
			FCI Management	✓
			FESS Energy	✓
		School EE	Willdan Energy Solutions	✓
SDG&E	✓	Direct Install (SDG&E)	Matrix Energy Services	✓
Totals	4			15

Findings from the in-depth interviews are integrated throughout the report and additional detailed findings are presented in Appendix A.

3.3 Conversion Rate Analysis

The Evaluation Team performed a conversion rate analysis toward the goal of identifying program attributes (and categories within them) that potentially influence customer willingness to participate and ultimately install program measures. We calculated conversion rates based on program tracking data and explored how various program attributes might impact conversion rates. Data were collected via a data request submitted in April 2016 through the California Public Utilities Commission (CPUC) to each of the IOUs.

Data Availability

Overall, our ability to address key research questions for the conversion rate analysis is highly dependent on the level of program-related detail tracked by implementation contractors. For example, not all programs track the data necessary to calculate and evaluate conversion rates, and previous attempts at similar research failed because too few programs had records of those measures that were not installed.⁵ Therefore, the first step in the conversion rate analysis was to contact the various IOUs and, in some cases, their respective implementation contractors to discuss data availability. The interviews indicated that most programs tracked sufficient data to allow us to calculate conversion rates.

Types of Conversion Rates

We calculated two types of conversion rates to provide insight into how many customers go on to install measures after receiving an energy audit, and how many of the recommended measures are ultimately installed.

Level 1: Energy Audit to Installation. The Level 1 conversion rate indicates the percentage of customers audited who actually install at least one program measure. The Level 1 conversion rate is important because it quantifies the success different programs have in convincing customers to make energy-efficient upgrades after an audit. This conversion rate was calculated by dividing the number of customers who went forward with installations by the number of customers who received energy audits within a program in a given year. Since conversion rates were calculated for a series of years (2013, 2014, 2015) we assigned projects to a given year based on the audit date.⁶

Level 2: Recommended to Installed Measures. The Level 2 conversion rate indicates the percentage of recommended measures installed by customers. The Level 2 rate is important because it quantifies the success different programs have in convincing customers to take all of the recommended energy-efficient upgrades. However, we were unable to calculate a Level 2 conversion rate for most programs because implementers only recorded the measures installed and did not necessarily record all recommended measures. For the programs that recorded this information, the conversion rate was calculated by first dividing the number of installed measures by the number of recommended measures for each customer who installed at least one measure, which gave us a within-customer conversion rate. In this case, a customer who installed all recommended measures would have a conversion rate of 100%. Next, we averaged the customer-level conversion rates to get an overall Level 2 conversion rate for the program in a given year.

Ultimately, as illustrated in Table 4, we received sufficient data to calculate an energy audit to installation conversion rate (Level 1) for 15 of the 19 programs. Unfortunately, however, we were only able to calculate a Level 2 conversion rate for six programs.

⁵ See, for example, Itron, 2014, *2010-12 CPUC Nonresidential (Non-Core) Audit Evaluability Assessment*. Prepared for the California Public Utilities Commission. Online: http://www.calmac.org/publications/LGP3P_EvaluabilityAssessment_FinalReport_20140624ES.pdf Accessed 6 June 2016.

⁶ This was done for the simple reason that energy audit-only customers do not have installation dates, therefore, leaving the audit date as the only viable option for assigning a customer/project to a given calendar year.

Table 4. Implementer Data Availability for Conversion Rate Analysis

IOU	Program	Level 1 Data Available	Level 2 Data Available	Implementer
PG&E	RightLights	✓	✓	Ecology Action
	Ecology Action	✓	✓	
	Casino Green	✓	✓	
	Energy Fitness Program	✓	✓	RHA
	Redwood Coast EW	✓	✓	Redwood Coast Energy Authority
	San Francisco EW	✓		SF Department of the Environment
	Marin County EW	✓		California Energy Services Corp. (Smart Lights Program)
	East Bay Energy Watch	✓		
	Staples Energy Efficiency Program (Kern, SB, SLO, Valley EW)	✓✓✓✓		Staples Energy
	(Comprised of Kern County, Santa Barbara, San Luis Obispo, and Valley Innovative EWs)			
	Furniture Store EE			Matrix Energy Services
	K-12 Private Schools and Colleges			
	TEAA			TEAA
Sierra Nevada EW			Sierra Business Council	
SCE	Direct Install	✓		CRI, FCI Management, FESS Energy
	School EE Program	✓		Willdan Energy Solutions
SDG&E	Direct Install	✓	✓	Matrix Energy Services
Totals		15	6	

We screened all program data for duplicate records, missing values, and other common problems. Most implementer data did not have any issues. The most common problems included records with an installation date but no energy audit date, and records without a program label (from DI program implementers with multiple programs). We dropped those records with an installation date but no energy audit date. We assigned records without a program label to the most likely program given the customer’s size, type, and geographic location. These problematic records never made up more than three percent of the total data for the program in question. Therefore, we are confident that missing data did not affect our analysis.

Analysis of Program Attributes

Based on our in-depth interviews with program staff, we identified 10 program attributes that helped differentiate DI programs. Then, for each attribute, we identified categories that seemed to distinguish programs from one another. For example, one attribute we studied was administrative model. Within this

attribute, we categorized DI programs as follows: Core, LGP, 3P. Table 5 below lists the 10 attributes as well as the categories within each attribute.

Table 5. Program Attributes and Associated Categories Included in the Conversion Rate Analysis

#	Program Attribute	Categories
1	Program Administration	Core LGP 3P
2	Incentive Structure ^a	High Co-pay Medium Co-pay Low Co-pay Free
3	Audit Staff	In-house staff Both (Local Contractor and In-house staff)
4	Installation Staff	Local Contractors In-house staff Both (Local Contractor and In-house staff)
5	Measure Mix	Mostly lighting Mix of Lighting and Other Measures
6	Delivery Channel ^b	Horizontal Vertical
7	IOU Involvement ^c	Minimal Leads Cobranding Leads, cobranding Leads, cobranding, ridealongs
8	Outreach Strategy ^d	Two Strategies Three Strategies Four Strategies
9	Size Requirements	Less than 200 KW No restriction based on customer size
10	Outside Collaborations ^e	Yes No

^a Incentive categories are based on each program’s overall percent average co-pay for the 2013-2014 program cycle, as self-reported by implementers during depth interviews. Category designations include: Free (0% co-pay), Low (1% to <33%), Medium (33-66%), and High (>66%).

^b Programs with a vertical delivery channel cater to a specific business sector (e.g., lodging, schools, casinos). Programs with a horizontal delivery channel serve all types of commercial customers regardless of industry.

^c IOU Involvement categories are based on what types of support the IOU provides to implementers.

^d Outreach Strategy categories are based on the number of outreach strategies employed: IOU Leads, Canvassing, Ridealongs, Utilizing Existing Relationships, Contractor Referrals. All programs utilized either 2, 3, or 4 outreach strategies.

^e Outside Collaborations are categorized based on whether the program implementer collaborates with outside entities for marketing implementation (e.g., with cities or business organizations).

The conversion rate analysis consisted of studying each of the 10 attributes listed in Table 5 separately. For each attribute, we compared the average conversion rate for all programs that fell into a given category to the other categories. This allowed us to see if a given category of the attribute seemed to be associated with higher or lower conversion rates.

We completed the conversion rate analysis fully understanding that, given the limited number of DI programs, differences in conversion rates are likely to be qualitative or directional in nature. In other words, the results are unlikely to definitively determine the extent to which a given attribute category contributes to a favorable (or unfavorable) conversion rate. The most significant reason for this is that programs vary in terms of the combination of attribute categories they include. Therefore, at best, the analysis may provide indications that certain attribute categories are associated with higher or lower conversion rates.

3.4 Customer Surveys

The evaluation team fielded surveys with 2015 full and audit-only participants in DI programs for which 2015 conversion rate data was available (14 out of the 19 DI programs).⁷ We designed the surveys to assess how customers perceive the program, what aspects of the program are working well, and what areas need improvement. In addition, we designed customer surveys to provide insight into whether there are certain program attributes that might influence customer willingness to participate and, ultimately, customer willingness to install (either through the program or on their own) recommended measures. We also sought to assess whether there are any differences between programs that perform well or poorly based on Level 1 conversion rates and/or program depth of retrofit and cost effectiveness (DORCE) score rank.⁸

Sample Design

We illustrate the sample design for the customer surveys in Figure 1. As shown, we surveyed full and audit-only participants in each of four quadrants (each representing a combination of DORCE score rank and Level 1 conversion rates) with the goal of achieving a representative sample from each quadrant. Given the size of full and audit-only participant populations in each quadrant, we used a combination of random samples and census attempts. In particular, we drew random samples of full participants from quadrants one and three, and performed a census attempt within quadrants two and four. For audit-only participants, we attempted a census for all quadrants except quadrant three where we took a random sample.

⁷ For the purposes of this study, full participants are customers who participated in the audit and installation of program measures. Audit-only participants are those who decided after receiving the audit to decline measure installation.

⁸ The DORCE score is a metric developed by Itron as part of its Comprehensiveness Study, which produces a single score of comprehensiveness per program based on two program attributes: depth of retrofit (DOR) and cost-effectiveness (CE). At the time of this study, the Comprehensiveness Study was still in draft form, but the evaluation teams from Itron and Opinion Dynamics, as well as staff from the CPUC felt it was still the most robust metric available for use.

Figure 1. Sample Design

Performance Indicators	High DORCE Score Rank (Ranking from 1-83)	Low DORCE Score Rank (Ranking from 84-166)
High Conversion Rate >50%	Q1: 32% of Full Participants/1% Audit-Only	Q2: 8% of Full Participants/2% Audit-Only
	Program Participants Non-Participants	Program Participants Non-Participants
	SDG&E DI 3,827 26	East Bay EW 606 164
	Redwood EW 379 51	SF EW 369 200
	Lodging Savers 86 72	Marin County EW 165 66
	Total: 4,292 149	Total: 1,140 430
Low Conversion Rate =<50%	Q3: 59% of Full Participants/97% Audit-Only	Q4: <1% of Full Participants/<1% Audit-Only
	Program Participants Non-Participants	Program Participants Non-Participants
	SCE DI 6,640 17,117	San Luis Obispo 56 71
	Energy Fitness 868 1,028	Total: 56 71
	RightLights 250 451	
	Kern County EW 163 217	
	Santa Barbara 48 68	
	Valley Innov. 50 57	
	Casino Green 2 8	
	Total: 8,021 18,946	

Note: As documented throughout the report and illustrated here by the ratios of full and audit-only participants in each quadrant, there are large variations in conversion rates across programs.

