Opinion Dynamics

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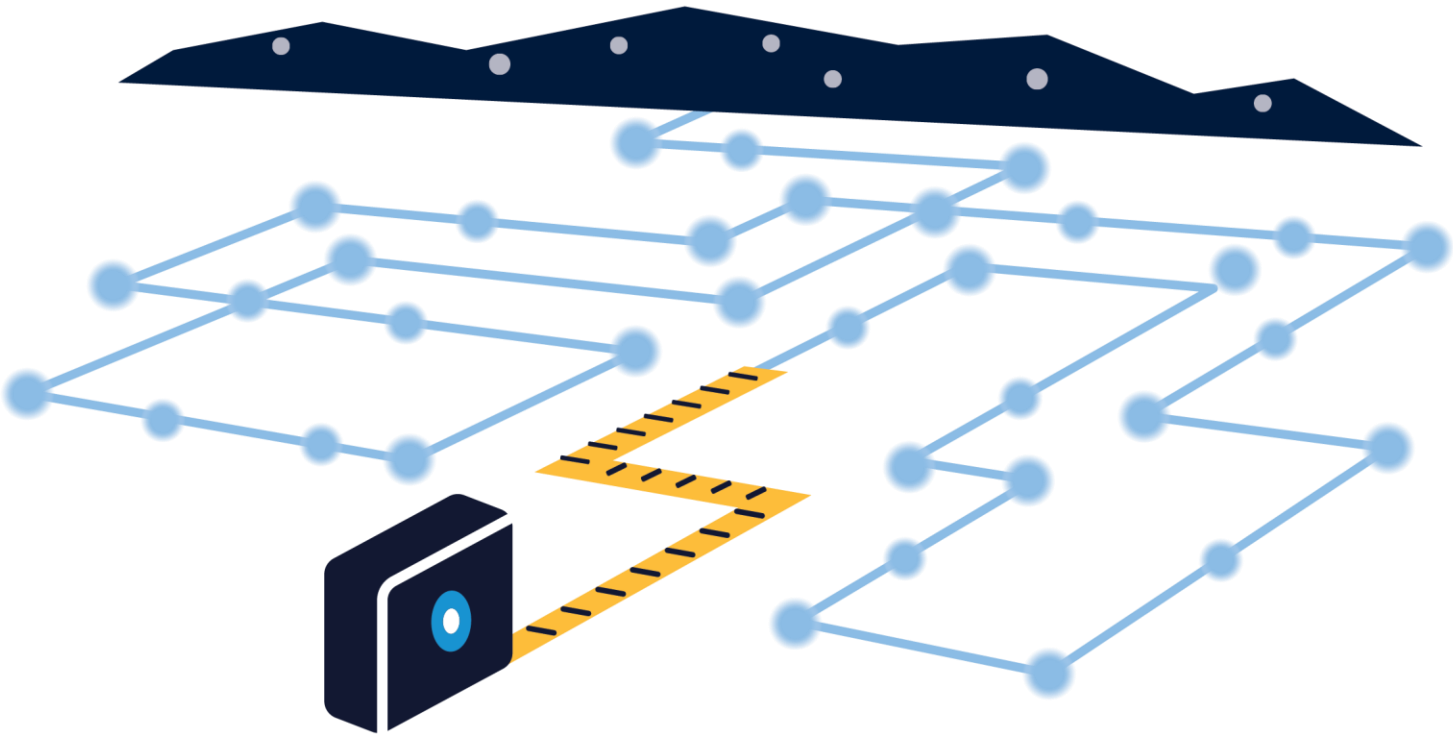
TIERRA Resource Consultants, LLC

Assessment of California Regional Energy Networks - DRAFT

CPUC Contract Group B: Deliverable 22 Year 1 Study



October 23, 2020

This study is covered under CPUC Contract 17PS5017 between Opinion Dynamics and the California Public Utilities Commission (CPUC). Tierra Resource Consultants and Itron, Inc. are subcontractors to Opinion Dynamics for this work.

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1. Executive Summary

The Opinion Dynamics evaluation team, with Tierra Resource Consultants and Itron as its sub-contractors, is pleased to present to the California Public Utilities Commission (CPUC) this Assessment of California's Regional Energy Networks (RENs), as part of the Year 1 Efficiency Program Oversight and Evaluation of the Group B Sectors. RENs, which are organized at the local/regional government level, offer energy efficiency (EE) programs outside of public or investor owned utility (IOU) program offerings to the residents and businesses in their service territories. RENs coordinate with other Program Administrators (PAs), including IOUs and community choice aggregators (CCAs), to fill gaps in available program offerings, pilot new activities, and target hard-to-reach customer segments.

1.1 REN Overview and Study Purpose

The main objective of this evaluation was to understand and measure the impacts of RENs' non-resource activities on California's EE portfolio and EE in general, particularly those offered during the 2016-2017 program years. The CPUC defines a non-resource program as one that is not directly responsible for attributed energy savings but that supports the EE portfolio through activities, such as marketing or improved access to training and education.[1] This study broadens the focus from non-resource programs to non-resource activities since oftentimes PAs engage in discrete actions, as opposed to formally defined programs, that are meant to promote participation in their resource offerings. These activities, in and of themselves, do not directly produce energy savings, but do contribute to better outcomes and energy savings in resource programs.

At the outset of this research, the CPUC and the evaluation team agreed to focus the first year of this study on non-resource activities carried out by the Bay Area Regional Energy Network (BayREN) and Southern California Regional Energy Network (SoCalREN), the two RENs that offered ratepayer-funded EE programs to customers during 2016 and 2017. BayREN serves the nine counties of the San Francisco Bay Area. SoCalREN's service territory includes twelve counties in the Southern and Central California areas. Both offer resource programs and non-resource activities intended to support their individual programs, which target the residential, commercial, and public market segments.

The third approved REN, Tri-County (3C-REN), began offering programs in San Luis Obispo, Santa Barbara and Ventura Counties in mid-2019 and is not included in the analyses of this report.

1.1.1 BayREN and SoCalREN Non-Resource Activities

Both BayREN and SoCalREN engage their customers through a variety of non-resource activities. BayREN conducted outreach through its website, trainings, presentations, and community events; provided multifamily property technical assistance; offered code compliance training and updates; and supported participation in the Property Assessed Clean Energy (PACE) program during 2016-2017, among other activities. During the same time period, SoCalREN provided residential energy audits; ran a call center to educate customers about energy efficiency and rebate programs offered by IOUs and CCAs; provided local governments with whole building retrofit support; and offered workforce development and contractor training events and resources. Because the program data associated with these activities varied in quality and quantity, the evaluation team focused on those for which BayREN and SoCal REN gathered enough usable data to associate viable customer

[1] https://www.cpuc.ca.gov/General.aspx?id=4137

contact details with specific non-resource activities. The team focused on the non-resource activities associated with the following programs:

- **BayREN Bay Area Multifamily Building Enhancements (BAMBE):** BayREN's multifamily program provides technical assistance, rebates, and access to financing to multifamily property owners.
- **BayREN Single Family Home Upgrade:** During the 2016-2017 program years, BayREN administered the California Home Energy Upgrade program to residents in its nine-county area, providing a variety of non-resource activities including online and in-home energy assessments, email and social media messaging, and outreach at community events.
- **SoCalREN Single Family Program:** Between 2013 and 2018, SoCalREN's single family program offered home energy efficiency awareness training and financial incentives for home upgrades through the California Home Energy Upgrade Program, as well energy efficient home tours and contractor certifications.
- **SoCalREN Residential Marketing, Education, and Outreach (ME&O):** While not an independent program, SoCalREN's ME&O efforts take place in parallel with and contribute support to its single family program. They are completely non-resource and provide residential customers with a variety of services including home energy audits and a customer call center to help educate customers about ways to reduce energy usage in their homes and about applicable rebate programs offered by IOUs and CCAs covering the same service territory.

1.1.2 Overview of Evaluation Approach

As part of the first-year assessment of RENs, the evaluation team conducted a variety of tasks to complete this evaluation. The team first conducted in-depth interviews to gain an understanding of BayREN, SoCalREN, and 3C-REN resource programs and non-resource activities. Upon completion of the interviews, we submitted data requests to acquire non-resource activity datasets and supporting program materials to help the team identify the datasets containing the most complete and robust data.

We next conducted an evaluability assessment of the data received from BayREN and SoCalREN to determine if the datasets contained the fields necessary to locate participants of non-resource activities in the CPUC program database. The team used the evaluability assessment to determine which non-resource activity datasets the team could use to support additional evaluation activities.

To determine how many customers located in BayREN and SoCalREN's service territory went on to participate in resource programs after their interaction with the RENs' non-resource activities, the evaluation team conducted a channeling analysis. This analysis identified customers influenced by one or more REN non-resource activities to participate in a PA resource program. We completed this task by identifying matching records of customers in the provided REN's non-resource activity datasets and in the CPUC program database of EE program participants.

To identify the EE equipment and behavioral changes that customers carried out after engaging in BayREN or SoCalREN's non-resource activities, the evaluation team conducted a web survey of 137 REN program participants. This survey not only gathered data about installation of EE equipment installed after a customer's REN non-resource activity interaction, but also asked about the degree to which the non-resource activity influenced their decision to install the equipment. The team used this information to determine how those non-resource activities led to measurable and quantifiable energy savings. The team next conducted an

engineering analysis, which provided first-year gross and net electric and gas savings[2] for the equipment installed by non-resource activity participants. Last, we carried out an attribution analysis, which allowed us to determine the amount of savings attributable to the non-resource activity itself.

1.1.3 Key Findings and Recommendations

This subsection provides findings and recommendations from the research and evaluation activities conducted in the Year 1 Assessment. Note that not all findings have an associated recommendation.

Finding #1: Based on the results of the attribution analysis, the evaluation team found sizeable unclaimed energy savings that are in part attributable to REN non-resource activities. Of the total attributable first-year net electric savings (877.1 MWh) from installed EE equipment, 16% (138 MWh) resulted from customers who were exposed to REN non-resource programs installing EE equipment outside of a PA resource program. The gas savings attribution percentage was appreciably greater. Of the total attributable first-year net gas savings (5,189 therms) from installed EE equipment, 95% (4,907 therms) resulted from installing EE equipment outside of a PA resource program. Much of this was due to the notable differential in therm savings between rebated and non-rebated measures for BayREN's multifamily program. From this analysis, it is clear that a sizable number of customers who participate in REN non-resource activities and go on to complete an EE project may not be reflected in CPUC EE portfolio data either because customers did not apply for rebates or because inadequate data tracking makes it difficult to link non-resource activity-based customer contacts with the resulting energy efficiency projects. Consequently, sizable percentages of REN-related electric and gas net savings are not accounted for in the California EE portfolio, unless they were incidentally incorporated into spillover analyses conducted of the IOU resource programs.

Recommendation: Establish a consistent set of metrics and data tracking practices for non-resource activities that in turn feed into standardized REN databases that align with CPUC databases to make future efforts to measure and evaluate REN non-resource activities more effective.

Finding #2: Based on the evaluability assessment of BayREN and SoCalREN's non-resource activity data, the evaluation team found the data to be partially complete. To the extent possible from the data provided, the team was able to quantify the benefits of selected REN non-resource activities. While BayREN's data was more complete and better organized than SoCalREN's, generally speaking, the team found the quality of both RENs' non-resource program data to be inconsistent, and their datasets lacking a standardized set of fields to be tracked.

> **Recommendation:** The evaluation team recognizes that the very nature of certain non-resource activities is not conducive to standardized data collection (for example, live outreach campaigns that rely on customer intercepts such as tabletop events). **However, RENs should gather detailed participant information for audits, technical assistance visits, workshops, referrals to other programs, and other similar activities that allow for the collection of this information.** Information that would improve the evaluability of non-resource activities includes: customer name, email address, service address, dates of participation in the non-resource activity, and all associated customer IDs used by the PAs. Such data would facilitate customer identification in REN records and the matching of those data in the CPUC program database. As data quality and completeness improve, evaluators can more fully capture the attributable energy savings from non-resource activities. Analyses of this sort go far

[2] Gross savings are defined as the change in energy consumption and/or demand that results directly from program-related actions taken by participants in an efficiency program, regardless of why the customer participated and unadjusted by any factors. Net savings are the total change in electric or gas consumption and/or demand that is attributable to an energy efficiency program.

to demonstrate the benefits of non-resource activities, particularly those offered by PAs with a more local or community focus, such as CCAs.

Finding #3: The channeling analysis matched 25% of BayREN records and 1% of SoCalREN records with CPUC participant data for PA resource programs – collectively 23% of all REN non-resource participants across all REN programs and other non-resource activities. These percentages provide a lower bound for the number of REN non-resource participants that went on to participate in PA resource programs. Our estimates are constrained by data limitations; the actual percentages of such REN participants are likely much higher. Upon completion of this analysis, the evaluation team concluded that BayREN customer data was sufficiently aligned with CPUC records for the team to develop a sample of survey respondents for the non-resource activity participant survey, but SoCalREN's was not.

> **Recommendation: If the RENs and the CPUC are interested in a more comprehensive accounting of the impacts of REN non-resource activities on the California EE portfolio, the evaluation team recommends the RENs use a standardized method and format for recording non-resource activity participant data, for at least those activities where data can easily be tracked.** For example, when residents and businesses receive energy assessments, attend presentations and workshops, and receive referrals to resource programs, the RENs should capture contact names, business names, email addresses, phone numbers, and mailing addresses, along with customer IDs in a standardized digital format. The CPUC program database requires the RENs to provide their resource program data in a standardized format and we recommend that this same format, when possible, is applied to the tracking of non-resource activity participants.

Finding #4: Sixty-six percent of the respondents (91 of 137) indicated completing at least one EE equipment upgrade at their single or multifamily property since interacting with either BayREN or SoCalREN through a non-resource activity between 2016 and 2018. Breaking this down by REN, 71% of SoCalREN's and 61% of BayREN's combined single family and multifamily customers indicated completing upgrades during that time. Based on this information, it is evident that REN-related non-resource activities are contributing to PA-sponsored EE projects and there are likely additional projects in the CPUC program data that may be linked to REN non-resource activities. However, given the challenges in establishing a link between REN non-resource activity efforts and CPUC program data discussed in Findings #2 and #3, this correlation may be difficult to establish.

> **Recommendation:** We recommend consistent use of the REN data flag within program data and in concomitant non-resource activity tracking by RENs, IOUs and third-party implementers, as it would make it far easier to align REN and other PA program records. This would help to ensure that REN efforts are more accurately and appropriately tracked and credited to ultimate energy savings.

Finding #5: Survey respondents are generally satisfied with both the quality of the energy related information received from their respective RENs (mean 7.8 out of 10) and with their REN's energy saving activities (mean 7.1). Satisfaction is higher for BayREN customers, with average satisfaction scores of 7.3 for the quality of EE information received and 7.7 for EE activities, compared to SoCalREN customers who provided average satisfaction scores of 6.9 for EE information and 7.0 for EE activities.

Finding #6: Forty-three percent of all survey respondents (59 of 137 respondents) provided suggestions for improving their respective RENs' EE activities. In all, 48% of BayREN customers and 39% of SoCalREN customers provided suggestions. Among BayREN respondents, the top two suggestions were to provide more information on the range of potential EE upgrades and the cost effectiveness of each choice (19%) and provide additional funding for rebates and incentives (13%). Meanwhile, more than half (57%) of SoCalREN customers recommended improvements in customer communication, marketing, and rebate processing (11%).