We developed the sample frame based on full and audit-only participant databases provided by the implementation contractors for each program. As part of the cleaning process, we dropped projects without a valid phone number, projects that were completed before or after 2015, and duplicate records. When a single contact person and phone number were associated with projects at multiple addresses, we randomly selected one project for that person. We also excluded all projects in the impact evaluation survey sample prepared by Itron. The final full participant sample frame included 12,145 projects, and the final audit-only participant sample frame included 15,609 projects.

Table 6. Customer Survey Sample Frame and Completed Interviews

Quadrant	Description	Population		Sample Frame		Completed Interviews	
		Full Parts	Audit-Only	Full Parts	Audit-Only	Full Parts	Audit-Only
1	High CR/High DORCE	4,292	149	3,801	144	62	15
2	High CR/Low DORCE	1,140	430	476	229	57	31
3	Low CR/High DORCE	8,021	18,946	7,815	15,170	84	86
4	Low CR/Low DORCE	56	71	53	66	1	1
TOTAL		13,509	19,596	12,145	15,609	204	133

Survey Disposition and Response Rate

We fielded the full participant survey from November 4 through November 28, 2016, and the audit-only participant survey between November 3 and November 30, 2016. Table 7 presents the survey dispositions from the calls.

Table 7. Customer Survey Dispositions

Category Key	Disposition	Total Full Participants	Total Audit-Only Participants
I	Complete Interview	204	133
N	Eligible Incomplete Interview	37	19
X1	Survey-Ineligible Business	35	63
X2	Not a Business	193	368
U2	Undetermined if Business	237	124
U1	Business with Undetermined Survey Eligibility	1,208	1,268
e1	Estimated Proportion of Cases of Unknown Survey Eligibility That Are Eligible	87%	71%
e2	Estimated Proportion of Cases of Unknown Business Eligibility That Are Eligible	88%	80%
Total Participants in Sample		1,914	1,975

Table 8 presents the response rate for the customer surveys, which the evaluation team calculated using the standards and formulas set forth by the American Association for Public Opinion Research (AAPOR).

Table 8. Customer Survey Response and Cooperation Rates

AAPOR Rate	Full Participant Survey	Audit-Only Participant Survey
Response Rate	14%	12%
Cooperation Rate	39%	21%

Weighting

To ensure that survey responses were representative of the population of full and audit-only participants, we developed and applied weights to the survey data. For each quadrant, we calculated a weight by dividing the quadrants share of the full or audit-only participant population by its share of responses. We provide the weights in Table 9 (full participants) and

Table 10 (audit-only participants) below.

Table 9. Full Participant Survey Weights

Quadrant	Population		Survey Completes		Population Weight
	Total Full Participants	% Participants	Total Full Participants	% Participants	
1	4,929	31.7%	62	30.4%	1.05
2	1,140	8.4%	57	27.9%	0.30
3	8,021	59.4%	84	41.2%	1.44

Quadrant	Population		Survey Completes		Population Weight
	Total Full Participants	% Participants	Total Full Participants	% Participants	
4	56	0.4%	1	0.5%	0.85
Total	13,509	100%	204	100%	

Table 10. Audit-Only Participant Survey Weights

Quadrant	Population		Survey Completes		Population Weight
	Total Audit-Only Participants	% Audit-Only	Total Audit-Only Participants	% Audit-Only	
1	149	0.8%	15	11.3%	0.07
2	430	2.2%	31	23.3%	0.09
3	18,946	96.7%	86	64.7%	1.50
4	71	0.4%	1	0.8%	0.48
Total	19,596	100%	133	100%	

Analysis

Data Cleaning

In reviewing the answers of audit-only participants to survey questions about their decision not to install recommended measures, we found that 36% of audit-only participants said that they did in fact install equipment through the program. Such a high number of audit-only participants indicating full participation could be a result of several things: errors in implementer data, customers receiving an audit in 2015 and installing equipment in 2016, or customers installing equipment at another facility or outside of the program.

Our review of program tracking data for these customers suggests that a lag between audit and installation, as well as potential confusion over what was installed at different facilities are driving these responses. However, since we did not have 2016 program tracking data to verify later participation, we have removed these respondents from our analysis. As a result, the number of completed audit-only interviews referenced throughout the report.

Group Comparisons

The evaluation team’s analysis of the customer survey data involved making comparisons between different groups of respondents. In particular, we highlight any significant differences between full and audit-only participants, customers in high and low DORCE ranked programs, customers in programs with low and high conversion rates, and customers in different quadrants. Note that we did not see significant differences between specific program attributes such as whether in-house or local contractors installed recommended equipment.

We decided to make these comparisons based on our hypotheses about the relationship between (1) the level of customer involvement (i.e., audit-only vs. measure installation) and the customer experience, as well as (2) program characteristics and the customer experience. Our hypotheses included the following:

- Hypothesis #1: A higher cost to participate (i.e., co-pay) will lead to lower conversion rates.

Evaluation Methodology

- Hypothesis #2: Programs without size requirements will have higher conversion rates because larger customers with more resources (staff and financial) have fewer obstacles to participation.
- Hypothesis #3: Programs that offer multiple measure types will have higher conversion rates because customers are often interested in multiple types of measures.
- Hypothesis #4: Customers want a choice of multiple measures and therefore, satisfaction will be higher among participants in more comprehensive programs.

Based on this framework, we provide comparisons between respondent groups where statistically significant.

4. Evaluation Findings

4.1 Program Participation

Within this section, the evaluation team provides a snapshot of program reach and achievements to date, as well as an analysis of how customers move through the program from intake and completion of an energy audit to installation of recommended energy efficient equipment.

4.1.1 Program Offerings and Activity

The vast majority of measures recommended to customers and ultimately installed fall within the lighting end-use. Refrigeration, HVAC, and hot water equipment, although offered through most programs, are installed at a much lower rate than lighting. Table 11 summarizes the types of measures typically offered by Direct Install Programs.

Table 11. Examples of Types of Measures Offered in Direct Install Programs

End-Use Category	Example Measures
Lighting	<ul style="list-style-type: none"> LED bulbs and fixtures, CFLs, High Performance and Reduced Wattage T8 Fixtures and Lamps, T5 Fixtures and Lamps, LED Open Signs, Fluorescent Delamping, Occupancy Sensors
Refrigeration	<ul style="list-style-type: none"> Anti-Sweat Heater Controls, Auto-Closers for Walk in Coolers/Freezers, Vending Machine Controls, Electronically Commutated Motors (ECM) for Walk in Evaporator Fans, Strip Curtains for Walk in Coolers/Freezers, Night Covers for Refrigerated Display Cases
HVAC	<ul style="list-style-type: none"> Variable Frequency Drives (VFDs), Packaged Terminal Air Conditioner (PTAC) Controllers, Programmable Thermostats, Evaporative Coil Cleaning, Refrigerant Charge Replacement, Condenser Coil Cleaning, Pipe Insulation
Hot Water	<ul style="list-style-type: none"> Low Flow Showerheads, Faucet Aerators

Source: IOU and Implementer Data Files Submitted to Opinion Dynamics in April and May of 2016.

In terms of program reach and performance, as shown in Table 12, the 19 DI programs included in this evaluation reached over 52,000 customers in 2013 and 2014. Further, based on ex ante data, five of the 19 programs either met or exceeded at least one of their energy or demand saving goals and another eight were within 80% or higher of energy saving goals.

Evaluation Findings

Table 12. Self-Reported Program Goals and Achievements in 2013-2014

Program	Customers	kWh			kW			Therms		
		Goal	Actual	% of Goal	Goal	Actual	% of Goal	Goal	Actual	% of Goal
SCE Direct Install	35,561	63,321,507	128,450,203	203%	13,996	30,871	221%	-	(431,889)	NA
3P Programs (Goals data from EEStats and Customers and Actual Data from Claimed Savings Database) ^a										
SDG&E Direct Install	5,186	31,820,791	36,377,117	114%	7,794	9,486	122%	(9,572)	(10,428)	109%
SCE School EE	351	20,345,353	16,962,032	83%	294	3,176	1080%	-	(79,990)	NA
PG&E RightLights	838	19,341,924	16,797,299	87%	2,580	2,339	91%	(117,464)	(44,473)	38%
PG&E Energy Fitness	626	14,853,645	10,223,237	69%	2,771	2,000	72%	(79,927)	(36,673)	46%
PG&E Furniture Store	303	7,232,952	11,500,372	159%	1,628	2,354	145%	(42,170)	(66,019)	157%
PG&E K-12 Private Schools	83	4,075,921	3,777,677	93%	1,031	349	34%	(54,824)	(30,926)	56%
PG&E LodgingSavers	191	13,045,130	15,469,088	119%	3,766	5,126	136%	9,592	(12,626)	(132%)
PG&E Casino Green	12	4,886,061	3,268,830	67%	1,500	434	29%	67,306	(10,724)	(16%)
PG&E TEAA	299	6,302,595	3,986,608	63%	1,224	740	60%	(28,731)	(9,816)	34%
LGP Programs (Goals data directly from PG&E and Customers and Actual Data from Claimed Savings Database) ^b										
PG&E East Bay EW	4,995	41,875,000	15,651,918	37%	5,600	2,019	36%	-	4,523	NA
PG&E Marin County EW	1,178	5,077,758	1,050,190	21%	756	125	17%	-	(5,512)	NA
PG&E Redwood Coast EW	843	2,019,956	2,728,972	135%	223	486	218%	-	(13,768)	NA
PG&E Sierra Nevada EW	534	8,241,287	6,706,036	81%	1,227	1,006	82%	-	(19,858)	NA
PG&E San Francisco EW	836	28,560,240	16,617,110	58%	4,319	3,368	78%	-	36,968	NA
PG&E Kern EW	597	12,976,188	11,793,595	91%	1,964	2,055	105%	-	(63,644)	NA
PG&E Santa Barbara EW	303	3,714,285	3,586,926	97%	567	610	108%	-	(22,271)	NA
PG&E San Luis Obispo EW	378	4,738,095	4,266,802	90%	718	706	98%	-	(25,127)	NA
PG&E Valley Innovative EW ^c	90	2,249,999	2,151,028	96%	345	359	104%	-	(9,598)	NA

^a For 3P programs, we were able to obtain goals for the budget and savings from IOU Monthly Energy Efficiency Programs Report from December 2014 (EEStats) and the customer count and actual data from Claimed Savings Database, Version from 11-02-2015 (Itron's Analysis).

^b LGP programs have multiple components, including DI, and report savings for the whole programs rather than by program components. As such, to gather data related only to the DI component of the programs, we obtained these numbers from PG&E directly. Given how reporting is performed for these programs, these numbers are 'best estimates' for the DI component of the programs. Customer count and actual data is from the Claimed Savings Database, Version from 11-02-2015 (Itron's Analysis).

^c The Evaluation Team was unable to verify the customer and actual data in the Claimed Savings Database. As such, the data shown here are from PG&E directly.

4.1.2 Program Conversion Rates

As part of efforts to understand how eligible customers participate in DI programs, as well as which programs have the greatest success in channeling customers through the energy audit process to measure installation, the evaluation team attempted to calculate conversion rates for each DI program.

Based on the methods described in Section 3.3, we calculated conversion rates for all programs with available data. As a reminder, we conceptualized conversion rates on two levels:

- **Level 1:** The percentage of customers who, after receiving measure recommendations from an energy audit, proceed with the installation of at least one of the recommended measures
- **Level 2:** The percentage of recommended measures installed by program participants (i.e., those who proceed with an installation)

Table 13 summarizes Level 1 and Level 2 conversion rates for 2013, 2014, and 2015 for each of the 15 DI programs for which data was available for this analysis. Overall, there is significant variation across programs in terms of the percentage of customers that move from energy audit to installation. As shown below, five programs achieved Level 1 conversion rates of around 75% or more. However, for eight programs, less than half of the customers who receive an energy audit continued on to complete a project by installing at least one recommended measure. When comparing these rates, it is important to remember that these programs differ greatly in terms of their scope, available measures, incentive structure, geographic coverage, and numerous other features. The large amount of variation in conversion rates (from less than 40% on the low end to 100% or close to it on the high end) likely reflects these differences.

We were only able to calculate Level 2 conversion rates for six of the 19 programs included in the study. In most of these cases, full participants install over three quarters of recommended measures and in some cases all of the recommended measures. Though the small number of Level 2 rates make it difficult to draw broad conclusions, the analysis does suggest that customers tend to accept or reject the entire package.

Table 13. Level 1 and Level 2 Conversion Rates by Program

Program	Level 1 Conversion Rate (Percentage of Energy Audit Recipients that Install Measures)				Level 2 Conversion Rate ^c (Average Percentage Recommend Measures Installed)			
	2013	2014	2015	Average	2013	2014	2015	Average
Direct Install (SDG&E)	100%	100%	99%	100%	99%	100%	97%	99%
School EE	100%	89%	N/A ^b	95%				
Redwood Coast EW	66%	83%	88%	79%	83%	91%	91%	88%
San Francisco EW	77%	69%	65%	70%				
Valley Innovative EW	93%	55%	47%	65%				
East Bay EW ^a	49%	64%	79%	64%				
Kern EW	69%	58%	43%	57%				
Marin County EW ^a	44%	49%	71%	55%				
LodgingSavers	49%	58%	54%	54%	79%	79%	98%	85%
Santa Barbara EW	68%	51%	41%	53%				
San Luis Obispo EW	64%	44%	44%	51%				
Energy Fitness	47%	46%	46%	46%	60%	57%	65%	59%
RightLights	52%	33%	36%	40%	90%	84%	88%	87%
Direct Install (SCE)	32%	37%	28%	32%				
Casino Green	46%	20%	20%	29%	96%	100%	83%	93%

Note: Sierra Nevada EW, K-12 Private Schools, Furniture Store EE, and TEAA did not have data to support calculating a Level 1 Conversion Rate.

^aThese numbers are based only on the Smart Lights component of East Bay EW and Marin EW. The other DI program implementers for these programs did not track all of the data necessary to calculate a Level 1 Conversion Rate.

^b The Evaluation Team did not receive energy audit data for this program for 2015 and was unable to calculate a conversion rate.

^c Kern EW, Santa Barbara EW, San Luis Obispo EW, Valley Innovative EW, San Francisco EW, Sierra Nevada EW, K-12 Private Schools, Furniture Store EE, TEAA, Marin EW, East Bay EW, Direct Install (SCE) and School EE did not have data to support calculating a Level 2 Conversion Rate.

Factors Influencing Level 1 Conversion Rates

Program Attributes

As discussed in Section 3, we identified 10 attributes that seemed to assist in differentiating DI programs from one another. Then, within each attribute, we developed categories that distinguished a program or group of programs from all others.⁹ Finally, we compared the average conversion rate for programs that fell into each category to one another—toward the goal of determining if programs within a given category of the attribute (e.g., Core) achieve higher or lower Level 1 conversion rates than programs that fall into the other categories of the attribute (e.g., LGP, 3P). Below, we repeat Table 5 (now Table 14) from Section 3 to illustrate the 10

⁹ For example, one attribute we studied was the program administrative model. For this attribute, we sorted programs into one of three administrative model categories: Core, LGP, 3P.

Evaluation Findings

attributes we identified, as well as the categories we grouped each DI program into for purposes of the analysis.

Table 14. Program Attributes and Associated Categories Included in the Conversion Rate Analysis

#	Program Attribute	Categories
1	Program Administration	Core LGP 3P
2	Incentive Structure ^a	High Co-pay Medium Co-pay Low Co-pay Free
3	Audit Staff	In-house staff Both (Local Contractor and In-house staff)
4	Installation Staff	Local Contractors In-house staff Both (Local Contractor and In-house staff)
5	Measure Mix	Mostly lighting Mix of Lighting and Other Measures
6	Delivery Channel ^b	Horizontal Vertical
7	IOU Involvement ^c	Minimal Leads Cobranding Leads, cobranding Leads, cobranding, ridealongs
8	Outreach Strategy ^d	Two Strategies Three Strategies Four Strategies
9	Size Requirements	Less than 200 KW No restriction based on customer size
10	Outside Collaborations ^e	Yes No

^a Incentive categories are based on each program’s overall percent average co-pay for the 2013-2014 program cycle, as self-reported by implementers during depth interviews. Category designations include: Free (0% co-pay), Low (1% to <33%), Medium (33-66%), and High (>66%).

^b Programs with a vertical delivery channel cater to a specific business sector (e.g., lodging, schools, casinos). Programs with a horizontal delivery channel serve all types of commercial customers regardless of industry.

^c IOU Involvement categories are based on what types of support the IOU provides to implementers.

^d Outreach Strategy categories are based on the number of outreach strategies employed: IOU Leads, Canvassing, Ridealongs, Utilizing Existing Relationships, Contractor Referrals. All programs utilized either 2, 3, or 4 outreach strategies.

^e Outside Collaborations are categorized based on whether the program implementer collaborates with outside entities for marketing implementation (e.g., with cities or business organizations).

Evaluation Findings

Based on this comparative process, we found that the conversion rate results (i.e., comparing, within a given attribute, categories of programs to each other) were largely indeterminate. Overall, there simply were not enough programs (15) to allow us to isolate the influence of a category within an attribute (e.g., whether or not the program administrative model was Core, LGP, or 3P) from all the other categories within the same attribute.

A typical example of this is the incentive structure attribute where we categorized programs into one of the following four types of incentive structures: high co-pay, medium co-pay, low co-pay, and free. We found the free category had higher conversion rates when compared to the other three categories. However, upon closer examination, one can see that this result is driven by two programs (out of the three free programs) that both had 100% conversion rates. Perhaps even more troubling was the fact that while these two programs resulted in the high conversion rate for this category (i.e., Free), the other program in the Free category had one of the lowest conversion rates across the 15 programs. Thus, even within the programs that fell into this attribute category (i.e., Free) there was a great deal of variation in the individual program-level conversion rates.

Title 24

In addition to comparing conversion rates for various categories of a given attribute, we performed an analysis to identify any changes to conversion rates as a result of changes in Title 24 that went into effect on July 1, 2014. Many DI program implementers, during our in-depth interviews, cited the new Title 24 rules (particularly the limitations on lighting fixture retrofits) as a reason why customers chose not to participate in an audit or install equipment. As a result, in order to investigate the impact of Title 24 more deeply, we compared Level 1 conversion rates for 14 of the 15 DI programs included in our conversion rate analysis before and after Title 24 changes went into effect.¹⁰

The analysis showed no conclusive trend after Title 24 went into effect. As shown in Table 15, five programs experienced a decline in Level 1 conversion rates after the changes to Title 24 went into effect, three experienced an increase, and six experienced no real change.

Among the five programs that experienced a decline in conversion rates, the evaluation team heard from program implementation staff that Title 24 led the SCE DI program to walk away from facilities with more than 40 lighting fixtures, while other implementers saw certain measures become ineligible or fail to meet cost effectiveness requirements. From the perspective of program implementation staff, these changes contributed to a decline in completed projects and ultimately conversion rates. Additionally, the Valley Innovative DI program, as well as the Casino Green and RightLights programs increased co-pays in order to meet cost-effectiveness thresholds (i.e., higher baselines result in lower savings per measure and, therefore, programs need to reduce incentive offerings—forcing higher customer co-pays), which as shown above, appears to have a negative effect on conversion rates.

In contrast, three programs saw their conversion rates *increase* substantially. For the Marin County and East Bay Energy Watch Programs, higher conversion rates were reportedly a result of these programs being able to offer LEDs in 2015 (they were both part of the Smart Lights Program). To incentivize program staff, implementation program managers also offered a bonus to staff based on total kWh captured. The Redwood Coast program brands itself as a government agency that serves the community as the resident energy expert, who provides unbiased recommendations and opinions on energy considerations in the community. The

¹⁰ One program was not included because it did not have sufficient data during the one-year period immediately before and after the new rules went into effect.

implementer cites this relationship building as a key reason why the program has remained successful through 2015, and reports significant demand for the program remaining.