Finding #7: REN non-resource activities have moderate influence on customer decisions to install EE equipment and engage in energy saving behaviors, with degree of influence varying across non-resource activities. Among all 137 survey respondents, more than half (55%) found the REN-sponsored non-resource activities to be either somewhat or extremely influential in their decision to install EE equipment, with a mean score of 6.1 compared to a mean score of 3.9 for the combined effect of any other non-REN related influencing factors. For SoCalREN customers, interactions with community groups and with local government were the most influential activities, while for BayREN customers, community group interactions and attendance at community events were strongly influential. The divergence in these findings across the two RENs likely arises from differences in program design and implementation.

1.1.4 Conclusion

The REN's non resource activities are having a positive impact on the California energy efficiency portfolio, and energy savings arising from these efforts are likely under-counted. While a sizable percentage of customers who participate in REN-sponsored non-resource activities go on to install energy efficiency upgrades and adopt energy saving behaviors, data tracking limitations make it difficult to determine the full extent of the impacts associated with these REN efforts. Establishing a consistent set of metrics and data tracking practices for non-resource activities will improve the evaluability of non-resource activities and provide for greater insights into their contributions to the statewide EE portfolio.[3]

[3] Although an evaluation of non-resource activities associated with non-REN program administrators was not the subject of this study, the evaluation team suggests that establishing a standardized set of common metrics and data tracking practices for all non-resource activities across the California EE portfolio would be worthy of careful consideration.

2. REN Overview and Study Purpose

Regional Energy Networks (RENs) are coalitions of local governments created to administer EE programs independent of the IOUs. The REN concept originated from the desire of local governments to undertake EE program design and management more freely. At the same time, disbursement of federal American Recovery and Reinvestment Act (ARRA) funding to the state's local governments for EE purposes resulted in significantly increased EE capacity within a relatively short time. These events, in part, prompted the CPUC to find the REN pilot concept reasonable and, in turn, invited applications for RENs.[4] RENs are contracted through the utilities to administer EE programs but apply directly to the CPUC for program approval and have full control of their programs within the limits the CPUC sets.

RENs are required to meet at least one of the following three revised criteria:[5]

- Offer activities that the investor-owned utilities or CCAs cannot or do not intent to undertake.
- Pilot activities where there is no current utility or CCA program offering, and where there is potential for scalability to a broader geographic reach, if successful.
- Offer activities serving hard-to-reach markets, whether or not there is another utility or CCA program that may overlap.[6]

In D.12-11-015, the CPUC approved the creation of the BayREN and the SoCalREN (formerly The Energy Network) to administer EE programs in Northern and Southern California so long as they met at least one of the above listed criteria. The Tri-County Regional Energy Network (3C-REN) business plan was approved in D.18-05-041 in 2018 under the EE rolling portfolio to serve customers on the Central Coast and is held to the same criteria. BayREN is entirely within the PG&E service territory, SoCalREN covers much of the SCE/SCG joint service territories, and 3-C REN covers Ventura, San Luis Obispo, and Santa Barbara counties. The Tri-County REN territory overlaps with those of PG&E, SCE and SoCalGas (see Table 1). Because REN activities and programs are required to meet the above criteria, which causes them to be generally more expensive than average to deliver, and since they do not have the ability to offset cost-ineffective programs within a larger portfolio of largely cost-effective programs as IOUs currently do, the CPUC did not set a threshold cost-effectiveness level for RENs.[7] This was reaffirmed in the recent adopted Decision of ALJ Fitch,[8] which also removed the pilot status of RENs.

[4] D.12-05-015.
[5] The REN criteria were initially established in D.12-05-015 and later revised in D.19-12-021 to include CCAs as potentially overlapping program administrators.
[6] Proposed Decision of ALJ Fitch, October 23, 2019. Decision Regarding Frameworks for Energy Efficiency Regional Energy Networks and Market Transformation, page 32.
[7] D.12-11-015, p. 18-19.
[8] Proposed Decision of ALJ Fitch, October 23, 2019. Decision Regarding Frameworks for Energy Efficiency Regional Energy Networks and Market Transformation, page 32.

Table 1. Regional Energy Networks at Time of Study

REN	Counties Served	IOU Territories Served
BayREN	Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, Sonoma	PG&E
SoCalREN	Imperial, Inyo, Kern (partial), Kings (partial), Los Angeles, Mono, Orange (partial), Riverside, San Bernardino, Santa Barbara (partial), Tulare (partial), Ventura	SCE, SCG
Tri-Country REN	San Luis Obispo, Santa Barbara, Ventura	PG&E, SCE, SCG

BayREN and SoCalREN's early performance was scrutinized as to whether they were achieving their CPUC directed goals. After the earliest reviews of these programs, D.14-10-046 essentially limited the RENs' programs and budgets to the levels annualized in D.12-11-015 for 2015, except for BayREN's multifamily program (which showed popularity even in its early days), due to the limited amount of data available at the time to properly evaluate the pilots' performance.[9,10] After the completion of two studies[11] that sought to evaluate the RENs, an ALJ ruling on January 12, 2016 soliciting comments on the future of RENs asked two essential and overlapping questions:

- "Does REN program performance warrant continuing REN programs, regardless of whether RENs remain program administrators? Which programs should continue, receive expanded or reduced funding, or be terminated?"
- "Should RENs remain program administrators in connection with whatever portfolio of programs they oversee?"

In Decision 16-08-019 most parties generally agreed that REN data availability at that time was "insufficient for the Commission to draw any final conclusions," resulting in a decision that RENs would continue to function as pilots and would be "evaluated on an equal footing with other administrators" until such a time as the data were sufficient to address these questions.[12]

The approval of the RENs' business plans in D.18-05-041 for the 2018-2025 program years raised additional concern directly associated with the question of whether the RENs' program performance warrants continuation, and if they should be receiving expanded or reduced budgets based on the criteria set in D.12-11-015. Specifically, the decision sought to clarify the definition of hard-to-reach, which is used in one of these criteria. The new definition of hard-to-reach as approved in D.18-05-041 will likely result in the RENs needing to modify some of their EE programs to ensure proper targeting of hard-to-reach customers or market segments based on this definition. To partially resolve the issue, as well as to address the IOUs' concern with the overlap with between REN and IOU programs, the ALJs have required "the PAs to submit annual joint cooperation memos that explicitly identify how overlapping programs are complementary rather than duplicative, as well as to detail how the different PAs will cooperate or make changes to programs that may overlap in the upcoming program year,"[13] considering the potential for overlap among the following IOU and REN program pairings:

[9] D.14-10-046, p. 145-146.
[10] Opinion Dynamics. Prepared for the Energy Division of the California Public Utilities Commission (2016) PY2013-14 Regional Energy Networks Value and Effectiveness Study, CALMAC Study ID: CPU0114.01.
[11] Itron, Inc. Prepared for the Energy Division of the California Public Utilities Commission (2016). 2013-14 Regional Energy Networks and Community Choice Aggregator Programs Impact Assessment: Final Report and Appendices, CALMAC Study ID: CPU0113.01.
[12] D.16-08-019, p. 8.
[13] D.18-05-041, OP 38.

- PG&E and BayREN;
- SCE, SCG, and SoCalREN; and
- PG&E, SCE, SCG, and Tri-County REN.

On March 27, 2019, an ALJ Ruling addressed the future of the RENs in which it asked for input from parties on the following questions:

- Are the RENs still appropriate in light of likely geographic overlap and/or portfolio overlap with CCAs and/or local government programs (LGPs), in addition to utilities?
- Should the existing RENs continue? If so, why?
- Should the CPUC allow for the formation of new RENs?

Based on the input the CPUC received, ALJ Fitch released a Proposed Decision (October 23, 2019) that was adopted in December 2019 (D.19-12-021), which recognizes that the RENs have been in place long enough and no longer are considered pilots; the CPUC will allow for newly formed RENs but all existing and new ones must include more than one local government so that they remain regional in nature; each REN, including existing or newly formed RENs, must submit with their business plan individual Joint Cooperation Memos (JCMs) they have developed with each PA with whom they share the same geographic area to address program and customer overlap. The Proposed Decision further clarified that REN business plans must:

- Be vetted by stakeholders through the California Energy Efficiency Coordinating Committee (CAEECC);
- Include an explanation of their REN governance structure;
- Include benefit-cost ratios and savings targets, although RENs are not required to meet a cost-effectiveness threshold.

Further noted in D.19-12-021 are the changes in the landscape of funding for EE programs in California, as the budgets and roles for LGPs are shrinking and CCAs increasingly show an interest in administering EE programs. As the REN criteria are designed to result in programs outside of IOU and CCA activities, the decision maintains that RENs should continue to serve customers and places no restriction on the customer segments or program areas served so long as one of the above criteria is met. One intent of the CPUC with these comments was to reduce the uncertainty about the future of the RENs raised in D.18-05-041, with the caveat that in the event of changing circumstances, the topic could be revisited.

2.1 Description of RENs Covered in this Study

Below are descriptions of BayREN and SoCalREN including the service territories they cover and the resource programs and non-resource activities they offer. We additionally describe 3C-REN below, though the evaluation team did not include this REN in the evaluation activities. For 3C-REN, we collected data on resource program and non-resource activities in advance of its 2019 roll-out.

2.1.1 Bay Area Regional Energy Network (BayREN)

BayREN, led by the Association of Bay Area Governments, is a collaboration of the nine counties of the Bay Area: Napa, Solano, Marin, Sonoma, San Francisco, Contra Costa, Alameda, San Mateo, and Santa Clara.

Since 2012, BayREN has offered the more than seven million residents of these counties regional-scale EE programs, services, and resources alongside PG&E and, more recently, MCE EE program offerings.

BayREN's flagship resource program is its multifamily program, known as BAMBE. The program is designed to be a turnkey, middle-of-the-road offering for the owners of multifamily buildings who do not qualify for MCE or PG&E's programs. In addition to the multifamily program, in 2016-2017 BayREN administered the California Home Energy Upgrade Program for Single Family residents in the nine counties, as well as Finance, Codes and Standards, and Water Bill Savings (WBSP) programs. The 2018-2025 BayREN budget of $225.4 million was approved in D.16-08-019 to continue funding for this portfolio of programs, with the Finance program including a Multifamily Capital Advance program, Commercial Property Assessed Clean Energy (PACE), and WBSP.

2.1.2 Southern California Regional Energy Network (SoCalREN)

SoCalREN through its lead agency, the County of Los Angeles, applied to administer EE programs in 2012 to customers in twelve counties across Southern California Edison (SCE) and Southern California Gas (SCG) territories. SoCalREN services are available to over 700 public agencies in SCE/SCG service territories. This territory equates to 40% of the municipalities in California and some 20 million residents. During 2016-2017, SoCalREN offered ten programs targeting homeowners, local governments, low-income communities, contractors/energy professionals, and commercial and multifamily property owners.

SoCalREN's activities mostly focus on building local government capacity, including providing services to jurisdictions not served by LGPs or, more recently, CCAs, with the aim of providing an effective platform for public agency energy programs that require regional consistency and scale. SoCalREN's Public Agencies program is a prime example of this targeted audience and has enabled local governments to jointly participate in bundled procurement and contracting and financing services to reduce cost, save time and leverage resources. SoCalREN's current portfolio includes residential (single and multifamily), public agency, financing, and workforce development programs. The 2018-2025 budget approved in D.16-08-019 included $187.1 million in funding for these resource programs.

2.1.3 Tri-County Regional Energy Network (3C-REN)

The CPUC approved 3C-REN to administer EE programs in May of 2018 to residents and businesses located in the Central Coast counties of Ventura, Santa Barbara, and San Luis Obispo with the express intent of filling gaps left in workforce training, local government training, and full service EE services for hard-to-reach markets outside of the major population centers in the Los Angeles and San Francisco metropolitan areas. This approval allowed 3C-REN to offer three programs beginning in mid-2019: the Codes Coach Service, Workforce Education and Training, and the Residential Direct Install Program for Hard-to-Reach Customers. A budget of $52.8 million for these programs was approved with 3C-REN's 2018-2025 business plan. Because 3C-REN was not yet offering programs in 2016-2017, the Year 1 evaluation of 3C-REN was limited to collecting available data on program activities in advance of 2019 roll-out and on intended non-resource activities.

2.2 Non-Resource Activities Offered by BayREN and SoCalREN

While both BayREN and SoCalREN offer ratepayer-funded EE programs, they both also offer a variety of non-resource activities including marketing and outreach, technical assistance, workshops and trainings, energy audits, and/or referrals to other programs. As noted earlier, the CPUC describes a non-resource program as

one that has no directly attributed energy savings but serves to support the EE portfolio through activities such as marketing or improved access to training and education.[14]

This study broadens the focus from non-resource programs to non-resource activities since oftentimes PAs engage in discrete actions, as opposed to formally defined programs, that are meant to promote participation in their resource offerings but that do not in and of themselves produce energy savings. Energy audits serve as a prime example of a non-resource activity. Audits do not generate savings, but instead provide customers with recommendations to improve EE perhaps through the installation of new equipment that requires less energy to operate or through behavioral changes. If customers then decide to purchase rebated energy efficient equipment through a resource program, the non-resource activity (the audit) indirectly led to energy savings that contributed to California's EE portfolio.

BayREN and SoCalREN both engage in non-resource activities, and 3C-REN is expected engage in similar activities as its non-resource programs ramp up in 2019. The Year 1 Study focused on non-resource programs offered in support of the residential programs offered by BayREN and SoCalREN in 2016-2017, and these are described below.

2.2.1 BayREN

To understand the non-resource activities BayREN offered during 2016 and 2017, the evaluation team reviewed documentation of its activities as presented in its Annual Reports for these years.[15,16] The Annual Reports communicate BayREN's annual energy and demand savings and cost-effectiveness for its portfolio of programs and notable strategies employed to encourage EE actions in general and participation in the EE resource programs it offers. The evaluation team reviewed these strategies and found that they fit the definition of non-resource activities.

Our review shows that BayREN engaged in several types of non-resource activities with the intention of promoting its resource programs. For example, BayREN provides multifamily property owners with free technical assistance and referral services. It is possible that customers receive this technical assistance and decide to then participate in BayREN's multifamily program. Other possibilities include implementing the recommendations through participation in a similar program offered by another PA such as PG&E or MCE, acting on the recommendations on their own outside of an EE program, or not acting on the recommendations at all. This technical assistance does not produce energy savings but is meant to lead customers towards participation in BayREN's program, which would then result in savings.

Other non-resource activities that BayREN engaged in are not specifically tied to the promotion of a specific program, such as cross-cutting marketing and outreach to its customers more generally about BayREN's mission, the services it offers, as well as its EE programs. Similarly, BayREN targets its marketing and outreach efforts to not just residents or homeowners, but also to property managers, contractors, and other stakeholders involved in EE service provision.

Table 2 below presents several BayREN non-resource activities carried out during 2016-2017, as presented in BayREN's Annual Plans. Note that a majority of the non-resource activities listed in the table directly support specific programs, as this was how the information was presented in their Annual Report. In summary, BayREN relied on outreach through its website, trainings, presentations, and community events; provided multifamily

[14] https://www.cpuc.ca.gov/General.aspx?id=4137
[15] 2016 BayREN Energy Efficiency Annual Report. https://63bce253-fb1e-40fd-9fe6-f6631fc8865f.filesusr.com/ugd/1ef210_bee3448bd829426ba04169e7feaf6150.pdf?index=true
[16] 2017 BayREN Energy Efficiency Annual Report. https://63bce253-fb1e-40fd-9fe6-f6631fc8865f.filesusr.com/ugd/1ef210_2a6533c3b68c4e1183d19662289ef8ef.pdf?index=true

property technical assistance; provided commercial and residential financing support; and developed local government capacity with training courses and code compliance tools.

Table 2. BayREN's Non-Resource Activities Carried Out in 2016-2017

Program	Non-Resource Activities
Multifamily	▪ Provided technical assistance to more than 76,500 units since the program's inception (15,000 units in 2016 and 16,000 units in 2017). ▪ Conducted fifteen workshops and six industry events attended by a total of 201 building owners or property managers. ▪ Referred over 3,722 units to other multifamily incentive programs in the Bay Area in 2016. Over 2,998 units referred to other multifamily incentive programs in 2017. ▪ Carried out 24 mailer campaigns in 2016-2017. ▪ Recognized program participants at local government events and in local publications.
Single Family	▪ Recruited participating contractors for the Home Upgrade Program resulting in the creation of 63 jobs. ▪ Hosted technical, business, sales trainings, and networking events for Participating Contractors. ▪ Provided technical, program, and processing support for 848 Participating Contractor support cases resulting in 2,100 contractor interactions in 2017. ▪ Offered the BayREN Learning Center – a free training resource for Participating Contractors. ▪ Maintained the BayREN website, receiving over 75,000 website hits in 2016. ▪ HEScore Program enrolled 41 Program Assessors during the 2016-2017 program years, increasing the number of qualified Assessors to 53 in 2017.
Codes and Standards	▪ Delivered 79 training sessions related to Title 24 to 995 building professionals. ▪ Provided technical assistance to local jurisdictions. ▪ Developed curriculum related to online code compliance and Zero Net Energy (ZNE) building development. ▪ Facilitated and/or participated in working groups for reach codes, residential energy assessment and disclosure, and other statewide EE topics.
Financing	▪ Provided EE project financing to four properties through the Bay Area Multifamily Capital Advance loan program. ▪ Hosted roundtables and outreach events in the Bay Area. ▪ Developed commercial PACE options in Sonoma County.
Water Bill Savings Program	▪ Began serving multifamily customers through the East Bay Municipal Utility District's Water Smart On-Bill Program in 2016. ▪ Completed 138 projects through the Green Hayward PAYS® Program with a net savings over $18,000 per billing cycle. ▪ Supported the Town of Windsor's Windsor Efficiency PAYS® Program for single family program redesign, including contractor outreach and contract agreement updates. ▪ Conducted marketing and outreach services to potential multifamily eligible customers. ▪ Coordinated outreach with key partners and stakeholder groups including the BAMBE program, the East Bay Rental Housing Association (EBRHA) and Rental Housing Association of Southern Alameda County (RHASAC) in 2017. ▪ Conducted market surveys of Bay Area plumbing and landscaping contractors regarding their familiarity with prevailing wage and public works projects.

2.2.2 SoCalREN

The evaluation team reviewed documentation of SoCalREN's activities as presented in its Annual Reports for 2016 and 2017 to understand the non-resource activities SoCalREN engaged in during those years.[17,18] The Annual Reports communicate SoCalREN's annual energy and demand savings and cost-effectiveness for its portfolio of programs and notable strategies employed to encourage EE actions in general and participation in the EE resource programs it offers. The evaluation team reviewed these strategies and found that they fit the definition of non-resource activities.

Our review shows that SoCalREN engaged in several types of non-resource activities with the intention of promoting its resource programs. For example, SoCalREN provides a free call center for participants in the single family program. Customers who contacted the call center may decide to then participate in SoCalREN's single family program, implement the recommendations on their own outside of an EE program, or not act on the recommendations at all. The call center did not produce energy savings but was meant to lead customers towards participation in a PA's program, which would then result in savings.

Other non-resource activities that SoCalREN engaged in are not specifically tied to the promotion of a specific program, such as cross-cutting marketing and outreach to its customers more generally about SoCalREN's mission, the services it offers, as well as its EE programs. As with BayREN, SoCalREN's target audience for its marketing and outreach efforts is not limited to just residents or homeowners, but also to property managers, contractors, and other stakeholders involved in EE service provision.

Table 3 below presents several SoCalREN non-resource activities carried out during 2016-2017, as presented in SoCalREN's Annual Plans. Note that a majority of the non-resource activities listed in the table directly support specific programs, as this was how the information was presented in their Annual Report. In summary, SoCalREN relied on outreach through its website, trainings, presentations, and electronic newsletters; conducted small business energy audits and provided multifamily property technical assistance; supported green jobs; and supported participation in the Property Assessed Clean Energy (PACE) program during 2016 and 2017.

Table 3. SoCalREN's Non-Resource Activities Carried Out in 2016-2017

Program	Non-Resource Activities
Multifamily	▪ Instituted in-person interview campaigns. ▪ Provided webinars, education events and focus groups for contractors. ▪ Provided direct account management services to participating raters including regular communication through various channels (e.g. conference calls, emails, online jobs portal).
Single Family	▪ Conducted in-person interview campaigns to collect feedback from contractors. ▪ Provided webinars and focus groups. ▪ Updated brochures and collateral to include service area maps and up-to-date guidance in 2016. ▪ Held open houses at the homes of three Home Upgrade participants. Hosted education events for contractors, including six corporate "Lunch & Learns".
Public Agencies	▪ Offered customized, comprehensive technical support services to public agencies. ▪ Customized guidebooks and templates for EE measures for local governments. ▪ Supported agencies in utilizing private-sector tailored financing options.

[17] 2016 SoCalREN Energy Efficiency Annual Report. http://eestats.cpuc.ca.gov/EEGA2010Files/SoCalREN/AnnualReport/SoCalREN.AnnualNarrative.2016.1.pdf
[18] 2017 SoCalREN Energy Efficiency Annual Report. https://63bce253-fb1e-40fd-9fe6-f6631fc8865f.filesusr.com/ugd/1ef210_2a6533c3b68c4e1183d19662289ef8ef.pdf?index=true

Program	Non-Resource Activities
	▪ Maintained a pre-bid pool of energy project contractors available to implement projects. ▪ Provided project management services and construction management assistance. ▪ Offered niche services in Water/Wastewater in partnership with SCE's Water Infrastructure and System Efficiency (WISE) Program. ▪ Attended outreach events and made informational presentations on energy project financing.
Low-Income Single Family	▪ Offered bid document review assistance for the Community Development Commission (CDC) to confirm project eligibility. ▪ Provided EE and SoCalREN program offering outreach/information materials to 538 contractors. ▪ Sent 32,000 flyers to prospective program applicants in 2016.
Residential Marketing, Education, and Outreach	▪ Organized homeowner-facing events and hosted booths at community events, providing information on efficiency programs and the whole house approach. ▪ Offered direct education and outreach assistance including maintaining a program call center. ▪ Distributed 26 "Stakeholder Email Newsletters" in 2016. ▪ Maintained SoCalREN's website and other digital channels. ▪ Updated, as needed, customized marketing materials for Home Upgrade and related financing offerings in 2016.
Financing	▪ Funded nearly $20 million in comprehensive building retrofits through Commercial PACE since 2013. ▪ Conducted direct outreach to specific end-user groups, such as commercial building owners and managers, and investment/banking interests. ▪ Held homeowner workshops and community events to provide information and collateral. ▪ Developed homeowner-facing digital campaigns, Google AdWords, and emails. ▪ Hosted contractor-facing webinars.
Workforce Development	▪ Supported projects which led to the creation of 162 construction jobs. ▪ Updated resource guides, provided training and apprenticeship, and continued capacity building support for small, minority contractors through an E-Contractor Academy Program. ▪ Implemented the Local Worker Hiring Program (LWHP) for EE projects awarded by the County of Los Angeles Internal Services Department. ▪ Provided contractor training on how to use an online certified payroll system (LCP Tracker) and share its best practices and strategies for local worker inclusion.
Contractor Outreach and Training	▪ Provided training and program recruitment. ▪ Offered marketing and outreach support to contractors on EE topics. ▪ Offered contractor events and networking, special marketing channels and resources for contractors, specialized training, and distribution of EE field kits for participating contractors. ▪ Provided contractor outreach, boot camp, and county staff trainings.
Green Building Labeling (Closed)	▪ Updated marketing campaigns to brokers and realtors in 2016. ▪ Certified 144 realtors through three Green Designation trainings. ▪ Continued education, in-person peer-to-peer meetings, field trainings, and an online learning management system.
Regional Energy Data and Regional Climate/Energy Action Planning Program (Closed)	▪ Processed datasets of over 27 million addresses for the development of the Energy Atlas energy data tracking tool. ▪ Continued outreach and promotion of the Atlas tool and its significance to policymakers, researchers, political leaders, and community stakeholders.

2.3 Key Research Questions

The study objective for this assessment was to understand the effects of the non-resource activities offered by RENs on California's overall EE portfolio. During the initial study design, the CPUC and its evaluation team planned to focus on the activities carried out by all three RENs during 2016–2017. However, since 3C-REN did not launch begin to offer ratepayer-funded EE programs until 2019, a number of the research questions were restricted to focus on BayREN and SoCalREN's non-resource activities. The following are the research questions the team addressed in this report:

- What non-resource activities do BayREN and SoCalREN offer to their customers? Which ones occur as part of resource programs and which occur outside of programs?
- What non-resource activities are most successful in channeling customers into PA resource programs?
- How many participants engaged in a BayREN and SoCalREN non-resource activity that went on to participate in a PA resource program, and what are their associated gross ex-ante savings from their participation?
- What types of EE actions (behavioral or programmatic) are taken outside the PA EE resource programs that are attributable to participation in a REN non-resource activity? Can we estimate the savings from these activities and if so, what are they?
- Roughly, what percentage of these savings are attributable to the influence of the non-resource programs?
- Can the evaluation team quantify the contributions of REN non-resource activities to the California EE portfolio?

3. Overview of Evaluation Approach

This section first describes the research tasks the evaluation team carried out to address the key research questions presented in Section 1. It then follows with a description of the data collection and analytical methods used to accomplish the research tasks.

3.1 Research Tasks

The evaluation team conducted the tasks listed in Table 4 for this first-year assessment of RENs.

Table 4. Research Tasks for RENs Study First-Year Assessment

Evaluation Tasks	Description
Data Request	Submit a data request to BayREN and SoCalREN to acquire non-resource activity tracking data including participant names, contact information, and dates of participation.
Materials/Data Review	Review response to the data request to learn about the marketing and outreach campaigns, types of non-resource activities, and resource programs offered by BayREN and SoCalREN.
In-Depth Interviews with BayREN and SoCalREN Staff and Implementers	Conduct in-depth interviews with staff at BayREN and SoCalREN and their implementation teams, if applicable, to gain insights about how they conduct their non-resource activities, how they are funded, and whether they are a part of resource programs they offer.
Program Theory and Logic Model Development	For selected programs offered by BayREN and SoCalREN, develop or update existing program theory and logic models to reflect how non-resource activities are used to promote participation in EE programs or energy saving behaviors.
Evaluability Assessment	Conduct a review of the non-resource tracking datasets provided by BayREN and SoCalREN to determine whether they include information needed to evaluate the benefits of these activities.
Channeling Analysis	Identify BayREN and SoCalREN non-resource activity participants who subsequently participated in a PA resource program and those who did not. Use this information in the development of the survey sample.
BayREN and SoCalREN Non-Resource Activity Participant Survey	Conduct a participant web survey with REN non-resource activity participants to assess whether they installed rebated or non-rebated EE equipment and/or changed their energy using behaviors after participating in an activity; also assess the degree to which the non-resource activity influenced their subsequent equipment installation and behavior.
Engineering/Attribution Analyses	Use information gathered from the participant web survey to estimate energy savings from installed EE equipment that occurred after engagement with REN non-resource activity and attribute the portion of savings coming from the influence of non-resource activities.

3.2 Methodology

This section outlines the methodologies used to complete 1) the evaluability assessment of the data provided by BayREN and SoCalREN, 2) the channeling analysis to determine which REN non-resource

activity participants went on to participate in a PA EE resource program, 3) the REN non-resource activity participant web survey, 4) the engineering analysis to estimate the ex-ante gross and net first-year savings[19] from EE installations by each REN's non-resource participants, and last, 5) the attribution analysis which was used to determine the influence of the RENs' non-resource activities on customers' decisions to purchase EE equipment, some of which were claimed towards California's EE portfolio goals.

3.2.1 Evaluability Assessment

We reviewed data provided by BayREN and SoCalREN to determine whether the evaluation team could use it for the channeling analysis and to develop a sample for our survey efforts. In response to the data requests sent in January 2019 to BayREN and SoCalREN, the evaluation team received the following program materials and data in February and March 2019:

- Program materials including annual reports, program implementation plans, program theory and logic models (where available), marketing collateral and other materials used to inform customers about REN offerings; and
- REN non-resource and selected EE resource program tracking databases.

In addition to the data and materials received from the RENs, the evaluation team also gained access to CPUC's program data, some of which is publicly available through the CPUC's California Energy Data and Reporting System (CEDARS).[20]

The evaluation team reviewed program materials and tracking databases to understand 1) the types of non-resource activities and resource programs that BayREN and SoCalREN offer to their customers; 2) the goals of their program offerings; 3) the size of the programs based on participation records; and 4) the availability of program participant information for the channeling analysis, survey sample development, and other evaluation tasks.

As part of the evaluability assessment, the evaluation team reviewed participant data for 10 of SoCalREN's programs operating during the evaluation period, as well as supporting material for an additional four programs since closed. The evaluation team also reviewed participant data shared by BayREN for various non-resource activities conducted as part of their Multifamily, Single Family, Financing, Codes and Standards, and Water Bill Savings programs. The primary focus of the evaluability assessment concentrated on data completeness, quality, and the feasibility of conducting channeling analyses using REN data and CPUC program data. Section 5 presents detailed results of the evaluability assessment and recommendations for non-resource activity data tracking.

3.2.2 Channeling Analysis

The evaluation team conducted a channeling analysis to acquire the set of customers who first engaged in a BayREN or SoCalREN non-resource activity in 2016-2017 and subsequently participated in an EE program offered by one of the California PAs. The premise of the channeling analysis is that customers who participated in a PA resource program may potentially have been, in part, influenced by a REN non-resource activity in which they participated. The channeling analysis provides a list of the customers who

[19] Gross savings are defined as the change in energy consumption and/or demand that results directly from program-related actions taken by participants in an efficiency program, regardless of why the customer participated and unadjusted by any factors. Net savings are the total change in electric or gas consumption and/or demand that is attributable to an energy efficiency program.
[20] The CPUC program database contains data about savings claims with more granularity than what is publicly available. This database contains individual savings claims from all PA resource programs including associated customer information and measures installed.

may have been influenced by the non-resource activity. However, the degree of influence, if any, cannot be determined through this analysis.