Table 15. Level 1 Conversion Rates Before and After Title 24 Changes

Program Name		Level 1 Conversion Rate (Energy audit to Installation)	
		Before Title 24 Changes (July 1, 2013 – June 30, 2014)	After Title 24 Changes (July 1, 2014 – June 30, 2015)
Increase	Marin County EW	37%	68%
	Redwood Coast EW	72%	88%
	East Bay EWB	49%	73%
Decrease	Casino Green	45%	8%
	Valley Innovative EW	58%	40%
	Direct Install (SCE)	37%	27%
	RightLights	41%	36%
	San Francisco EW	74%	64%
Same	LodgingSavers	52%	52%
	Kern EW	50%	50%
	San Luis Obispo EW	50%	48%
	Energy Fitness	46%	45%
	Santa Barbara EW	49%	48%
	Direct Install (SDG&E)	100%	100%

As was the case for the general conversion rate analysis, the numbers presented in Table 15 are inconclusive, as Title 24 was not the only factor that changed during the time-period under study. For example, several programs began offering LEDs in 2015, and other programs expanded their measure mix to include refrigeration and HVAC measures. Further, other measures, such as programmable thermostats, were removed from some programs.

Although these results are not causal, they do suggest a need for more rigorous research into the effects of the July 2014 Title 24 changes on DI programs. For example, Direct Install (SCE), which experienced one of the larger drops in conversion rates after the Title 24 changes, was also disproportionately affected by the change relative to programs offered by other IOUs.¹¹ It is also striking that the two PG&E programs, which serve relatively large customers, LodgingSavers and Casino Green, experienced very high drops in conversion rates. More detailed discussions with program DI program implementers may shed additional light on how active a role Title 24 changes played in these reductions.

4.2 Customer Experience and Satisfaction

To assess how eligible business customers engage with DI programs and make decisions about their participation, the evaluation team conducted telephone surveys with full and audit-only participants. We

¹¹ While other IOUs effectively capped the number of fixtures that could be replaced at 39, SCE did not allow DI program implementers to service buildings with more than 39 fixtures.

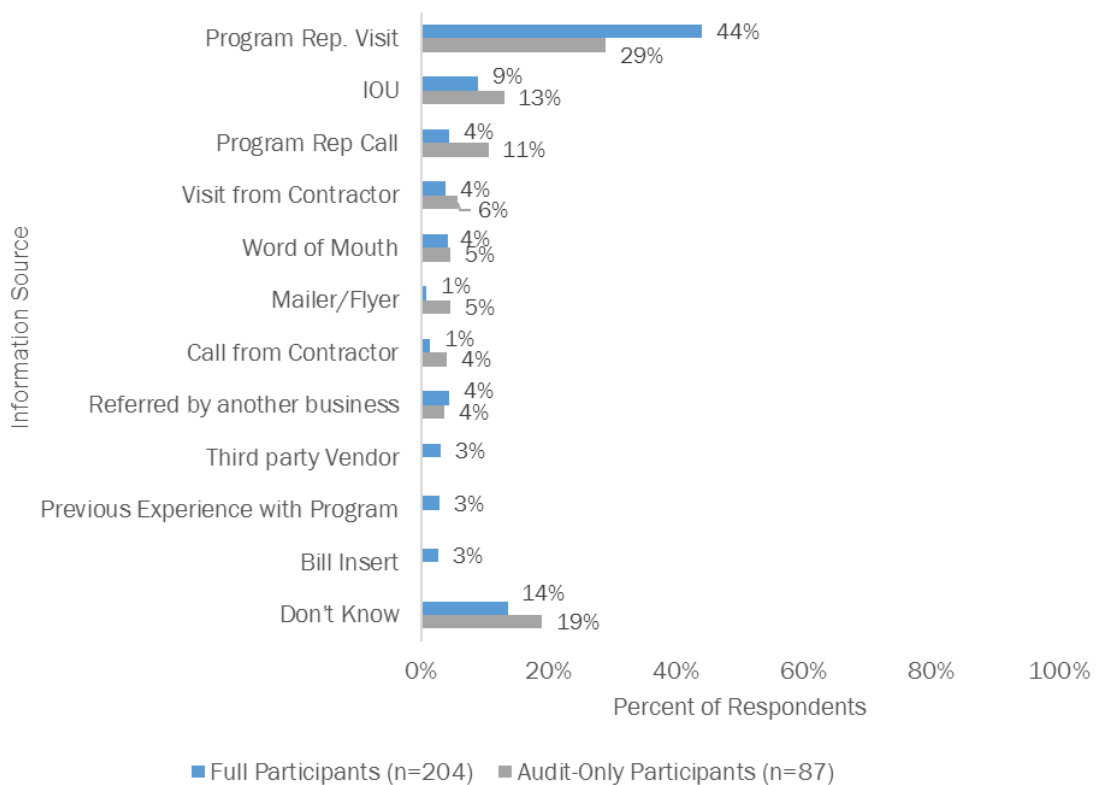
discuss the results from these surveys below. Overall, full and audit-only participants have significantly different opinions about the program as expressed through satisfaction ratings for the various components in which they were involved. In general, full participants are significantly more satisfied than audit-only participants with the discounts, equipment selection, information provided and staff conducting the energy audits.

4.2.1 Participation Processes

Customer Recruitment

Almost half of full and audit-only participants learned about DI programs directly from program representatives (48% and 40% for full participants and audit-only participants, respectively¹²), with in-person visits being the most common form of outreach (Figure 2). These findings are consistent with the outreach methods reported by program managers and implementers during in-depth interviews and confirm program implementers' self-reported characterization of customer recruitment.

Figure 2. How did you first hear about the Program?



¹² This reflects the sum of the percentage of participants who reported learning of the program through a program representative visit and call.

Evaluation Findings

Source: Full and Audit-Only Participant Surveys (QP1). Percentages may not sum to 100% due to rounding.
Note: Only responses with 3% or more in at least one category are presented.

Given interest in understanding why cross program participation is low, we paid close attention to the percentage of survey respondents who learned about the program through another program offering. Overall, very few full and audit-only participants learned about the program through a referral. In particular, less than 1% of the customers surveyed said they learned about the DI program through another program, and none could remember what program referred them. This finding supports statements made by program implementers during in-depth interviews that very little cross-promotion is occurring.

Reasons for Participating

Overall, a majority of both full and audit-only participants decided to participate in the program to reduce their energy bills or save energy (Table 16). Significantly, more audit-only participants than full participants cited reducing their energy bills as a reason they engaged with the program (72% versus 58%). In contrast, significantly more participants cited discounts (11% versus 3% of audit-only participants) and new equipment (9% versus <1% of audit-only participants) as reasons for participation. These findings, particularly for audit-only participants, illustrate the sensitivity of this group to energy costs, as well as the cost of program participation. As discussed in later sections of the report, this group is less satisfied with the program co-pays and is more likely to suggest larger discounts of program equipment in the future.

Table 16. Reasons for Participation in the Program or Audit (Multiple Response)

Reason for Participation	Full Participants (A) (n=204)	Audit-only participants (B) (n=87)
To Reduce Energy Bills	58%	72% ^A
To Save Energy	47%	45%
The Discounts Available	11% ^B	4%
New Equipment	9% ^B	2%
Equipment was Free	5%	0%
Recommendation from a Program Rep.	2%	4%
Don't Know	3%	4%

Source: Full and Audit-Only Participant Surveys Fall 2016: Participation Process (QP2).

Note: Only responses with 3% or more in at least one category are presented.

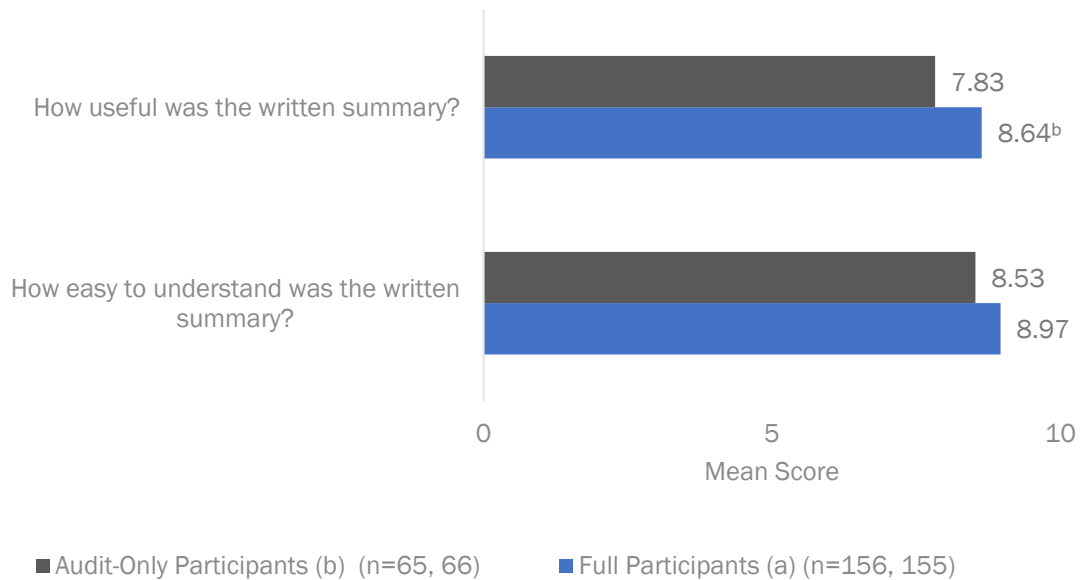
^A Indicates a significant difference from full participants at the 95% level.

^B Indicates a significant difference from audit-only participants at the 95% level.

Experience with the Energy Audit

Overall, full and audit-only participants provided positive feedback about the audit process and the information provided. For example, 91% of full participants and 79% of audit-only participants said the program process was clearly explained to them (significantly more full than audit-only participants felt the process was clearly explained). Further, approximately 95% of full participants and 91% of audit-only participants said they did not have any difficulty scheduling the audit. Among those who received written assessments after the audit (83% of full and 74% of audit-only participants, respectively), the ratings for the assessment in terms of both usefulness and understanding were high (Figure 3).

Figure 3. Mean Respondent Ratings of Written Assessments among Those Who Received Them



Source: Full and Audit-Only Participant Surveys Fall 2016: Participation Process: (QP9 and QP11). Customers ranked on a scale from 0 to 10 where 0 means “not at all easy to understand” or “not at all useful” and 10 means “very easy to understand” or “very useful”.