We recognize that BayREN and SoCalREN's non-resource activity participants may have chosen to install EE equipment outside of PA resource programs. The channeling analysis does not capture this information. However, the team fielded a survey with a sample of each REN's non-resource activity participants to understand what EE equipment and behavioral changes were made both within and outside of PA resource programs and what influence the non-resource activity had on their decision.

To conduct this channeling analysis, the evaluation team: 1) identified records from each REN's non-resource activity tracking datasets; 2) created unique records of non-resource activity participants; and 3) looked for customer matches in the CPUC tracking data that showed customer purchases of EE equipment occurring after their interaction with BayREN or SoCalREN. The CPUC tracking data used in this analysis covered program years 2016 through 2018.

The evaluation team needed two main sources of information to conduct the channeling analysis:

- A list of REN non-resource activity participants with customer identifying information, type of non-resource activity in which the customer participated, and date of participation
- A list of PA resource program participants with customer identifying information and dates of participation so that the evaluation team could confirm that participation occurred after non-resource activity participation.

The two lists ideally would contain a common identifier, such as a customer ID that is included in both datasets. Most times this information was not present. The evaluation team therefore had to rely on other ways to match customers to records in the CPUC tracking data, such as through customer name, email address, phone number, and/or mailing address. To prepare the non-resource participant datasets for the channeling analysis, we:

- Converted each non-resource participant tracking dataset into a standardized format;
- Standardized variable names;
- Cleaned the data in a standardized manner; and
- Retained the following fields for each record, where populated: name, premise address, phone, email, and dates of non-resource activity participation.

We next appended all the standardized non-resource tracking datasets. This allowed the team to conduct a search for duplicate records across non-resource activity datasets. The team defined unique records based on a unique combination of premise location and customer name since EE upgrades, and hence energy savings, occur at the property level and are experienced by the resident or business that occupies that premise.

We employed a fuzzy matching algorithm to identify duplicate records.[21] In some cases, a record would contain a customer name and email address and in another it would contain customer name and a street address. In these cases, the evaluation team appended the information from the two datasets so that we would retain as much information as we could for that given record. This allowed the team to create a single unique record from two sources that contained different information about the same

[21] Fuzzy matching is a computer science-based technique used to link records, particularly when there are less than 100% identical field values across sources.

customer/premise combination and would help increase the chance of finding a match in the CPUC data. After we ran the algorithm, the final non-resource participant tracking dataset contained unique records. We made sure to include flags to indicate the non-resource activities in which customers participated. According to the data sets provided, most customers participated in only one non-resource activity type.

The evaluation team then matched the non-resource participant dataset with unique records to the CPUC program data in a similar manner used to remove duplicate records from the non-resource participant data. We again used a fuzzy matching algorithm to link records from the non-resource activity data to the CPUC program tracking by looking for matches first by customer ID. Because customer IDs were not often available, the team searched for matches based on a combination of names, email addresses, and premise addresses.

3.2.3 REN Non-Resource Activity Participant Survey

As part of the assessment of RENs, the evaluation team conducted a computer-assisted web interviewing (CAWI) survey of BayREN and SoCalREN customers who engaged with non-resource program activities conducted by each REN as part of their EE programs and their general marketing and outreach campaigns.

Sample Design

The evaluation team reached out to 1,784 SoCalREN and 871 BayREN non-resource activity participants (for a total of 2,655) and ultimately obtained 137 complete surveys, exceeding the target of 100 completes. As shown in Table 5, the survey sample can be disaggregated by individual REN or by program, with Single Family additionally rolled-up as a single cohort for reference.[22]

Since sample points for some of the different non-resource activities are limited, the evaluation team used a census approach and contacted BayREN and SoCalREN non-resource activity participants who had contact information (i.e., email address or mailing address). Notably, the number of completes by non-resource activity participant type is consistent with the population.

Table 5. BayREN and SoCalREN Participant Survey Sample Composition

Non-Resource Activity Participant Program Type	Population		Sample Frame		Sample		Survey Completes	
	N	Percent (N=2,655)	n	Percent (n=2,415)	n	Percent (n=1,793)	n	Percent (n=137)
All participants (BayREN and SoCalREN)	2,655	100%	2,415	100%	1,793	100%	137	100%
SoCalREN customers (SF)	1,784	67%	1,642	68%	337	19%	73	53%
BayREN customers (SF, MF)	871	33%	773	32%	285	16%	64	47%
BayREN Multifamily	548	21%	472	20%	241	13%	42	31%
BayREN Single Family	323	12%	301	12%	44	2%	22	16%
Single family participant (BayREN and SoCalREN)	2,107	79%	1,943	80%	381	21%	95	69%

[22] SoCalREN's Multifamily program was excluded from the survey because the total sample size of non-resource participants was 15, which was deemed insufficient for producing statistically rigorous results for analysis.

Survey Fielding

The evaluation team fielded the web survey between October 1st and 22nd, 2019. All BayREN and SoCalREN non-resource activity participants were contacted by email. In an effort to boost survey completions, the evaluation team coordinated with the program managers at the RENs and arranged for them to send email messages to their customers notifying them of a forthcoming email regarding a CPUC evaluation of REN activities. The RENs sent their email messages approximately 24 hours in advance of the first round of survey invitations sent by our survey team. The evaluation team sent three additional reminder emails at one week, three days, and one day prior to the closing of the survey.

Table 6. Email and Invitation Reminders

Respondent Type	Email Invitation	Reminder 1	Reminder 2	Reminder 3
All Respondents (SoCalREN and BayREN)	**2,655**	**2,088**	**1,833**	**1,584**
SoCalREN (single family only)	1,642	1,463	1,327	1,233
BayREN (single and multifamily)	773	625	506	351
BayREN (multifamily)	472	366	297	237
BayREN (single family)	301	259	209	114
Single Family (SoCalREN and BayREN)	1,943	1,722	1,536	1,347

Survey Disposition and Response Rate

Table 7 provides the survey dispositions for the participant survey and

Table 8 presents the response rate (RR). We calculated survey dispositions and response rate using the standards and formulas set forth by the American Association for Public Opinion Research (AAPOR), as described in Appendix C. The acronyms we use in Table 7 and

Table 8 reference the AAPOR terminology.

Table 7. Participant Survey Disposition

Disposition Code	Disposition Category	Number of Customers
Complete	I	137
Partial complete - survey eligibility confirmed	N	65
Partial complete - survey eligibility unknown	U1	46
Refused	U1	3
No response	U1	1,499
Ineligible to participate	X1	43
Bounced email	X2	622
Total		**2,415**

Table 8. Participant Survey Response Rate

AAPOR Rate	Percent
Response Rate 3	8.81%

3.2.4 Engineering Analysis

The main objective of the engineering analysis was to estimate for surveyed customers the first-year ex-ante gross and net energy impacts of any EE equipment they installed (either through a PA resource program or on their own) after participating in BayREN or SoCalREN's non-resource activities. The evaluation team used the data obtained from the participant survey, which we had fielded to non-resource activity participants within each REN's respective service territory (see sub-section immediately above for the non-resource activities covered in the survey). Responses were provided by 137 participants.

In order to complete the engineering analysis of savings, the evaluation team compiled the following list of measure categories based on the survey data:

- Appliances
- Building Shell
- HVAC
- Lighting
- Office Equipment
- Pool
- Solar
- Water Heating
- Other

For each of the measure categories above, the evaluation team identified sub-measures that contributed to the measure category level savings. For every sub-measure, we analyzed the participant responses and calculated the ex-ante energy savings by applying the deemed savings values using either the CPUC tracking database or the READI (Remote Ex-Ante Database Interface, version 2.5.1) program.

READI is a program that enables users to examine the ex-ante measure information based on DEER (Database of Energy Efficiency Resources) stipulations. Users can access measure-specific information such as:

- ex-ante data tables,
- existing DEER and non-DEER measure definitions,
- deemed energy impacts associated with measures in tables and graphs, and
- measure-specific net-to-gross ratios (NTGRs).

READI also provides an option for the user to download data tables and create and save new measures based on existing scaled measure definitions. The evaluation team used these deemed savings values in conjunction with pertinent survey data on measure quantities and specifications, etc., to determine the first-year gross savings for both rebated and non-rebated EE equipment.

Table 9 summarizes the assumptions and sources used to calculate the gross and net savings for each measure category.

Table 9. Measure-Specific Assumptions and Sources

Measure Category	Sub-Measure	Analysis Source/ Assumptions		
		Unit Energy Savings*	Measure Qty	NTGR
Appliances	ENERGY STAR Clothes Washer	DEER	Survey Data	DEER Support Tables
	ENERGY STAR Dishwasher	DEER	Survey Data	DEER Support Tables
	ENERGY STAR Refrigerator	DEER	Survey Data	DEER Support Tables
	ENERGY STAR Clothes Dryer	MidAtlantic TRM v9	Survey Data	DEER Support Tables
	ENERGY STAR Room Air Conditioner	DEER	Survey Data	DEER Support Tables
	ENERGY STAR Freezer	DEER	Survey Data	DEER Support Tables
	ENERGY STAR Dehumidifier	DEER	Survey Data	DEER Support Tables
	ENERGY STAR Air Purifier	Unable to quantify due to insufficient data	-	-
	Recycled old secondary refrigerator	Unable to quantify due to insufficient data	-	-
	Recycled old secondary freezer	Unable to quantify due to insufficient data	-	-
	Recycled old room air conditioner	Unable to quantify due to insufficient data	-	-
Building Shell	Added insulation	DEER	Survey Data	DEER Support Tables
	Caulked, weather-stripped or sealed windows, doors, and/or outlet gaskets	DEER	Survey Data	DEER Support Tables
	Caulked, weather-stripped or spray-foamed air leaks in attic or crawlspace	DEER	Survey Data	DEER Support Tables
	Weather-stripped or insulated attic hatch or door	DEER	Survey Data	DEER Support Tables
	Installed ENERGY STAR double or triple pane windows	DEER	Survey Data	DEER Support Tables
	Installed window film to existing windows	Unable to quantify due to insufficient data	-	-
	Installed cool roof	Unable to quantify due to insufficient data	-	-

Measure Category	Sub-Measure	Analysis Source/ Assumptions		
		Unit Energy Savings*	Measure Qty	NTGR
Food Service	ENERGY STAR Dishwasher	DEER	Survey Data	DEER Support Tables
HVAC	New Central AC	DEER	Survey Data	DEER Support Tables
	New Air Source Heat Pump	DEER	Survey Data	DEER Support Tables
	New Ductless Mini-split Heat Pump	IL TRM v7	Survey Data	DEER Support Tables
	New Ground Source Heat Pump	IL TRM v7	Survey Data	DEER Support Tables
	New Furnace	DEER	Survey Data	DEER Support Tables
	HVAC System Tune-Ups	CPUC Tracking Data Averages	Survey Data	DEER Support Tables
	Programmable or Smart Thermostat	DEER	Survey Data	DEER Support Tables
Lighting	CFL	DEER	Survey Data	DEER Support Tables
	LED	CPUC Tracking Data Averages	Survey Data	DEER Support Tables
	TLED	CPUC Tracking Data Averages	Survey Data	DEER Support Tables
	Linear Fluorescent	DEER	Survey Data	DEER Support Tables
Office Equipment	Advanced Power Strips	DEER	Survey Data	DEER Support Tables
	Computer Power Management Software	DEER	Survey Data	DEER Support Tables
	Energy Savings desktop or Laptop	IL TRM	Survey Data	DEER Support Tables
	ENERGY STAR Printer	ENERGY STAR Calculator	Survey Data	DEER Support Tables
	ENERGY STAR Copier	ENERGY STAR Calculator	Survey Data	DEER Support Tables
	ENERGY STAR Computer Monitor	ENERGY STAR Calculator	Survey Data	DEER Support Tables
Other	ENERGY STAR Clothes Washer	DEER	Survey Data	DEER Support Tables
	Installed ENERGY STAR double or triple pane windows	DEER	Survey Data	DEER Support Tables
	ENERGY STAR Dishwasher	DEER	Survey Data	DEER Support Tables
	ENERGY STAR Clothes Dryer	MidAtlantic TRM v9	Survey Data	DEER Support Tables
	Solar Panels	Itron's PV Watts Simulation Model	Survey Data	DEER Support Tables
	ENERGY STAR Refrigerator	DEER	Survey Data	DEER Support Tables
	Electric Vehicles/ Chargers	Unable to quantify due to insufficient data	-	-
	Water Efficiency Measures	Unable to quantify due to insufficient data	-	-

Measure Category	Sub-Measure	Analysis Source/ Assumptions		
		Unit Energy Savings*	Measure Qty	NTGR
Pool	ENERGY STAR pool pump	Tracking Data Averages	Survey Data	DEER Support Tables
	Pool Pump Timer	Unable to quantify due to insufficient data	-	-
	Pool Cover	Disqualified measure per evaluation guidance		
Water Heating	Low Flow Shower Head	DEER	Survey Data	DEER Support Tables
	Low Flow Faucet Aerator	DEER	Survey Data	DEER Support Tables
	Pre-rinse Spray Valves	Tracking Data Averages	Survey Data	DEER Support Tables
	Thermostatic Restrictor Valve	DEER	Survey Data	DEER Support Tables
	ENERGY STAR Water Heater	DEER	Survey Data	DEER Support Tables
	Demand Control Recirculation Pump	DEER	Survey Data	DEER Support Tables
	Pipe Insulation	Tracking Data Averages	Survey Data	DEER Support Tables
Compressed Air	No NR Activity			
Refrigeration	No NR Activity			

* The acronym "TRM" used in this column refers to Technical Resource Manual, which is an informational tool analogous to California's DEER. Various states have their own TRMs; this table references those of the MidAtlantic States and Illinois (IL).

In addition to the gross savings, the evaluation team identified and applied measure-specific NTGRs from DEER to the calculated first-year gross savings to estimate the total net energy savings of EE equipment installed by participants of the non-resource activity types and for each of the measure categories above.

As a part of the savings estimation, we relied on our measure-specific evaluation expertise and identified best available proxies for missing tracking database or DEER data fields to establish conservative savings estimates. As such, these estimates are purely representative of the likely non-resource activity related savings and do not have statistical significance or precision-based metrics for broader extrapolation.

3.2.5 Attribution Analysis

Based on data collected from BayREN and SoCalREN's non-resource activity participants, the evaluation team calculated customer-level ratios that represent the degree of influence each REN's non-resource activities had on the customer's decision to install EE equipment, whether it be through an EE resource program or on their own. Once we calculated this ratio, we applied it to the customer-level ex-ante gross and net energy savings calculated in the engineering analysis to estimate the proportion of savings attributable to BayREN or SoCalREN's non-resource activities.

Attribution Survey Questions

The evaluation team developed customer-level attribution ratio based on responses to the following survey questions:

IN1. On a scale of 0 to 10, where 0 is "Not at All Influential" and 10 is "Extremely Influential", how influential was <REN> **<NR activity>** in your decision to install energy saving equipment?

IN2. Now we would like to ask you about the importance of <REN> **<NR activity>** in your decision to install energy saving equipment compared to other factors that may have influenced your decision.

If you were given a TOTAL of 10 points to rate the importance of <REN>'s energy saving program in your decision to **install energy saving equipment** and you had to divide those 10 points between (1) <REN> **<NR activity>** and (2) any OTHER factors, how many points would you give to the importance of your interaction with the REN? Your best estimate is fine.

IN3. Now please think about the action you would have taken with regard to installing energy saving equipment that helps save energy if you hadn't interacted with the REN.

Using a scale from 0 to 10, where 0 is "Not at all likely" and 10 is "Extremely likely", if you had not interacted with <REN> through its **<NR activity>**, what is the likelihood that you would have installed EXACTLY the same energy saving equipment either at the same time or later?

[ASK IF IN3>0]

IN4. Using the same scale from 0 to 10, if you had NOT interacted with <REN> through its **<NR activity>**, what is the likelihood that you would have installed exactly the same energy saving equipment **within 12 months of when you did it**?

[ASK IF IN4>0]

IN5. When do you think you would have installed the energy saving equipment had you not interacted with <REN> through its **<NR activity>**? Please answer relative to the date that you **actually** installed the energy saving equipment:

0. At the same time
1. Within 6 months
2. More than 6 months up to 1 year later
3. More than 1 year up to 2 years later
4. More than 2 years up to 3 years later
5. More than 3 years up to 4 years later
6. More than 4 years later
8. Not sure

[ASK IF IN5=6]

IN6. Why do you think it would have been over 4 years later? **[OPEN END]**

Attribution Ratio Algorithm

Based on the responses to the questions above, the evaluation team calculated customer-level attribution ratios using the following algorithm:

Equation 1. Attribution Ratio Formula

Attribution Ratio = Average (NR Relative Influence, Adjusted No NR Activity)

Where:

NR Relative Influence = (IN2a score/10)

*Adjusted No NR Activity = 1 - (IN3 score/10) * Timing adjustment*

Timing adjustment = [1 – (# months expedited from IN5 – 6)/42]

We used the following values to represent the number (#) of months expedited since the survey responses provided ranges from which respondents could select:

Responses to IN5	Month Value	Timing Adjustment
0. At the same time	0	1
1. Within 6 months	0	1
2. 6 months to a year	9	0.928571
3. More than 1 years up to 2 years later	18	0.714286
4. More than 2 years up to 3 years later	30	0.428571
5. More than 3 years up to 4 years later	42	0.142857
6. More than 4 years later	48	0
8. Not sure	Not sure	If IN4 = 8, 9, or 10, then Timing Adjustment = 0; If IN4 < 8, then Timing Adjustment = 0.5

4. Program Theory and Logic Models

The evaluation team reviewed current and previous program theory and logic models (PTLM) from the RENs and compared them to what we learned about their non-resource activities from our program materials review and in-depth interviews conducted with REN program managers. Below, the team describes the review and development of these models for selected BayREN and SoCalREN programs.

We reviewed the logic models for all of the programs for all three RENs to help us determine which ones are most appropriate for further evaluation. The most recent available PTLMs are presented below. We include here only the PTLMs for the single family and multifamily programs whose non-resource activities were ultimately selected for deeper evaluation.

During the first year of the program evaluation cycle, the evaluation team reviewed all the program theory and logic models (PTLMs) from the various REN programs and compared the activities, outputs, and outcomes described in the PTLMs with what we learned from our review of other program materials and from in-depth interviews with REN staff about overall program design and implementation, which a focus on non-resource activities. The team sought to assess whether customer engagement in resource and non-resource program activities plausibly leads customers toward energy efficient actions and energy savings that are quantifiable through resource program participation.

The team conducted a review of the REN's PTLMs and discussed with relevant REN leaders and staff the models and the non-resource activities they referenced. The team learned that the RENs had invested time and resources into developing and keeping their PTLMs up-to-date through a process of program manager and stakeholder review. We concluded that any additional efforts to update these PTLMs prior to completing our channeling and attribution analyses would not add significant value.

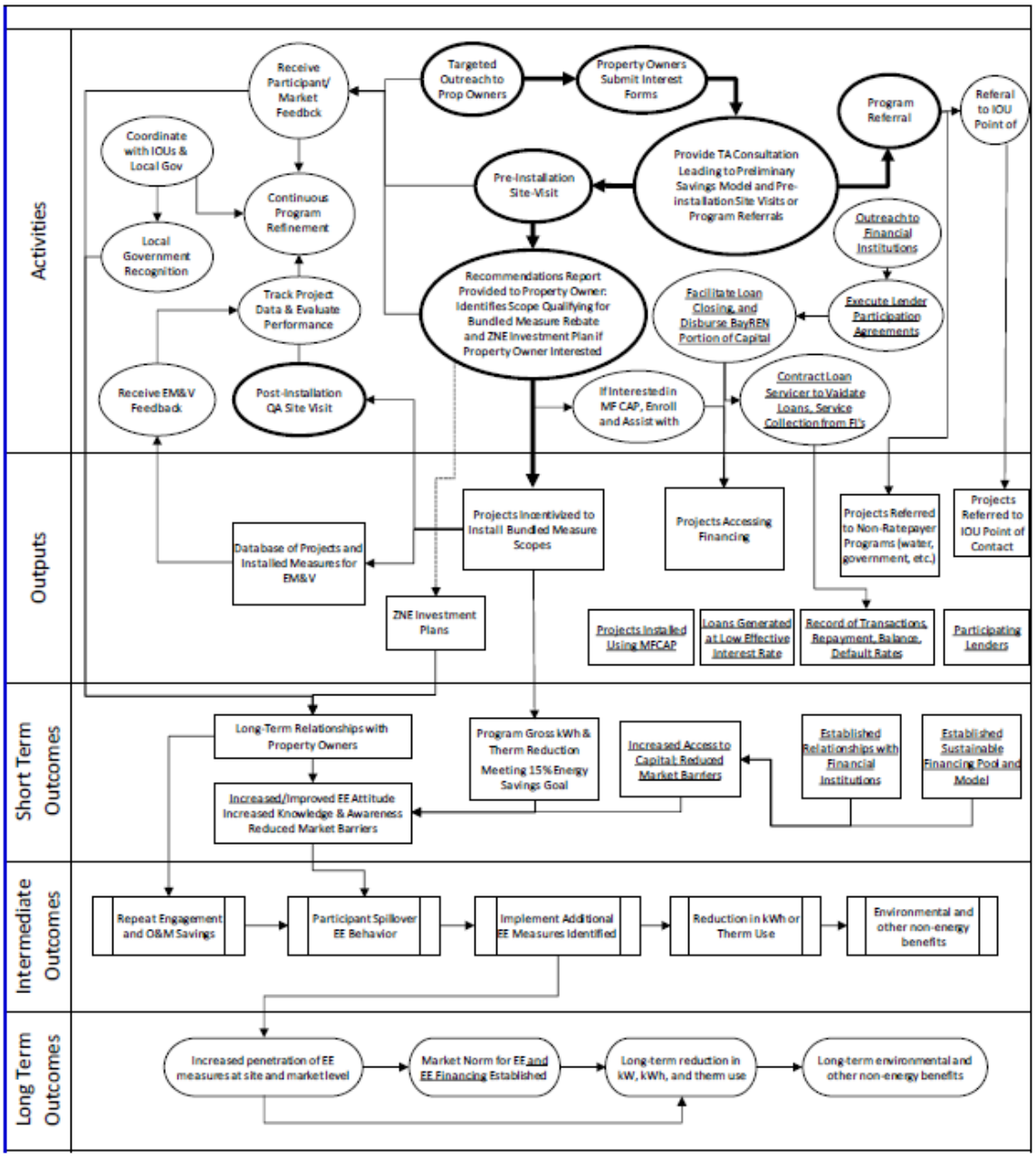
4.1 Program Theory and Logic Models for Selected BayREN Programs

The program theory and logic models for BayREN's multifamily and single family programs show multiple the non-resource activities conducted by BayREN in support of their residential programs. Figure 1, for example, notes the role of technical assistance (further discussed in the evaluability assessment, page 30) in the context of short and long term project outcomes for the multifamily program. Similarly, Figure 2 notes marketing and other non-resource outreach activities incorporated in the single family program.

Figure 1. BayREN Multifamily PTLM[23]

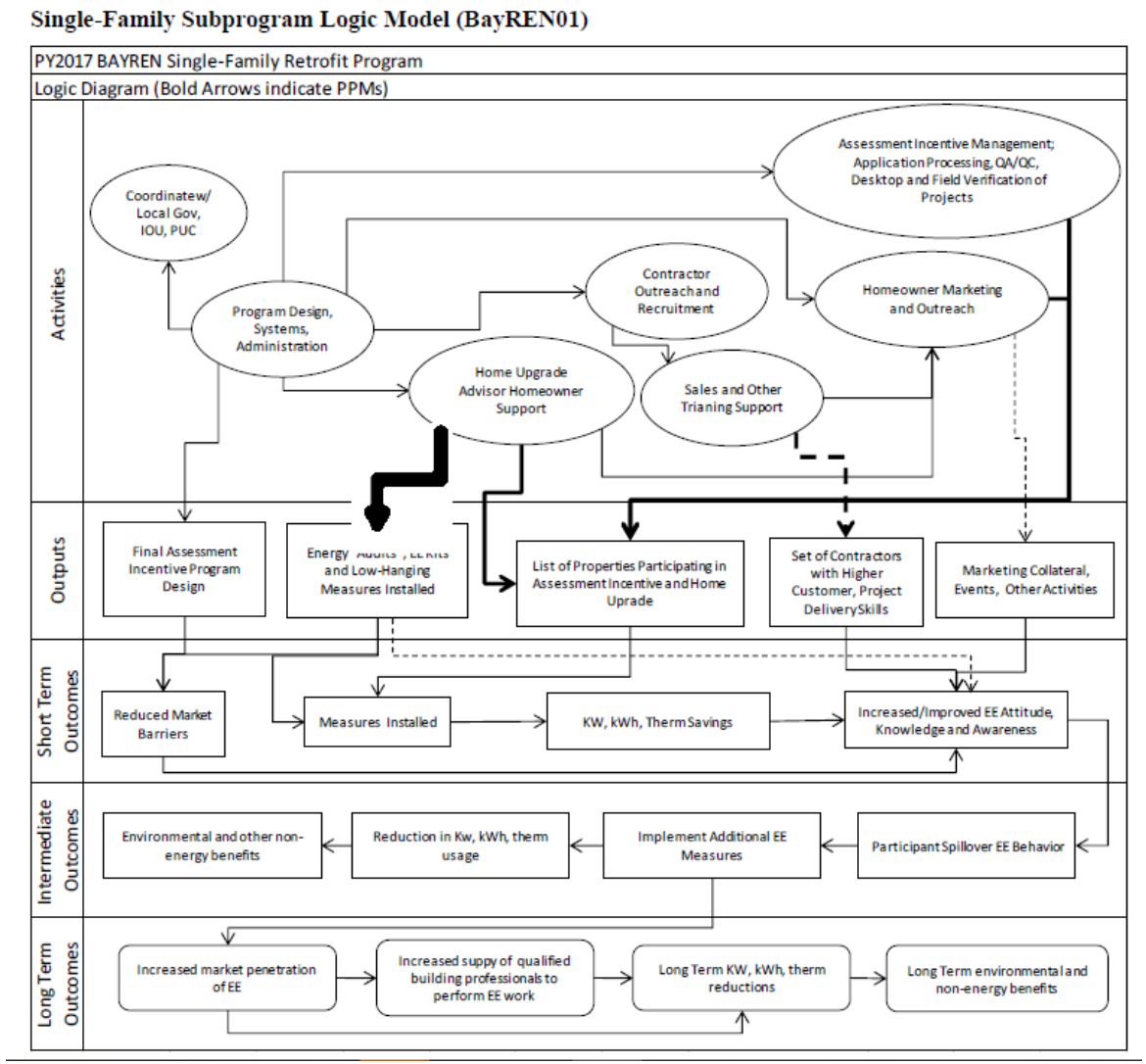
Comprehensive Multi-Family Subprogram Logic Model (BayREN02)

PY 2019 BayREN Comprehensive Multifamily Program with addition of financing program



[23] Appendix, Attachment 1, BayREN02: Multifamily Subprogram Logic Model, Association of Bay Area Governments, September 4, 2018.

Figure 2. BayREN Single Family Home Upgrade PTLM[24]

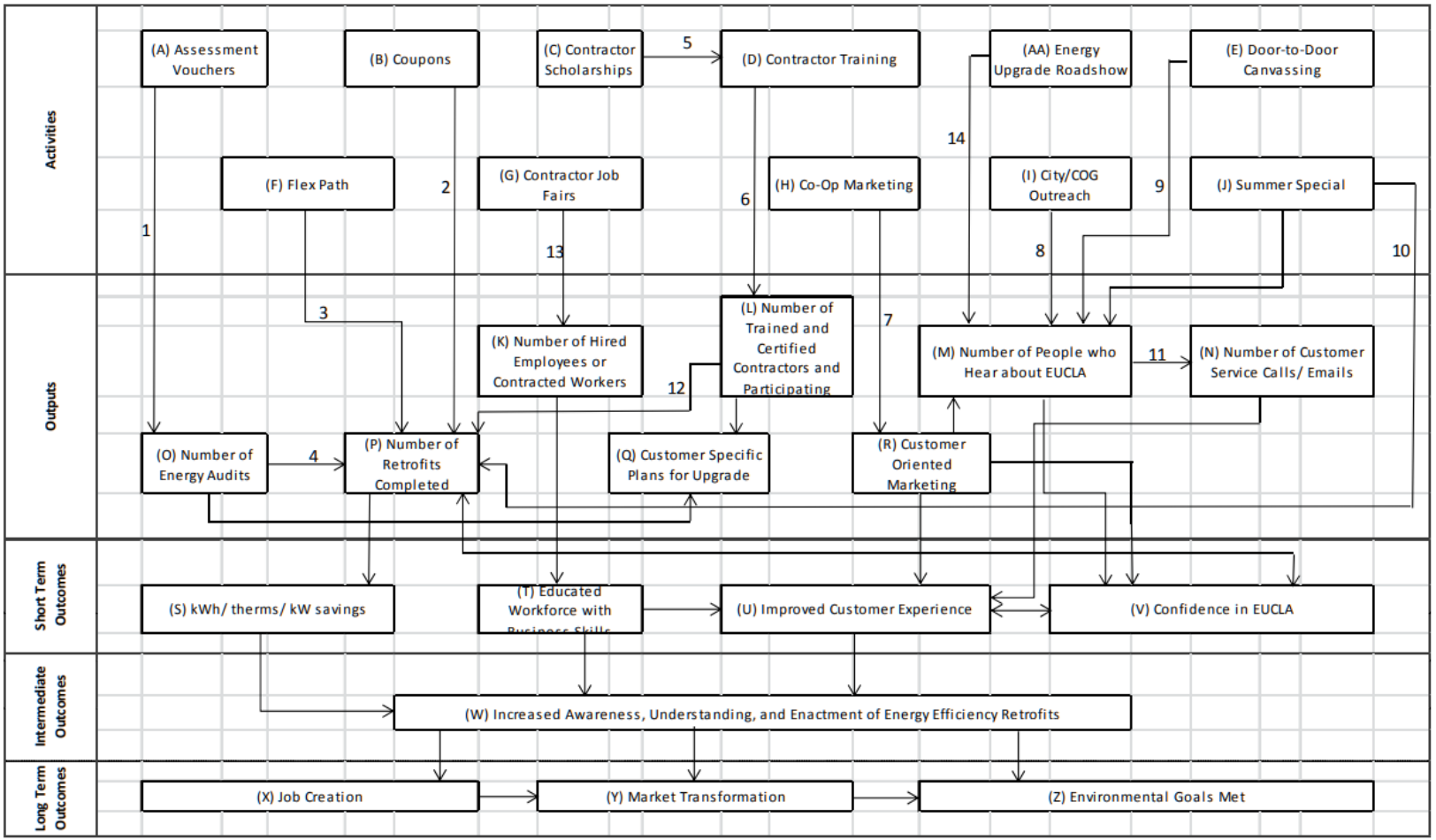


[24] Appendix A, Attachment 1, BayREN01: Single Family Subprogram Logic Model, Association of Bay Area Governments, September 1, 2016. Note: the updated logic model for BayREN's Single Family program can be found at https://cedars.sound-data.com/documents/download/1411/main/

4.2 Program Theory and Logic Models for Selected SoCalREN Programs

The program theory and logic model for SoCalREN's single family program illustrates, among other things, the program's non-resource activities such as door-to-door canvassing and contractor training.