Note: Excludes “don’t know” and “refused” responses. The number of responses for QP9 is listed followed by the number of responses for QP11.

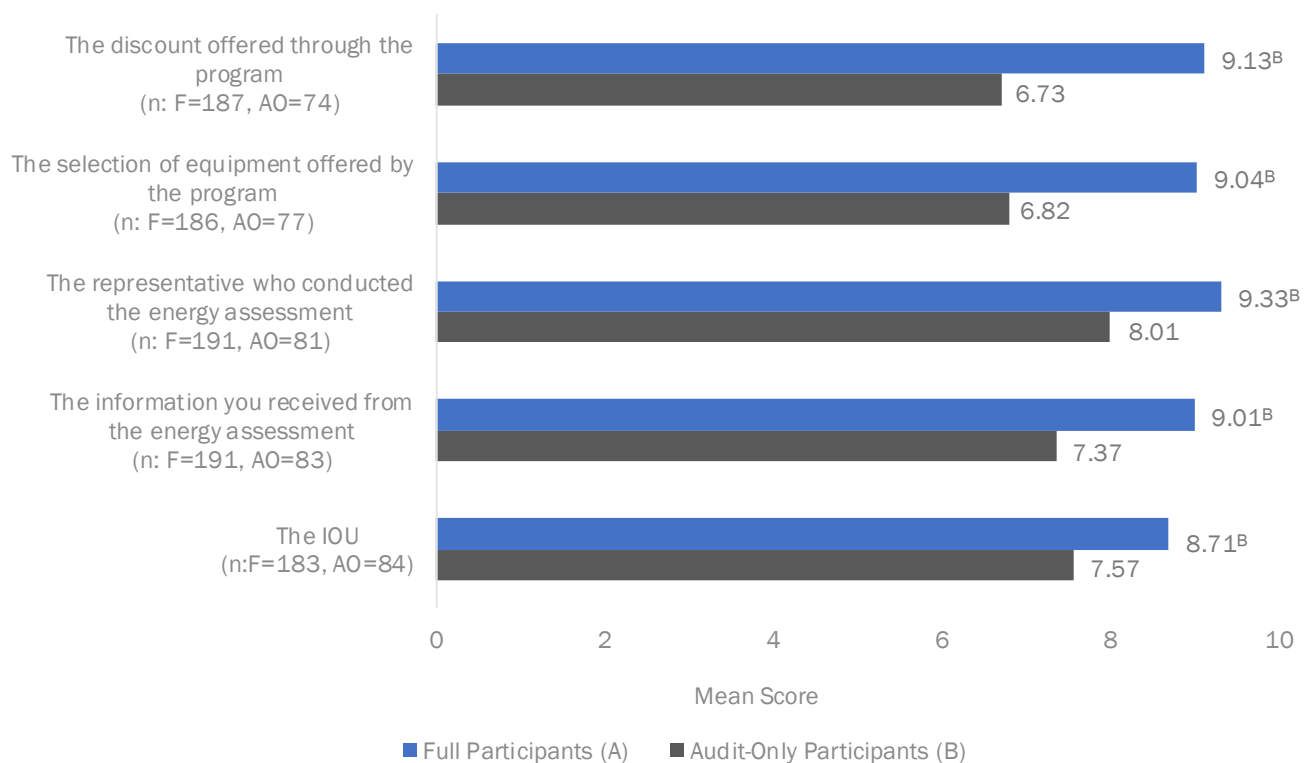
A significant difference between full and audit-only participants in terms of the audit process is that more full participants (78%) said that they participated in the energy audit compared to audit-only participants (65%). This may indicate that including the decision maker in the audit can lead to higher program conversion. For instance, by personally participating in the audit, the decision maker is more invested in the audit process, may end up better understanding what the auditor recommends and how it will benefit them, and the auditor will have more time and opportunity during the course of the audit to gradually convince the decision maker that a retrofit would benefit them. Alternatively, it is also possible that those decision-makers who are ready to take energy savings actions are more likely to participate in the energy audit.

As illustrated by the findings presented above, very few customers were unhappy with the energy audit or general participation process. However, audit-only participants are significantly more likely than full participants to feel the process for participating in the program was not clearly explained to them (14% of audit-only participants compared to less than 2% of full participants). When asked which part of the process was not clearly explained, respondents highlighted generally poor communication from the program representatives, specifically that the program representatives did not convey accurate or adequate information about how the program worked (n=4 for full participants, and n=10 for audit-only participants).

4.2.2 Program Satisfaction

Full participants are significantly more satisfied overall and with various program components than audit-only participants (Figure 4), which we would expect given that full participants decided to install equipment through the program. Of particular note, full participants are significantly more satisfied with the discount offered by the program than audit-only participants, which illustrates the cost related barriers to participation for the audit-only group. We also saw differences in satisfaction between participants in high and low DORCE ranked programs. In particular, participants in high DORCE ranked programs are significantly more satisfied with the price paid for equipment, the selection of equipment, and the quality of the equipment than low DORCE participants.

Figure 4. Program Satisfaction Scores for Program Components Experienced by Full and Audit-Only Participants



Source: Full and Audit-Only Participant Surveys Fall 2016: Satisfaction (QS1a-h). Customers used a scale from 0 to 10, where 0 means “very dissatisfied” and 10 means “very satisfied”.

Letters indicate a statistically significant difference at the 95% level.

Note: For each question, the evaluation team indicates the number of responses with an F for full participants and an AO for audit-only participants. “Don’t know” and “refused” responses are excluded.

Further, as shown in Table 17, full participants had very high levels of satisfaction with the program, new equipment, and the representative who installed the equipment (mean scores of over 9 on a 10-point scale where 0 means “very dissatisfied” and 10 means “very satisfied”). In general, audit-only participants expressed moderately high levels of satisfaction with the energy assessment overall.

Table 17. Full and Audit-Only Participant Specific Program Satisfaction Scores

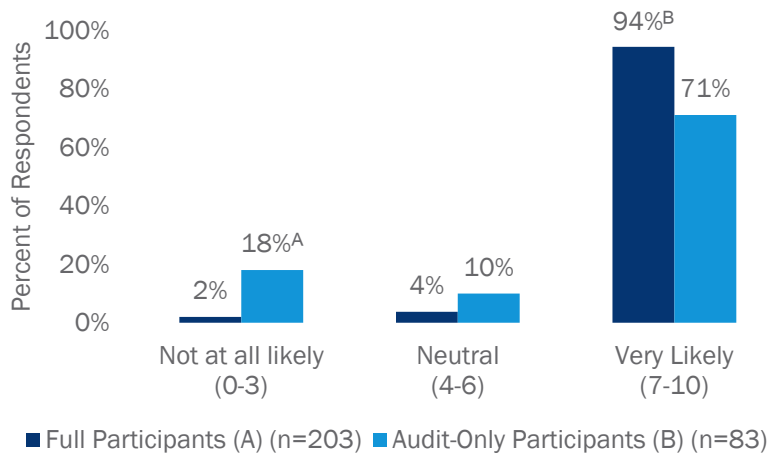
How would you rate your satisfaction with....	Mean Score from Audit-Only Participants (n=87)	Mean Score from Full Participants (n=204)
The energy assessment overall	7.61	N/A
The Program overall	N/A	9.13
The quality of the new equipment	N/A	9.23
The representative who installed the new equipment	N/A	9.26

Source: Full and Audit-Only Participant Surveys Fall 2016: Satisfaction (QS1a-h). Customers ranked on a scale from 0 to 10, where 0 means “very dissatisfied” and 10 means “very satisfied.”

Note that participants were not asked to rate the energy assessment overall.

Another indicator of high program satisfaction is that almost 90% of customers overall are very likely to recommend the program to other businesses. However, full participants are significantly more likely to recommend the program than audit-only participants (94% compared to 71%, respectively). Additionally, almost twenty percent (18%) of audit-only participants said that they are not at all likely to recommend the program. Among those audit-only participants who said they were unlikely to recommend the program (n=13), the most common reason was that nothing came of the assessment (n=6); specifically, that there was no follow up after the assessment or recommendations provided on how the customer could save energy.

Figure 5. Likelihood to Recommend the Program



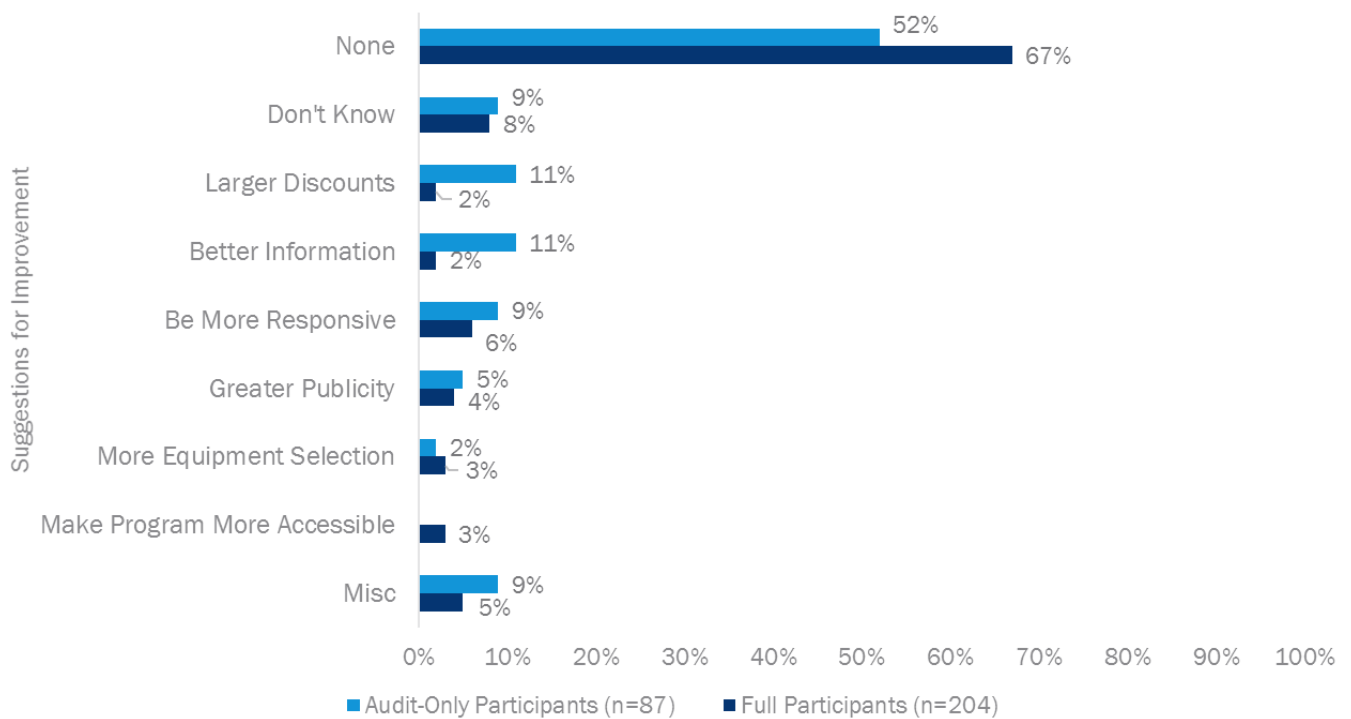
Source: Full and Audit-Only Participant Surveys Fall 2016: Satisfaction (QS2). Customers used a likelihood scale from 0 to 10, where 0 is “Not at all likely” and 10 is “Extremely likely”.