Figure 3. SoCalREN Single Family PTLM[25]



[25] SoCalREN Single Family Logic Model.

5. Evaluability Assessment

This section presents evaluability assessment findings of BayREN and SoCalREN program participant data to assess the availability, quality, and completeness of data tracked by each REN for their non-resource program activities. In the process, the team assessed the feasibility of conducting a channeling analysis that would merge REN non-resource program data with CPUC program data and whether we might be able to use the results of the channeling analysis to develop a sample of participants for the web survey.

After detailed reviews of the data provided by the RENs for the various non-resource activities associated with BayREN's multifamily program and both RENs' single family programs, the evaluation team found that the data provided is usable, but it varied in quality and usefulness in terms of its ability to support the channeling analysis and survey sample development. The team based this conclusion on the variations in the data fields collected by BayREN and SoCalREN, as well as by the completeness and quality of the provided data.

5.1 BayREN Evaluability Assessment

The evaluation team received BayREN program data for the five programs that BayREN operated in 2016 and 2017 in response to a data request: its multifamily program, BAMBE; Single Family Home Upgrade; Codes and Standards; Financing; and Water Bill Savings Program. The data request asked for Customer Names, Customer Addresses, Phone Numbers, Email Addresses, Types of Non-Resource Activities in which customers participated, Participation Dates, Unique Identifiers including Utility Customer IDs, Gas and Electric IDs, Premise IDs, and any other Unique Identifiers that BayREN tracks. The data we received varied by program. After reviewing the databases provided by BayREN in the context of the Year 1 evaluation goals, the team selected for study the multifamily program and the single family programs.

Table 10 gives an inventory of the databases received in response to the data request for each program, while the following sections detail BayREN's multifamily and single family programs, which were ultimately selected for study in Year 1 of the evaluation.

Table 10. Summary of BayREN Program Databases Provided

Program	Databases Provided
Multifamily Building Enhancements	5
Single Family Home Upgrade	13
Codes and Standards	10
Financing	3
Water Bill Savings Program	3

5.1.1 Multifamily Program

Data Review Summary

BayREN non-resource activities for its multifamily program, BAMBE, include marketing and outreach, referrals, and technical assistance; data quality and completeness vary between these activities. The received data suggest BayREN does not track utility customer identifiers, such as customer account numbers or service account numbers for all of these activities.[26] BayREN staff indicated that they may have access to account numbers through the technical assistance team and, less frequently, through referral activity tracking. Addresses are available in both cases but are not available for marketing and outreach activities, which are themselves varied in type and scope.

Customer addresses potentially facilitate merging records in the multifamily program data to the CPUC database to support a channeling analysis. However, street address is often recorded in various formats (such as "Avenue" and "Ave.", making it challenging to merge using this field. The evaluation team was able to locate matches in the CPUC program data based on cleaned customer mailing address, but this is a more time intensive activity due to address formats.

Data Quality and Completeness

The data provided for each non-resource activity varied in quality and completeness (Table 11). For technical assistance and referral activities, street address details were the most complete. Properties that received technical assistance were tracked with consistent fields delineating "Property Address", "City", "County", "State", and "Zip"; while addresses in the referral tracking database were collected under "Project Name". However, Project Name data lacked a consistent format; projects were recorded either by property name or property street address, limiting the ability to link the data to CPUC databases. In additional, "Year Built" in the referral tracking database has missing data, limiting usefulness in assessing whether it is energy efficient based on CA building codes, which vary with building age.

Tracking data for marketing, education, and outreach activities fell into three broad categories corresponding to activities identified in the data request: participant recognition events, workshops/industry events, and mailing campaigns. Of these, the tracking data for participant recognition events was of the highest quality, with complete "Participant Name" and "Participant Phone" fields including the participant's first and last names separated by a single space and telephone numbers formatted consistently ((XXX) XXX-XXXX). In the workshops/industry event data tracking, attendee information was consistent in quality of reporting, however there were many gaps in the data for the name, phone, and email fields. Databases for mailing campaigns were not used as the tracking did not include customer information, but rather reported on the dates of mailings and number of recipients.

[26] BayREN staff noted that they did not ask for utility account identifiers for confidentiality reasons and for maintenance of trust with their customers.

Table 11. BayREN Multifamily Data Review Summary

Field Name	Description	Data Completeness[a]	Data Quality[b]	Mergeable with CPUC Data[c]
Technical Assistance Tracking Data				
Program Year	Year of technical assistance receipt	✓	✓	Not in CPUC Database [d]
Project ID Number	Unique identifier for internal tracking	✓	✓	Not in CPUC Database
Meter Number	Multifamily resident individual meter number	Missing some entries	Unable to Assess	Not in CPUC Database
Gas/Electric	Identifies if meter is gas or electric	✓	✓	Not in CPUC Database
Property Address	Customer street address	✓	✓	✓
City	Customer city address	✓	✓	✓
County	Customer county address	✓	✓	✓
State	Customer state address	✓	✓	✓
Zip Code	Customer zip code	✓	✓	✓
Customer Referral Tracking Data				
Multifamily Project ID	Unique identifier for internal tracking	✓	✓	Not in CPUC Database
Project Status Category	Identifies customers who were referred out of the program		✓	Not in CPUC Database
Project Status	Referral status of customer		✓	Not in CPUC Database
TA Contact – SF Environment	Contact provided technical assistance from San Francisco Department of the Environment	Missing some entries	✓	Not in CPUC Database
TA Contact – AEA	Contact provided technical assistance from the Association for Energy Affordability	Missing some entries	✓	Not in CPUC Database
Project: Project Name	Property name or address	✓	Inconsistent	Not in CPUC Database
How did you find out about the program?	Identifies how participants learned about the Multifamily program	Missing some entries	Unable to Assess	Not in CPUC Database
Project Gas SAID	Customer gas service account ID	Missing some entries	Unable to Assess	✓
Project Electric SAID	Customer electric service account ID	Missing some entries	Unable to Assess	✓
Utility Account Number	Customer utility account number	Missing some entries	Unable to Assess	✓
Project Square Footage	Customer property square footage	Missing some entries	Unable to Assess	✓
Utility Providers	Customer electric and gas utility service providers	✓	✓	✓
Year Built	Customer property building vintage	✓	✓	Not in CPUC Database
Project City	Customer city address	✓	✓	✓
Project County	Customer county address	✓	✓	✓
Total Number of Units at Property	Number of units at the multifamily property.	✓	✓	Not in CPUC Database

Field Name	Description	Data Completeness[a]	Data Quality[b]	Mergeable with CPUC Data[c]
Date Site Visit Scheduled	Date of property site visit	Missing some entries	Unable to Assess	Not in CPUC Database
Date Referred Out of Program	Date of referral	✓	✓	Not in CPUC Database
Program Year Referred Out	Year of referral	✓	✓	Not in CPUC Database
Program Referred To	Service customers were referred to	✓	✓	Not in CPUC Database
ME&O Activities				
Participant Name	Name of participant in ME&O activities	Missing some entries	Unable to assess	✓
Customer Phone Number	Customer contact telephone number	Missing some entries	Unable to assess	✓
Customer Email Address	Customer contact email address	Missing some entries	Unable to assess	✓

[a] A check (✓) indicates that the data field is populated completely for each participant record in the dataset.

[b] Refers to the quality of data in each field (for example, standardized format across all records, spelling, and consistency in entries within the field). A check (✓) indicates that the data is of good quality for each participant record in the dataset. Notably, some fields cannot be assessed due to missing data.

[c] A check (✓) indicates that there is a similar field in the CPUC program tracking database and that it is possible to merge BayREN program data with CPUC program data using the fields marked.

[d] Data provided but not needed in channeling analysis.

5.1.2 Single Family Home Upgrade Program

For BayREN's single family program, the Home Upgrade program, the evaluation team requested any data available on selected non-resource activities, strategies and achievements described in BayREN's 2016 and 2017 Annual Reports. Non-resource activities conducted by the single family program include contractor referrals; homeowner workshops; an energy advisor call center; home energy score surveys; direct mail letters, postcards, or flyers; door-to-door canvasing and personal outreach; and social media messaging. The non-resource activities tracked in the databases provided were typically directed toward either customers or contractors. Table 12 summarizes the customer data received and our review findings.

Data Quality and Completeness

The evaluation team received tracking data for residents who interacted with the single family program and were assigned an account with the program (Table 12). Most of the fields in the tracking data were not completely populated. However, two fields relevant to the channeling analysis were of higher quality: "Account Name", referring to property address, and "Lead Source", referring to the method by which a customer learned about the program. Property addresses were primarily reported in a consistent format, producing records that could potentially be matched to CPUC tracking data. Lead data is not useful for the channeling analysis but is of value in determining which non-resource activities may have led customers to savings.

Feasibility of Channeling Analysis

Based on a detailed review of the data provided by BayREN for the various non-resource activities of their multifamily and single family programs between 2016 and 2017, the evaluation team found that program

data collected for the program was sufficient and of good quality such that it could be used to conduct a channeling analysis with CPUC program data and be used to develop a sample for the participant survey.

Even so, while the team found the data quality to be sufficient, for future efforts the evaluation team recommends consistent tracking of fields such as property names, property contact names, street addresses, city, zip, email addresses, and/or telephone numbers. We also recommend including utility service account numbers in data tracking as well as site identification numbers, when feasible, as these fields are found in CPUC's program database and can facilitate more precise matching between BayREN and CPUC databases.

Table 12. BayREN Single Family Data Review Summary

Field Name	Description	Data Completeness[a]	Data Quality[b]	Mergeable with CPUC Data[c]
Account ID	Unique account identifier	✓	✓	Not in CPUC Database[d]
Account Record Type	Identifies new or existing account type	✓	✓	Not in CPUC Database
Account Name	Property address	Missing some entries	Unable to assess	✓
Primary Contact Preferred Communication	Contact preferred communication, email or phone	Missing some entries	Unable to assess	Not in CPUC Database
Upgrade Advisor	Name of Home Upgrade Advisor providing Home Energy Score	✓	✓	Not in CPUC Database
Advisor Service Type	Identifies services provided by Upgrade Advisor	N.A.	N.A.	N.A.
Account Phase	Status of participant account	✓	✓	Not in CPUC Database
Account Origin	Identifies contact method used by participant to engage Upgrade Advisor	Missing some entries	Unable to assess	Not in CPUC Database
Lead Source	Identifies how participants discovered the program from a set list of leads	✓	✓	Not in CPUC Database
Lead Source - Other	Identifies how participants discovered the program if not listed in “Lead Source”	Missing some entries	Unable to assess	Not in CPUC Database
Created Date	Date of account creation	✓	✓	Not in CPUC Database
Account Enrolled Date	Date of account enrollment in the program	N.A.	N.A.	N.A.
Property County	Participant’s county	Missing some entries	Unable to assess	✓

5.2 SoCalREN Evaluability Assessment

The evaluation team received SoCalREN program data for the 10 SoCalREN programs operating in 2016 and 2017 in response to our data request: Multifamily; Single Family Home Upgrade; Green Building Labeling; Workforce Development; Residential Marketing, Education, and Outreach; Low-Income Single Family; Public Agencies; Financing; Contractor Outreach and Training; and the Regional Energy Data and Regional Climate/Energy Action Planning Program. The data request asked for Customer Names, Customer Addresses, Phone Numbers, Email Addresses, Types of Non-Resource Activities in which customers participated, Participation Dates, Unique Identifiers including Utility Customer IDs, Gas and Electric IDs, Premise IDs, and any other Unique Identifiers. The data received varied by program. The following sections detail databases provided for the single family program, which we chose for study in Year 1 of the evaluation.

5.2.1 Single Family Home Upgrade Program

Data Review Summary

For SoCalREN's single family program, the Single Family Home Upgrade program, the evaluation team requested any data available on selected non-resource activities, strategies and achievements described in SoCalREN's 2016 and 2017 Annual Reports. Non-resource activities conducted for the single family program include contractor referrals; homeowner workshops; an energy advisor call center; direct mail letters, postcards, or flyers; email and social media messaging; community events; public presentations; home energy tours; and contractor and program advertising.

As with BayREN, many of SoCalREN's single family program tracking databases contained contractor contact information, such as phone number, business address, and business name, in addition to the dates and locations of workshops or trainings. These databases, while valuable for understanding the full scope of non-resource activities for the single family program, were not useful for matching customer records to CPUC databases. To supplement the databases provided by SoCalREN for the single family program, which included three contractor contact databases and outreach materials, the evaluation team used materials provided for the Residential Marketing, Education, and Outreach program. Table 13 summarizes the customer data received and our review findings.

Data Quality and Completeness

The databases detailed in Table 13 document SoCalREN's customer-facing non-resource activities for the Single Family Home Upgrade and Residential Marketing, Education, and Outreach programs. SoCalREN provided examples of the materials used for outreach, several lists of dates and locations for homeowner outreach activities, and scanned PDFs of handwritten event sign-in sheets. However, because no unified database of customer contact and program could be provided, the materials we received were more helpful for our general understanding of the program than they were for the channeling analysis.

Perhaps the most significant inadequacy of the data provided by SoCalREN is that it did not contain any electric or gas service account ID (SAID) for customers. As discussed for BayREN, these missing foundational unique identifiers necessitated we use other common identifiers to merge with CPUC databases. In addition to issues stemming from a lack of unique identifiers, a high-level issue emerged in assessing the data quality and completeness of the call center tracking and email tracking workbooks provided by SoCalREN. Neither database had a complete record of customer information that could be used to match CPUC tracking databases, and there were significant inconsistencies in the way that missing information was flagged (for example, a missing first name might be indicated as "N/A", left blank, or a single letter).

Feasibility of Channeling Analysis

Several challenges emerged when attempting to identify potential merging fields between SoCalREN data and CPUC databases:

- The majority of databases tracked contractor outreach, trainings, and touch points;
- SoCalREN did not collect customer data for outreach events in a consistent manner nor did it digitize the records; handwritten sign-in sheets are unreliable for tracking the data needed for merging fields;
- Unique identifiers such as name, address, and phone number were not consistently collected or recorded for the non-resource activities conducted, particularly the call center and email distribution lists.

Despite these challenges, our detailed review of SoCalREN's data for 2016 and 2017 single family non-resource activities found the data are sufficient to support a channeling analysis and to develop a sample for the participant survey.

Even so, while the team found the data quality to be sufficient, for future efforts the evaluation team recommends consistent tracking of fields such as property names, property contact names, street addresses, city, zip, email addresses, and/or telephone numbers. We also recommend including utility service account numbers in data tracking as well as site identification numbers, when feasible, as these fields are found in CPUC's program tracking database and can facilitate more precise matching between SoCalREN and CPUC databases.

Table 13. SoCalREN Single Family Data Review Summary

Field Name	Description	Data Completeness[a]	Data Quality[b]	Mergeable with CPUC Data[c]
Residential MEO Home Upgrade Advisor and Call Center list (2016-2018)				
Date of Call	Date customer contacted call center	✓	✓	Not in CPUC Database
First Name	Customer first name	Missing some entries	Unable to assess	✓
Last Name	Customer last name	Missing some entries	Unable to assess	✓
Phone	Customer phone number	Missing some entries	Unable to assess	✓
Email	Customer email address	Missing some entries	Unable to assess	✓
Work Email	Customer work email address	Missing some entries	Unable to assess	✓
Street Address	Customer street address	Missing some entries	Unable to assess	✓
City	Customer city address	Missing some entries	Unable to assess	✓
County	Customer county address	Missing some entries	Unable to assess	✓
Other County	Supplemental customer county address	Missing some entries	Unable to assess	✓
Zip Code	Customer zip code	Missing some entries	Unable to assess	✓
Lead Source	Identifies how customers discovered the call center	Missing some entries	Unable to assess	Not in CPUC Database
Caller Type	Identifies if customer is homeowner or contractor	✓	✓	Not in CPUC Database
Call Category	Identifies reason for call	✓	✓	Not in CPUC Database
Homeowner and Stakeholder Legacy Email List				
First Name	Customer first name	Missing some entries	Unable to assess	✓
Last Name	Customer last name	Missing some entries	Unable to assess	✓
Company	Customer company name	Missing some entries	Unable to assess	Not in CPUC Database
Email Address – Home	Customer email address	Missing some entries	Unable to assess	✓
Email Address – Other	Customer alternate email address	Missing some entries	Unable to assess	✓
Email Address – Work	Customer work email address	Missing some entries	Unable to assess	✓
Energy Champions Disbursement with EUC project information 2-28-2019				
Energy Champions Project ID	Energy champion project ID	✓	✓	Not in CPUC Database
Account Name	Energy champion account name	✓	✓	Not in CPUC Database

Field Name	Description	Data Completeness[a]	Data Quality[b]	Mergeable with CPUC Data[c]
Billing Street	Energy champion street address	✓	✓	✓
Billing State	Energy champion state address	✓	✓	✓
Billing Zip	Energy champion zip code	✓	✓	✓
Rebates and Incentive Amount	Amount of rebate to customer	✓	✓	Not in CPUC Database
Paid Date	Date of rebate payment	✓	✓	Not in CPUC Database
IOU Validation ID	Project number identifying if customer participated in Home Upgrade or Advanced Home Upgrade Programs	✓	✓	Not in CPUC Database
Applicant Name (Property Owner)	Customer name	✓	✓	✓
Street Address (Project Address)	Customer street address	✓	✓	✓
Property Owner Phone	Customer phone number	Missing one entry	✓	✓
Applicant Email	Customer email	✓	✓	✓
Primary Contractor Account Name	Contractor account name	✓	✓	Not in CPUC Database
Upgrade Coupons Tracking 2016-2017				
Project ID	Unique project identifier	✓	✓	Not in CPUC Database
IOU Validation	Unique IOU project ID	✓	✓	Not in CPUC Database
Advanced Home Upgrade Program	Identifies IOU associated with project	✓	✓	Not in CPUC Database
Project Type	Identifies project type	✓	✓	Not in CPUC Database
Contractor Business Name	Contractor business name	✓	✓	Not in CPUC Database
Incentive Type	Describes type of incentive	✓	✓	Not in CPUC Database
Distribution Date	Date of incentive distribution	✓	✓	Not in CPUC Database
Application Submitted	Date of customer application	✓	✓	Not in CPUC Database
Paid Date	Date of project payment	✓	✓	Not in CPUC Database
Rebates and Incentive Amount	Amount paid in rebates or incentives	✓	✓	Not in CPUC Database
Check Number	Unknown	✓	✓	Not in CPUC Database
Homeowner Name	Customer first name	✓	✓	✓
Homeowner Last Name	Customer last name	✓	✓	✓
Homeowner Email	Customer email	✓	✓	✓
Property Owner Phone	Customer phone number	✓	✓	✓
Street Address	Customer street address	✓	✓	✓
City	Customer city address	✓	✓	✓
State	Customer state address	✓	✓	✓
Zip Code	Customer zip code	✓	✓	✓

Field Name	Description	Data Completeness[a]	Data Quality[b]	Mergeable with CPUC Data[c]
Assessment Vouchers tracking report				
Site Name	Identifies type of incentive tracked	✓	✓	Not in CPUC Database
Project ID	Unique project ID	✓	✓	Not in CPUC Database
Project Name (Voucher Code)	Unique project voucher code	✓	✓	Not in CPUC Database
Project Status	Identifies project status	✓	✓	Not in CPUC Database
Distribution Date	Date of incentive distribution	✓	✓	Not in CPUC Database
Paid Date	Date of project payment	✓	✓	Not in CPUC Database
Rebates and Incentive Amount	Amount paid in rebates or incentives	✓	✓	Not in CPUC Database
Contractor Business Name	Contractor business name	✓	✓	Not in CPUC Database
Contractor Contact Name	Contractor name	✓	✓	Not in CPUC Database
Contractor Phone Number	Contractor phone number	✓	✓	Not in CPUC Database
Contractor Email	Contractor email	Missing one entry	✓	Not in CPUC Database
IOU Validation ID	Unique IOU project ID	✓	✓	Not in CPUC Database
EUC Program Administrator	Identifies IOU program administrator	✓	✓	Not in CPUC Database
Project Type	Identifies if projects are Home Upgrades or Advanced Home Upgrades	✓	✓	Not in CPUC Database
PA Program's Project #	Unique project number	✓	✓	Not in CPUC Database
Homeowner Name	Customer first name	✓	✓	✓
Homeowner Last Name	Customer last name	✓	✓	✓
Street Address	Customer street address	✓	✓	✓
City	Customer city address	✓	✓	✓
State	Customer state address	✓	✓	✓
Zip Code	Customer zip code	✓	✓	✓

[a] A check (✓) indicates that the data field is populated completely for each participant record in the dataset.

[b] Refers to the quality of data in each field (for example, standardized format across all records, spelling, and consistency in entries within each field). A check (✓) indicates that the data is of good quality for each participant record in the dataset. Notably, some fields cannot be assessed due to missing data.

[c] A check (✓) indicates that there is a similar field in the CPUC program tracking database and that it is possible to merge SoCalREN program data with CPUC program data using the fields marked.

[d] Data provided but not needed in channeling analysis

6. Channeling Analysis Results

The channeling analysis sought to determine the proportion of REN non-resource activity participants who subsequently participated in a PA resource program, as indicated by CPUC program data. This analysis was hampered by missing data in the REN program datasets, as discussed in Section 5. The channeling analysis found 23% (34,415) of all REN non-resource participants in the CPUC program data – 25% of BayREN participant records and 1% of SoCalREN participant records (Table 14). These percentages provide a lower bound for the number of REN non-resource participants that went on to participate in PA resource programs. Our estimates are constrained by data limitations; the actual percentages of such REN participants are likely much higher.

Because non-resource activities do not directly generate savings, the CPUC does not place any requirements on the PAs to keep standardized records of participants. Additionally, the very nature of certain types of non-resource activities makes it impossible to track who may have been influenced by them. For example, PAs have an extremely difficult time recording relevant identifying information for all of the individuals and businesses exposed to its marketing and outreach campaigns, particularly for those non-resource activities that do not involve an email or mailing address, such as live events for which sign up/sign in is optional or impractical.

Table 14. REN Non-Resource Activity Records Tracking

Program	Percent of Records in CPUC Databases	Number of Records Received
BayREN	**25%**	**9,646**
Multifamily (BAMBE)	23%	790
Single Family Home Upgrade Program	23%	6,542
Codes and Standards	0%	1,691
Financing	0.5%	547
Water Bill Savings Program	3%	32
SoCalREN	**1%**	**24,769**
Single Family Home Upgrade Program	1%	556
Finance	3%	631
Residential Marketing Education and Outreach	6%	15,538
Multi-Family	47%	15
Public Agency	3%	5,630
Workforce Education and Training	2%	2,235
Combined		
All Single Family Participants (BayREN and SoCalREN)	23%	7,098
Total	23%	34,415

The datasets BayREN and SoCalREN provided to the evaluation team contained different types and amounts of data. For example, databases provided for BayREN's multifamily program ranged from text documents containing only lists of mailing dates to nearly fully populated databases of more than 600 recipients of technical assistance, including records with Service Account ID (SAID) numbers in some cases. Similarly, SoCalREN provided three fully populated databases for its single family program, but each contained fewer

than 100 records, with one database containing only two records. In other cases, the RENs provided handwritten customer sign in sheets that had been scanned and converted into PDF format. However due to the illegibility of some of the handwriting, and with no easy way to convert the scanned handwriting into a form that could be digitally read and analyzed, there was no practical way of extracting and using that information.

Each REN follows different reporting practices, but neither had a unified system of tracking non-resource activities between their different program offerings. The evaluation team recognizes that this is due to a number of factors, including REN partnerships with implementers, changes to those partnerships over time, and the practical challenges of recording detailed customer information for certain non-resource activities such as outreach events.

Table 15 provides a list of REN programs studied in Year 1 of the evaluation along with descriptions of the non-resource activity information and the number of records the evaluation team received in response to the data request. Note that the table below lists the raw number of records provided by each REN and includes duplicate records. Details about the types of information found in the various datasets are included in the evaluability assessment section of this report (Section 5). The table also shows the number of unique records for which the team could identify either an associated email address and/or customer name and mailing address to use in the channeling analysis. The last two columns in the table show for each non-resource activity dataset, the number of records found in the CPUC program data and the number we could not locate in CPUC tracking data.

Table 15. REN Non-Resource Participant Channeling Analysis

Program	Description of Non-Resource Activities	Number of Records Received	Number of Unique Records w/ Contact Information	Records found in CPUC Tracking Data	Records not found in CPUC Tracking Data
SoCalREN					
Single Family Home Upgrade Program	Contractor referrals; homeowner workshops; energy advisor call center; direct mail letters, postcards, or flyers; email or social media messaging; community events; public presentations; home energy tours; contractor and program advertising, rebate or discount coupons.	556	556	3	553
BayREN					
BAMBE (Multifamily)	Contractor referrals, community events, canvasing, mailing materials, email messaging, social media messaging, educational events, multifamily program technical assessment and program communication.	790	672	180	492
Single Family Home Upgrade Program	Contractor referrals; homeowner workshops; energy advisor call center; Home Energy Score survey; direct mail letters, postcards, or flyers; door to door canvasing and personal outreach; social media messaging.	6,542	6,009	1,502	4,507
All BayREN	N/A	7,332	6,681	1,682	4,999
All Single Family (BayREN and SoCalREN)					
Single Family	N/A	7,098	6,565	1,505	5,060
Total		**7,988**	**7,237** **100%**	**1,685** **23%**	**5,552** **77%**

6.1 Outcomes of the Channeling Analysis

As a result of the channeling analysis, the evaluation team concluded that BayREN had collected and provided to the team customer data that was of that sufficient quality, quantity, and in alignment with CPUC records in order for the team to develop a sample of survey respondents for the non-resource activity participant survey. However, this was not the case for SoCalREN.

As noted in Table 15 above, the data set that the evaluation team received for SoCalREN's multifamily program was limited to 15 projects (of which 7 were found in CPUC tracking data). Moreover, those 15 projects were managed by a small handful of individuals all working for the same property management firm. Consequently, the evaluation team concluded that there was an insufficient number of records from which to draw a meaningful sample. As a result, we decided to focus solely on SoCalREN's single family program.

While SoCalREN's single family program had a sizable number of program participants, the channeling analysis indicated, as shown in Table 15 that only 1% of records received from SoCalREN in relation to the single family program could be tied to records in a CPUC database. This meant that the team would not be able to readily draw connections between non-resource activities associated with SoCalREN single family program and EE measures associated with PA resource programs. Thus, in order to have a sufficiently sized sample population from which to better understand the influence of non-resource activities on participants in the single family program, the evaluation team coordinated with SoCalREN to augment the limited results of the channeling analysis by acquiring all the contact information for all participants in the program during 2016 and 2017.

With approval from the CPUC, the evaluation team eventually made the same request of BayREN in order to obtain the contact information for all of the participants from its single family and multifamily programs as well. With full lists of program participants from SoCalREN single family program, and BayREN's single family and multifamily programs in hand, the team was prepared to send survey invites to all participants for whom email addresses were available.

7. Participant Survey Results

To understand whether and to what extent non-resource activities have influenced customer participation in REN EE resource programs, installation of EE equipment outside of EE programs, and energy saving behaviors, the evaluation team conducted primary data collection through a computer-assisted web interviewing (CAWI) survey among participants of SoCalREN's single family program and BayREN's single family and multifamily technical assistance programs who had engaged in non-resource activities during the 2016 or 2017 program years. We contacted participants for whom the RENs provided viable email addresses. While customer contact data, such as mailing addresses and, in some cases, telephone numbers, were available for some participants lacking email addresses, we did not attempt to contact customers via these methods due to the costs of fielding a multimodal survey.

In addition to exploring the influence of non-resource activities on customers' decisions to participate in EE resource programs, the survey explored how participants became aware of the resource programs in which they participated, what drove them to participate in EE resource programs, any EE actions participants took outside of PA resource programs, the influence of the REN's non-resource activities on these EE actions, and how satisfied they were with the REN's non-resource activities. This section presents findings on these topics.

7.1 Survey Respondent Distribution

The evaluation team surveyed customers of BayREN and SoCalREN between October 1st and October 22nd of 2019. After sending out email invitations to a combined total of 7,237 non-resource participants, 137 customers ultimately completed the survey. Survey responses were more or less evenly split between SoCalREN (53%) and BayREN (47%) customers (Table 16). Single family customers (69%) outnumbered multifamily customers (31%) by a ratio of approximately 2 to 1. However, all 73 of SoCalREN's customers were single family customers since none of SoCalREN's multifamily technical assistance customers were sampled. Of the 64 BayREN customers who responded to the survey, 42 (31%) were multifamily, while 22 (16%) were single family customers of all respondents. This split represents 66% and 34% of BayREN's customers, respectively.

For the purpose of understanding the differences between the RENs, their respective programs, and the differences between multi- and single family programs, we separated and analyzed the data along these dimensions (Table 16). However, we caution readers to recognize the small sizes of these subgroups, which are further reduced when responses to individual questions are considered.