Letters indicate a statistically significant difference at the 95% level.

Note: Excludes “don’t know” and “refused” responses.

When asked for recommendations for how to improve the program, over half of respondents did not have any suggestions. Among those who offered suggestions, audit-only participants most frequently asked for larger discounts (11%) and better information (11%). Full participants suggested the program be more responsive (6%) and publicize more (4%).

Figure 6. Suggestions for Program Improvement



Source: Full and Audit-Only Participant Surveys Fall 2016: Satisfaction (QS3).

Note: Only responses with 3% or more in at least one category are presented.

A number of the suggestions raised by full and audit-only participants are also points of emphasis among program staff. In particular, four of the individuals we spoke with through our in-depth interviews mentioned issues related to the participation process and eligible equipment. In terms of the participation process, DI program implementers reported receiving some complaints from customers about scheduling installations with contractors and having to deal with contractors who showed up late or were not professional. The program implementers also mentioned customer frustration over having a select number of measures available to them through the program.

4.2.3 Measure Installation

As illustrated in the prior sections, full and audit-only participants generally experienced the program in similar ways and participated for similar reasons. This section explores the drivers of equipment installation for full participants, and the barriers for audit-only participants.

Full Participants

Over three quarters of full participants (76%) said that they installed all of the equipment recommended through the energy assessment. This is consistent with the Level 2 conversion rate analysis, which found that customers who installed at least one measure were likely to have installed all measures. The evaluation team also saw differences between full participants in programs with different Level 1 conversion rates (i.e., the percentage of customers who received an energy audit that went on to install recommended equipment) and DORCE score rankings. As shown in Table 18, significantly more full participants in high DORCE ranked programs said that they installed all recommended measures compared to full participants in low DORCE ranked programs (78% versus 62%).

Table 18. Equipment Installation Practices Among Full Participants

Equipment Installation	All Full Participants (n=204)	High DORCE (A)	Low DORCE (B)
All Equipment Installed	76%	78% ^B	62%
Not All Equipment Installed	16%	15%	27% ^A
Don't Know	7%	7%	12%

Source: Full and Audit-Only Participant Surveys Fall 2016: Measure Installation (Q11).
Note: Percentages may not sum to 100% due to rounding.

Full participants' reasons for installing new energy efficient equipment following the energy audit were largely the same as their reasons for participating in the program overall: to reduce energy bills (69%), for the equipment discount (18%), or to conserve energy (14%).

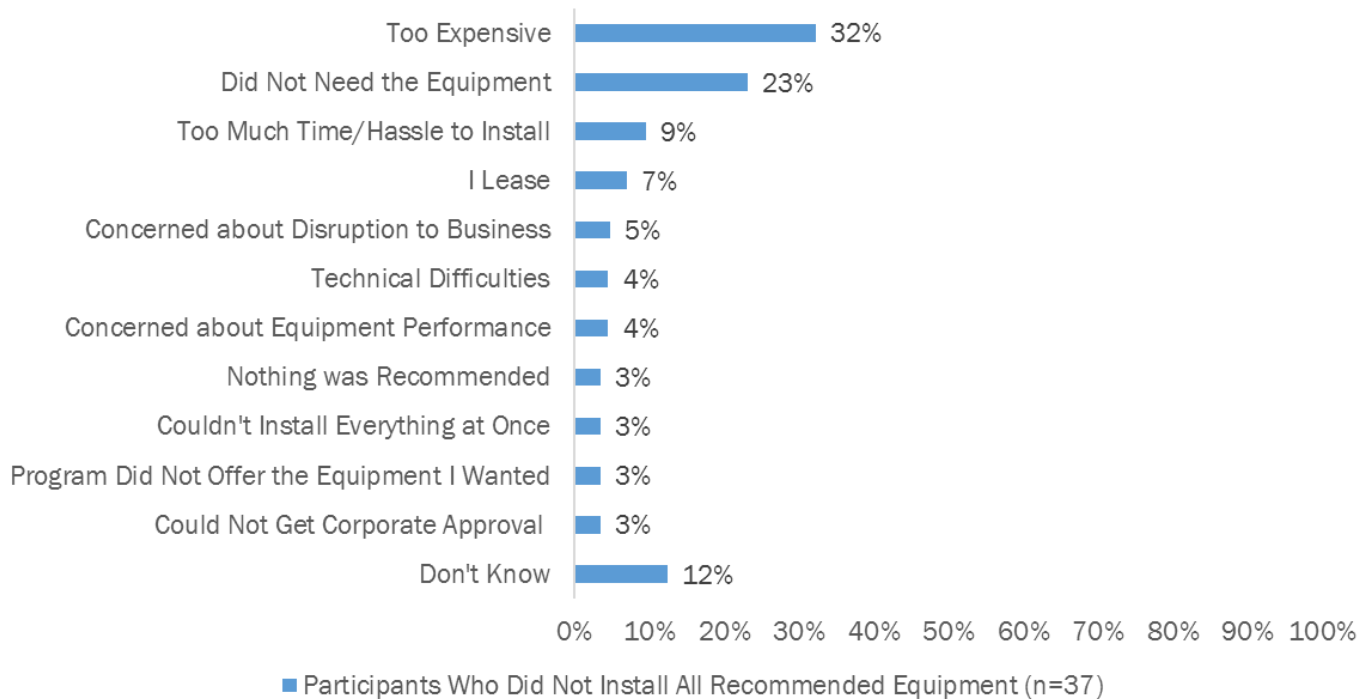
Table 19. Full Participants’ Reasons for Installing Equipment (Multiple Response)

Reason	Percent of Participants (n=204)
To Reduce Energy Bills	69%
Equipment Discount	18%
To Save Energy	14%
Program was Free	4%
Easy to Participate	6%
Needed New Lighting	5%
Wanted Better Quality Lighting	5%
Good for the environment	4%
Don't Know	4%
Representative was convincing	2%
Other	4%
Don't Know	4%
Refused	1%

Source: Full Participant Survey Fall 2016: Measure Installation (Q13).
 Percentages may sum to more than 100% because many respondents had multiple reasons for measure installation.

While the number of respondents who did not install all of the recommended equipment is small, the most frequently mentioned reasons for not installing all of the equipment among this sub-group of respondents are cost (32%) and a lack of perceived need (23%).

Figure 7. Reasons Cited by Full Participants for Not Installing All Recommended Equipment (Multiple Response)



Source: Full Participant Survey Fall 2016: Measure Installation (Q12).

Note: Only responses with 3% or more are presented.

Among those who did not install all of the recommended equipment, 82% said their reasons for not installing the equipment were consistent across various types of equipment.

Audit-Only Participants

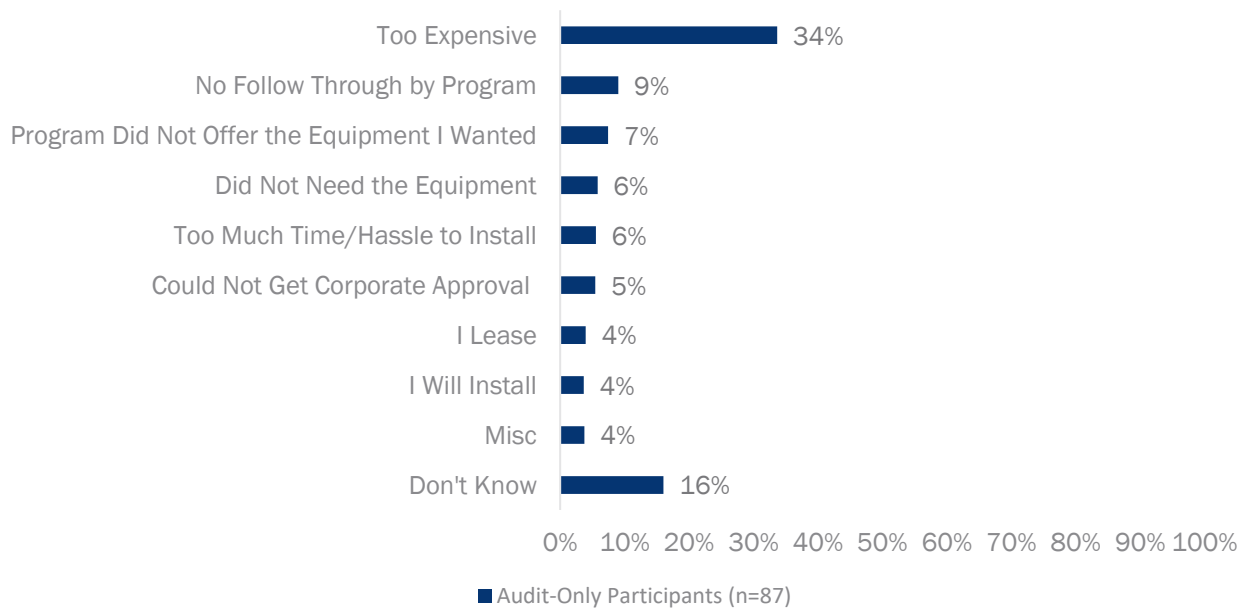
The main factor preventing audit-only participants from installing recommended equipment is cost. We asked audit-only participants about barriers to installation in three ways. First, we asked them why they chose not to install the equipment recommended to them through the energy audit.¹³ Second, we asked them what it would take to get them to install the recommended equipment, and third, we asked what they thought prevented businesses like theirs from participating. Across all three questions, responses indicated cost as the primary barrier to participation.

¹³ It is important to note that 36% of audit-only participants said that they did in fact install equipment through the program. Such a high number of audit-only participants indicating participation could be a result of several things: errors in implementer data, customers receiving an audit in 2015 and installing equipment in 2016, customers installing the equipment outside of the program, or recall error given that customer included in the survey received an energy audit in 2015. We removed this group of audit-only participants from the analysis.

Evaluation Findings

As shown in Figure 8, the main reason audit-only participants did not install recommended equipment after the energy assessment was because the equipment was too expensive (34%). Other reasons cited include that the program did not follow through (9%), it did not offer what the customer wanted (7%), or the business did not need the equipment (6%) or that it would take too much time or be a hassle to install (6%).

Figure 8. Reasons Cited by Audit-Only Participants for Not Installing Recommended Equipment (Multiple Response)



When asked what it would take for audit-only participants to install the measures, 38% said they would need a cheaper cost to install. Others said that they would need more program follow-through (9%), to better explain cost and payback (9%), or to obtain corporate/owner approval (7%). Further, when asked what they believed were the main reasons preventing businesses like theirs from installing energy efficiency equipment, 51% of audit-only participants said the cost of the equipment. Collectively, these findings indicate that audit-only participants are cost-sensitive and may not be able to invest in energy efficiency equipment.

4.2.4 Customer Characteristics

Overall, retail/service and office facilities are the most common business types among both full and audit-only participants (Table 20). The evaluation team also saw some differences in business types based on participation status and program categorization (i.e., low and high DORCE ranking). In particular, there are significantly more medical facilities and warehouses in high DORCE ranked programs than low DORCE ranked programs for both full and audit-only participants. There are also significantly more audit-only participants in the grocery sector than full participants (9% for audit-only versus 3% for full participants) likely due to the cost-

sensitivity of this group, which was explored in the Third Party Process Evaluation.¹⁴ As documented through that research, customers in the grocery sector face similar barriers to other businesses (i.e., time and knowledge constraints), but improvements for their facilities and equipment can be quite expensive.

Table 20. Participating Business Types

Business Type	Full Participants (n=204)	Audit-Only Participants (n=87)
Retail/Service	36%	30%
Office	11%	13%
Restaurant	9%	8%
Miscellaneous	8%	5%
Auto Repair or Sales	6%	9%
Medical	7%	7%
Warehouse/Distribution	4%	2%
Industrial/Manufacturing	5%	6%
Public Assembly	4%	5%
Grocery	2%	9%
Multifamily Housing	2%	0%
Hotel/Motel	2%	0%
Agriculture	1%	0%
K-12 School	1%	0%
Refused	2%	2%
Don't Know	1%	2%
Total	100%	100%

Source: Full and Audit-Only Participant Surveys Fall 2016: Firmographics (QF1).

In terms of business size, the majority of full and audit-only participants have less than 50 employees. Among full participants, more than half have less than 10 employees (54%), followed by 10 to 49 employees (17%). The trend is similar among audit-only participants where 49% have less than 10 employees and 26% have between 10 and 49 employees. Finally, more than 94% of the businesses with whom we spoke paid their own electric bill.

Responses to the survey also suggest that leasing a facility has not presented a barrier to participation in DI programs. In particular, we found that significantly more participants (60%) lease their facility than audit-only participants (48%) do. These findings suggest that DI programs have been able to address the split incentive barrier to participation to some extent.

¹⁴ Opinion Dynamics. PY2013-12 Third Party Commercial Program Value and Effectiveness Study. California Public Utilities Commission. August 2016. Accessed: http://www.calmac.org/publications/CPUC_3P_Report_Vol_I_FINAL_Published_Aug_2_2016.pdf

Evaluation Findings

Finally, survey data suggests that the programs have been able to reach key decision makers at participating customer facilities. As shown in Table 21, most survey respondents are mid to senior level staff including managers, owners, presidents, and CEOs.

Table 21. Title of Person Familiar with Program, by Participation Status

Respondent Title	Participation Status		Participant DORCE Ranking		Audit-only participant DORCE Ranking	
	Full Participants (n=204)	Audit-Only Participants (n=87)	High DORCE (n=146)	Low DORCE (n=58)	High DORCE (n=62)	Low DORCE (n=25)
Owner/President/CEO	41%	39%	42%	30%	39%	56%
General Manager/Regional Manager	25%	26%	24%	32%	26%	17%
Facility/Operations Manager	8%	24%	9%	3%	24%	14%
Office Manager/Administrator	6%	4%	6%	5%	4%	--
Manager/Supervisor	4%	4%	5%	2%	4%	--
VP or VP of Operations	3%	--	4%	--	--	--
Energy Manager/Engineer	3%	--	2%	10%	--	7%
Miscellaneous	7%	2%	7%	13%	2%	3%
Member	1%	2%	<1%	2%	2	3%
Refused	2%	--	2%	3%	--	--
Total	100%	100%	100%	100%	100%	100%

Source: Full and Audit-Only Participant Surveys Fall 2016: Firmographics (QF2).

5. Key Findings and Recommendations

The evaluation team provides the following key findings and recommendations based on the customer research and conversion rate analysis conducted as part of the Phase 2 DI Process Evaluation. This section is organized around each of the key research objectives of the Phase 2 study.

How do customers perceive the program, what aspects of the program are working well, and what areas need improvement?

- Full participants report significantly higher levels of satisfaction with the programs' components than audit-only participants do. In particular, mean satisfaction scores for full participants range from 9.01 for the information provided by the program to 9.33 for the representative who conducted the energy assessment. Audit-only participants provided mean satisfaction scores ranging from 6.73 on the program discount to 8.01 on the representative who conducted the energy assessment. Participants are also significantly more likely to recommend the program to other businesses than audit-only participants are (94% and 71% respectively).
- A key barrier to participation on the part of audit-only participants is cost. While this group is significantly more motivated to participate in a DI program to reduce their energy bills (72% compared to 58% for full participants), they are significantly less satisfied with the discounts offered by the program (mean score of 6.73 compared to 9.13 for full participants). DI programs are also having success reaching businesses that lease their facilities, a traditional barrier to participation in energy efficiency programs.
- In terms of program improvements, over half of respondents (52% and 67% for audit-only and full participants respectively) did not offer any suggestions for changing the program. Among those who did, audit-only participants asked for larger discounts and better information, while full participants asked for more follow up, greater publicity of programs like these, and a greater selection of equipment.
- Overall, we found very few significant differences in program satisfaction between customers in high or low DORCE score ranked programs. As such, while various programs offer different levels of comprehensiveness as measured through the DORCE score metric, there is little evidence to suggest the customer experience with the programs differs.

Why is there so little cross-program participation?

- Cross-program promotion is a critical step toward ensuring that customers have full knowledge and access to programs they are eligible to participate in. According to in-depth interviews with program staff, the majority of DI programs are making some effort to promote other programs to their customers. However, most of this promotion is informal in nature and as reported by program implementation staff, involves implementation staff mentioning that other programs are available, but not sharing program details or providing reference materials.

Are there program attributes that appear to influence customer willingness to participate and to install recommended measures?

- Given the small number of DI programs (n=19) and the wide variation between them in terms of program attributes, both the conversion rate analysis and survey analysis were inconclusive in identifying key program attributes driving full participation (i.e., equipment installation).

Key Findings and Recommendations

- We found that the conversion rate results (i.e., comparing, within a given attribute, categories of programs to each other) were largely indeterminate. Overall, there simply were not enough programs (15) to allow us to isolate the influence of one attribute (e.g., administrative model vs. incentive structure) or a category within an attribute (e.g., whether or not the program administrative model was Core, LGP, or 3P) from all the other categories within the same attribute. However, qualitative data from our analysis does suggest that co-pay may play a role in moving customers from the energy audit to measure installation, a finding that is reinforced by surveys with audit-only participants.

Are there any ramifications associated with performing DI installations “in-house” versus through local contractors?

- As documented in the Phase 1 evaluation report, some DI programs employ their own staff (i.e., “in-house” staff) to conduct energy audits and installations while other programs use a combination of in-house staff and local contractors. In general, we did not find any significant differences in the customer experience or satisfaction with the program between those served by in-house staff compared to a combination of both in-house and local contractors. In addition, we did not see any differences in conversion rates based on this attribute. As a result, there is no evidence to suggest that a consistent approach needs to be adopted across programs.

Recommendations

- **Recommendation #1: Where possible, include the individual responsible for making decisions regarding energy efficiency investments in the energy audit.** Identifying and reaching the key decision maker within a business, especially a small business, can be challenging. However, results from the customer survey indicate that contacts at participating customers were significantly more likely to have personally participated in the energy audit than those at nonparticipating customers. While there are multiple potential explanations for this finding, we hypothesize that this one-on-one interaction may help better educate customers about the benefits of the retrofit and give implementers a greater opportunity to make their case for full participation (i.e., installation of recommended equipment).
- **Consideration #1: The IOUs should consider investing in promotional materials to support the cross-promotion of energy efficiency programs for Commercial customers.** Given that some DI programs have no eligibility requirements in terms of customer size, DI program implementers are conducting outreach and projects for customers that could also participate in a range of other commercial program offerings. Given that many DI program implementers are already informally educating their customers about other program offerings, the IOUs could develop a one or two page brochure on the other energy efficiency programs available to business customers with information about where to go for additional information.
- **Consideration #2: Given the large number of DI programs, and the range of different program attributes among them, the CPUC should consider conducting case study research into the drivers of conversion rates among those at the low and high end of the conversion rate spectrum.** A case study approach would allow researchers to identify and focus in on a smaller number of DI programs for deeper analysis.

A. Appendix: Literature Review Findings

As noted within the Evaluation Methodology section, the DI Process Evaluation included a review of secondary data (i.e., literature) and in-depth interviews with program staff on the topic of audit recommendation comprehensiveness. We have included the findings from the literature review in this appendix given that it provides context around the currently level of interest in and past research around DI program comprehensiveness. It is important to note that the California Comprehensiveness Analysis provides a quantitative metric on the ability of programs to meet energy demand and usage reduction targets and should be referenced as part of any discussion on the topic of comprehensiveness.

A.1 Lessons Learned from Past Research

The Evaluation Team conducted a literature review on lost opportunities within commercial DI programs, particularly those that serve small businesses (SBDI). Lost opportunities include energy saving measures that are not realized due to factors such as program design, customer willingness to participate, and cost. Improving the comprehensiveness of DI programs is of high importance as the literature suggests that the reliance on lighting-only DI programs is coming to an end. In particular, while the bulk of DI program savings to date have been from lighting, these savings and opportunities will decline with technological and market improvements, and to a lesser extent with minimum lighting efficiency standards and building codes improve equipment baselines. As such, in order to meet energy savings goals, DI programs will need to pursue more comprehensive savings opportunities in the small business sector (York et al., 2013).

Within this section, we discuss barriers to more comprehensive DI energy audit recommendations, the implications of these barriers for savings from this sector, as well as recommendations for the evolution of DI programs moving forward based on the existing literature.

Barriers to Comprehensiveness

The literature suggests that there are four main barriers to more comprehensive energy audit recommendations: incentive structure, program allies, status quo, and lack of consistency. Each of the four barriers is discussed below. There are subsequent implications associated with each type of barrier.

Incentive Structure. The administrative costs of running small business programs are higher per unit of energy saved compared to other programs. In addition, small business budgets frequently demand short payback periods for energy efficiency projects (York et al., 2013). These factors encourage program designs that reward cost-effective savings, as opposed to comprehensive savings, and incentivize SBDI programs to focus on simple payback lighting opportunities rather than more comprehensive longer-payback projects such as refrigeration, motors, or kitchen equipment (Optimal Energy, 2011). In addition, the budgets that small businesses can allocate to energy efficiency are often constrained, which can create an incentive to implement projects that will meet short-term savings goals over projects that can achieve greater net energy savings (Neme and Stanfield, 2013).

Program Allies. Evidence from multiple SBDI program evaluations reveal a shortage of energy auditors adequately qualified to perform comprehensive energy audits beyond lighting or single measures, which means that small businesses may have difficulty finding contractors to complete comprehensive energy audits (Opinion Dynamics 2015, MA EEAC 2015). Similarly, energy auditors may not be adequately trained to recommend the full benefits of an energy audit program nor adequately incentivized to be comprehensive. For example, a study by Opinion Dynamics (2011), found that energy auditors participating in a Massachusetts

Key Findings and Recommendations

program failed to provide information to the majority of participants about other programs available to them, and the fact that they could identify custom projects for energy audit recipients.

Status Quo. A study by Navigant (2011) compared more comprehensive programs to less comprehensive programs. The study found that less comprehensive measures might be pursued over more comprehensive energy audits due to lack of incentives for change. Choosing to stay with the status quo is often a strategic choice, given high levels of savings per participant for simple lighting programs combined with high participation rates for those programs. The risk associated with deviating from the status quo is a barrier given that lighting-only programs have realized considerable savings.

Lack of Consistency. One SBDI process evaluation found that there was a lack of consistency in comprehensive measures offered to customers across vendors (MA EEAC, 2015). Program administrators provided checklists to ensure DI measure comprehensiveness, but only 3 of 14 vendors used the provided checklist. The lack of uniform adoption of the checklist across program vendors resulted in a lack of uniform energy audits and savings. Without consistency, DI energy audits vary in terms of cost, comprehensiveness, and realized savings. There has also been documented lack of consistency in realization rates. In a New York state SBDI evaluation, EM2 found that realization rates varied significantly between program administrators (2015).

Implications

Compared to large and medium sized businesses, the small business sector has the largest percent of unrealized savings (DNV KEMA, 2013). Additionally, compared to large- and medium-sized businesses, one study in Massachusetts found the ratio of savings to overall energy use is higher for the small business segment (at approximately 20-25%) (DNV KEMA, 2013).

Incentive Structure. Some SBDI programs do not offer measures beyond lighting and simple refrigeration, and the energy audits performed by these programs focus only on equipment offered through the program (as opposed to a comprehensive facility energy audit to identify all opportunities). This occurs despite the small business sector having the greatest percentage of remaining unrealized savings potential as compared to other customer groups (KEMA, 2013). In direct comparison with large firms, small businesses that elect to participate do not fully realize nor take advantage of the full range of benefits or savings available to them (KEMA, 2013). Additionally, small business cash flow may be limited and this could affect their ability to make co-pay payments, which could affect the incentive structure of direct install comprehensive energy audits (Itron, 2013).

Program Allies and Lack of Consistency. Program allies vary in terms of awareness and their ability to deliver comprehensive energy audits. Clearer messaging and streamlined instructions across energy auditors is necessary to realize greater savings from SBDI programs (MA EEAC, 2015; Opinion Dynamics, 2011). Marketing materials could also be improved to more consistently attract businesses and energy auditors to understand what is available to them and encourage them to participate (Itron 2013).

Status Quo. Unless program administrators and energy auditors are willing to evolve in terms of program breadth and depth, the status quo will remain and SBDI programs will continue to provide largely lighting only improvements. While savings are generally high among participants in these programs, there is room for improvement. The implications of remaining with the status quo are that without change and evolution in SBDI programs, savings will continue to be unrealized and there will be fragmentation among programs offered, lack of comprehensive energy audits, and varied awareness among program allies and small businesses alike.

A.2 Literature Review Bibliography

- Dan York, Maggie Molina, Max Neubauer, Seth Nowak, Steven Nadel, Anna Chittum, Neal Alliot, Kate Farley, Ben Foster, Harvey Sachs, Patti Witte. 2013. *Frontiers of Energy Efficiency: Next Generation Programs Reach for High Energy Savings*. Report Number U131, Washington, DC: American Council for an Energy Efficient Economy (ACEEE).
- DNV GL. 2015. *Small Business Program Process Evaluation Final Report*. Massachusetts: Massachusetts Program Administrators, MA LCIEC.
- DNV KEMA. 2013. *Mid-size Customer Needs Assessment*. EEAC Consultants and Massachusetts Energy Efficiency Program Administrators, Oakland: KEMA, Inc.
- E2 Working Group. 2015. *Small Business Direct Install Program Evaluation Review*. Albany, NY: Evaluation Studies Subcommittee, State of New York.
- Energy & Resource Solutions, Inc.; DNV-GL; Opinion Dynamics; Appaise. 2014. *Small Business Direct Install Program Impact Evaluation Summary*. New York, NY: Consolidated Edison Company of New York.
- Gibbons, David, Tom Palma, and Maggie McCarey. 2015. *Effective Policies for the Small Business Sector*. Memo, MA-EEAC.
- Hoffman, Ian, Mark Zimring, and Steven Schiller. 2013. *Assessing Natural Gas Energy Efficiency Programs in a Low-Price Environment*. Clean Energy Program Policy Brief, Berkeley: Lawrence Berkeley National Laboratory (LBNL).
- Ian Hoffman, Mark Zimring, Steven Schiller. 2013. *Assessing Natural Gas Energy Efficiency Programs in a Low-Price Environment*. Clean Energy Program Policy Brief, Berkeley: Lawrence Berkeley National Laboratory (LBNL).
- Itron. 2013. "Iberdrola RG&E/NYSEG Small Business Direct Install Program: Process Evaluation Summary." Report.
- Itron, Inc. 2014. *2010-2012 CPUC Nonresidential (Non-Core) Audit Evaluability Assessment*. Final Report, Oakland: Prepared For: California Public Utilities Commission.
- Itron, Inc. 2016. *Comprehensiveness Analysis Report – Phase I*. Oakland: California Public Utilities Commission (CPUC).
- Navigant Consulting. 2011. *Process and Impact Evaluation of Efficiency Vermont's 2007-2009 Geotargeting Program*. Final Report, Burlington: Submitted to Vermont Department of Public Service.
- Navigant Consulting.; KEMA Consulting. 2014. "Process Evaluation Report for Con Edison's and Orange & Rockland Utilities' Small Business Direct Installation Program." Philadelphia, PA.
- Neme, Rebecca Stanfield and Chris. 2013. *Building on Michigan's Energy Efficiency Accomplishments*. San Francisco: Natural Resources Defense Council.
- Opinion Dynamics, Cadmus, Navigant Consulting, Michaels Energy. 2015. "Impact and Process Evaluation of the 2013 Illinois Power Agency Small Business Direct Install Program." Report, Oakland.

Key Findings and Recommendations

Optimal Energy, Inc. 2011. *Pennsylvania 2013 - 2018 Energy Efficiency Goals*. Bristol: Prepared for PennFuture.

The Cadmus Group, Inc.; Navigant Consulting. 2013. "Massachusetts Small Business Direct Install: 2010-2012 Impact Evaluations." Waltham, MA.

York, Dan, Maggie Molina, Max Neubauer, Seth Nowak, Steven Nadel, Anna Chittum, Neal Alliot, et al. 2013. *Frontiers of Energy Efficiency: Next Generation Programs Reach for High Energy Savings*. Report Number U131, Washington, DC: American Council for an Energy Efficient Economy (ACEEE).

B. Appendix: Data Collection Instruments

The following files contain the full participant and audit-only participant surveys:



DI Process
Evaluation Audit-Or



DI Process
Evaluation Full Parti

For more information, please contact:

Hannah Arnold
Managing Director

510-444-5050 tel
510-444-5222 fax
harnold@opiniondynamics.com

1999 Harrison St., Suite 1420
Oakland, CA 94612



Boston | Headquarters

617 492 1400 tel
617 497 7944 fax
800 966 1254 toll free

1000 Winter St
Waltham, MA 02451

San Francisco Bay

510 444 5050 tel
510 444 5222 fax

1999 Harrison St
Suite 1420
Oakland, CA 94612

Madison, WI

608 819 8828 tel
608 819 8825 fax

2979 Triverton Pike
Suite 102
Fitchburg, WI 53711

Orem, UT

510 444 5050 tel
510 444 5222 fax

206 North Orem Blvd
Orem, UT 84057