Table 16. Survey Respondent Distribution

Customer Group	Count	Percent of All 137 Respondents
All participants (BayREN and SoCalREN)	137	100%
SoCalREN customers (SF)	73	53%
BayREN customers (SF, MF)	64	47%
BayREN Multifamily only	42	31%
BayREN Single Family only	22	16%
Single family participants (BayREN and SoCalREN)	95	69%

7.2 REN-Related Activities Recalled by Survey Respondents

The initial portion of the survey asked customers to self-identify which REN-related activities they recalled participating in during the 2016 and 2017 program years, as our sampling was driven by availability of email addresses rather than in which activities they participated. The list of possible activities was developed in coordination with the RENs and, for purposes of comparison, included the option of allowing customers to indicate that they had participated in a previous resource program and that they recalled previously receiving a rebate. The activities identified by the customers were then programmed into the survey to be automatically referenced as appropriate in subsequent follow-up questions. Customers were able to select more than one activity, and the survey was adjusted accordingly.

Results of the survey presented in Table 17 show that 39% of respondents reported received a rebate or discount for EE products or services. The most frequently mentioned non-resource activities that these BayREN and SoCalREN customers recalled included: receiving mail messages about EE programs and equipment (33%), a contractor recommendation (37%), email messages (28%), an in-home energy assessment by an energy professional (26%), or communication with a consultant from the multifamily program (24%).

Table 17. REN-Related Activities Recalled by Survey Respondents

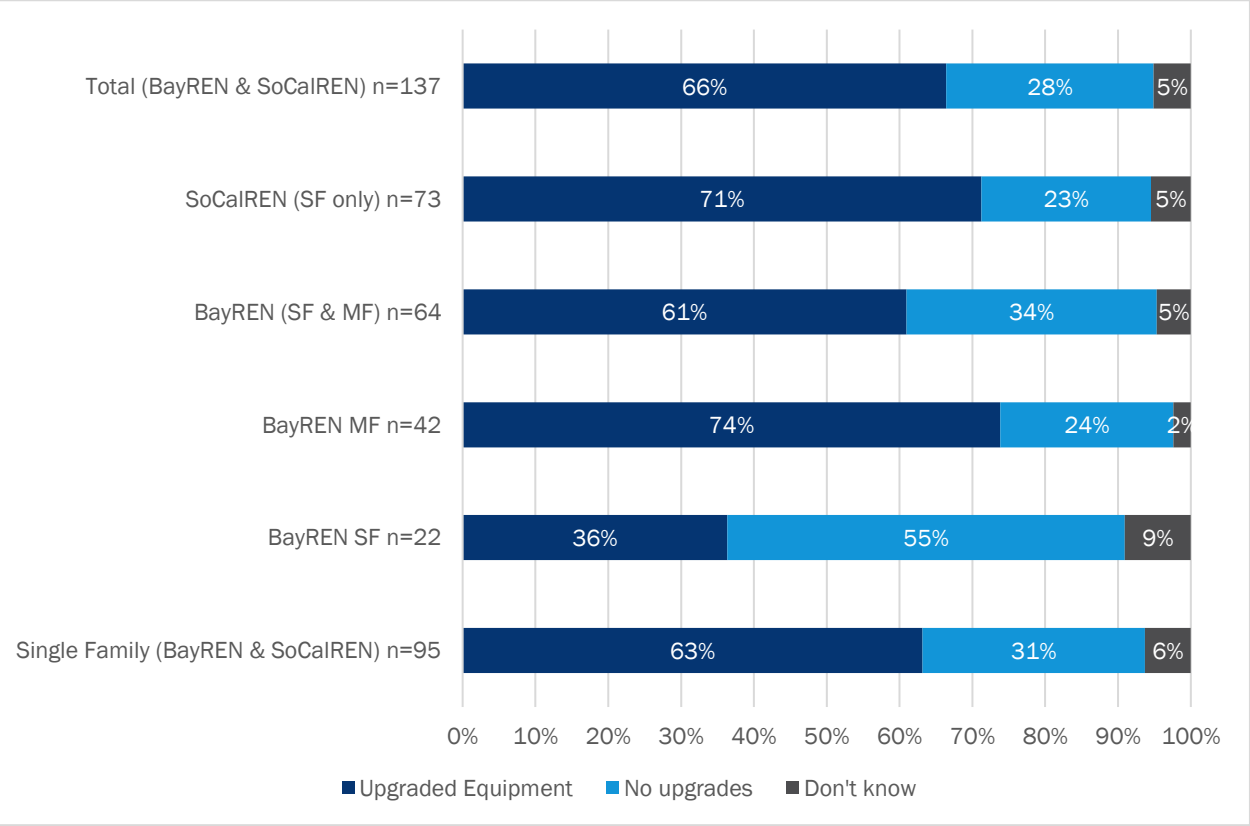
REN-Related Activities (Customers could indicate more than one response)	Total (BayREN & SoCalREN) n=137	SoCalREN (SF only) n=73	BayREN (SF & MF) n=64	BayREN MF n=22	BayREN SF n=42	Single Family (BayREN & SoCalREN) n=95
Resource Activities						
Rebate and/or discount for energy efficient products or services	39%	45%	31%	33%	27%	41%
Non-Resource Activities						
Mail message such as a letter, postcards or flyers about EE programs, equipment or actions	33%	36%	30%	36%	18%	32%
Contractor informed you about equipment and/or a program to help you save energy and money28%	37%	0%	19%	17%	23%	34%
Email about EE programs, equipment or actions	28%	26%	31%	26%	41%	29%
Professional in-home energy assessment	26%	21%	45%	0%	45%	26%
Multifamily program consultant communication (such as Association for Energy Affordability and San Francisco Department of the Environment)	24%	0%	24%	24%	0%	0%
Word of mouth from family, friends, co-workers, etc. about EE programs, equipment or actions	17%	18%	16%	12%	23%	19%
Local government informed you about equipment and/or a program to help you save energy and money	15%	8%	23%	21%	27%	13%

REN-Related Activities (Customers could indicate more than one response)	Total (BayREN & SoCalREN) n=137	SoCalREN (SF only) n=73	BayREN (SF & MF) n=64	BayREN MF n=22	BayREN SF n=42	Single Family (BayREN & SoCalREN) n=95
Phone call with an energy advisor	15%	10%	20%	26%	9%	9%
Online home energy assessment	13%	10%	23%	0%	23%	13%
Community event, workshop, or presentation where someone discussed EE programs, equipment or actions	12%	10%	14%	17%	9%	9%
Door-to-door canvasing notice or discussion about EE programs, equipment or actions	12%	16%	6%	2%	14%	16%
Social media about EE programs, equipment or actions	11%	10%	13%	10%	18%	12%
Community group informed you about equipment and/or a program to help you save energy and money	9%	7%	11%	7%	18%	9%
Other, specify	7%	7%	6%	7%	5%	6%
Don't recall	0%	0%	0%	0%	0%	0%

7.3 Survey Respondent Energy Related Activities

Of the 137 respondents, two-thirds (66%) reported completing at least one EE equipment upgrade in their single or multifamily property between 2016 and 2018 (Figure 4). Among SoCalREN customers, that number was even higher at 71%, while a combined total of 61% of BayREN's single family and multifamily customers indicated completing upgrades during that time. Note that the figure does not distinguish whether the EE equipment was rebated through a PA resource program or not.

Figure 4. Respondents with Equipment Upgrades by REN and Program Type



Lighting (56%), Energy Star appliances (54%), and HVAC (53%) were the most common EE upgrades with more than half of respondents indicating that they had installed at least one of these types of measures after participating in a non-resource activity (Table 18).

Table 18. Types of Participant Energy Equipment Upgrades by Those Who Installed EE Equipment

Type of Energy Efficient Upgrade	Total (BayREN & SoCalREN) n=91	SoCalREN (SF only) n=52	BayREN (SF & MF) n=39	BayREN MF n=31	BayREN SF n=8	Single Family (BayREN & SoCalREN) n=60
Lighting Equipment or Lighting Controls	56%	42%	74%	77%	63%	45%
ENERGY STAR appliances	54%	56%	51%	58%	25%	52%
Heating, cooling and ventilation equipment or controls	53%	67%	33%	32%	38%	63%

Type of Energy Efficient Upgrade	Total (BayREN & SoCalREN) n=91	SoCalREN (SF only) n=52	BayREN (SF & MF) n=39	BayREN MF n=31	BayREN SF n=8	Single Family (BayREN & SoCalREN) n=60
Domestic water heating equipment and controls	44%	29%	64%	74%	25%	28%
Building shell equipment (i.e., insulation and air sealing)	37%	40%	33%	35%	25%	38%
Energy saving consumer electronics and office equipment	18%	21%	13%	10%	25%	22%
Solar panels	15%	12%	21%	13%	50%	17%
Pool equipment (e.g., efficient pool pump, pool pump timer, pool cover)	12%	17%	5%	6%	0%	15%
Something else	23%	21%	26%	32%	0%	18%
None	1%	2%	0%	0%	0%	2%
Not sure	1%	0%	3%	3%	0%	0%

Single family program participants indicated energy saving behaviors they took since interacting with at least one of REN non-resource activities. (BayREN's multifamily technical assistance activities are not targeted towards residential customers, but rather to property owners or managers.)

Among all single family customers across both RENs, 87% indicated that they had taken at least one energy saving action or made at least one behavior change to save energy as a result of a REN-sponsored non-resource activity. When we disaggregate this by SF REN participants, we found 92% of SoCalREN customers had taken at least one action, compared with 73% of BayREN single family customers. Also, as Table 19 shows, SoCalREN customers consistently engaged in more energy saving actions than BayREN customers in every category.

Table 19. Participant Energy Saving Actions (BayREN & SoCalREN SF Program Participants)

Energy Saving Action	Single Family (BayREN & SoCalREN) n=95	SoCalREN SF n=73	BayREN SF n=22
Turn lights off when rooms are not in use	71%	77%	50%
Clean the lint screen in the dryer	69%	77%	45%

Energy Saving Action	Single Family (BayREN & SoCalREN) n=95	SoCalREN SF n=73	BayREN SF n=22
Open curtains and shades during the day to let in warming sunlight during cooler months	56%	63%	32%
Clean or change filters of heating/cooling equipment	56%	66%	23%
Close curtains and shades at night to protect against drafts during cooler months	55%	63%	27%
Check dryer vent to be sure it is not blocked	53%	58%	36%
Turn off electronics, such as a laptop, when they are not in use	52%	59%	27%
Make sure the dishwasher is full before it is run	46%	49%	36%
Wash clothes in cold water	44%	51%	23%
Use a toaster oven instead of a full-size oven	27%	30%	18%
Defrost freezers and refrigerators	4%	4%	5%
Other	14%	14%	14%
Not sure	1%	1%	0%
None	12%	7%	27%

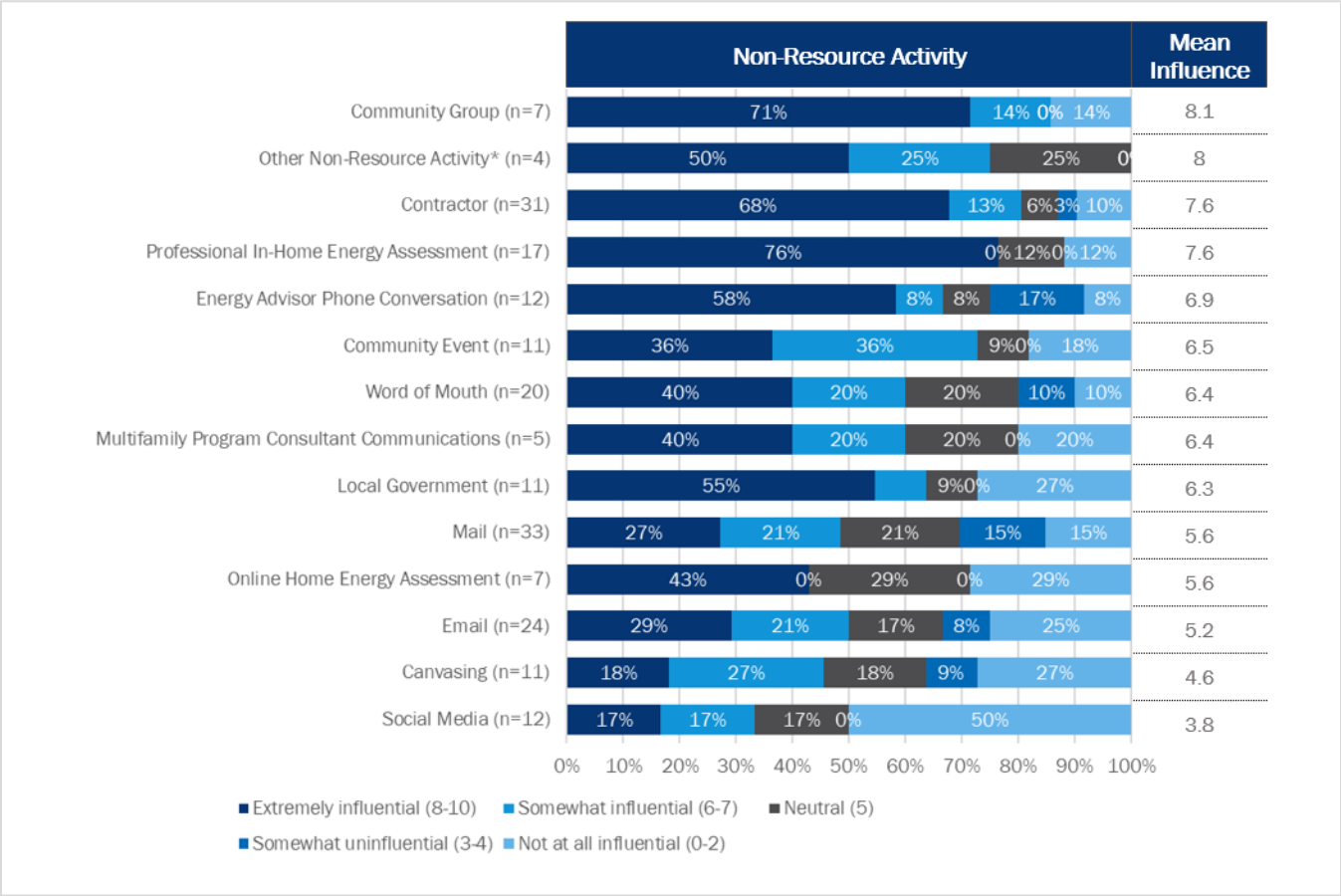
7.4 Factors Influencing Energy Saving Equipment Upgrades

To assess whether the RENs' non-resource activities influenced customers' actions toward saving energy, the evaluation team asked survey respondents to rate the level of influence that respective REN's non-resource activities had over their decision to upgrade to energy efficient equipment. Respondents were asked to use a scale of 0 to 10 to rate the level of influence of each individual non-resource activity they recalled engaging in, as well as the cumulative influence of all activities combined relative to any other factors that may have influenced their decision that were not related to REN-oriented factors.

7.4.1 All Survey Respondents

Interactions with a community group rated the highest level of influence on participants' EE upgrades, with an average influence of 8.1 on a scale of 0 to 10, although the sample size was small (Figure 5). In all, six out of the seven respondents (86%) who recalled engaging with a community group rated it as being somewhat or extremely influential. Although only 17 respondents mentioned professional in-home energy assessments, 13 out of the 17 (76%) rating it as extremely influential.

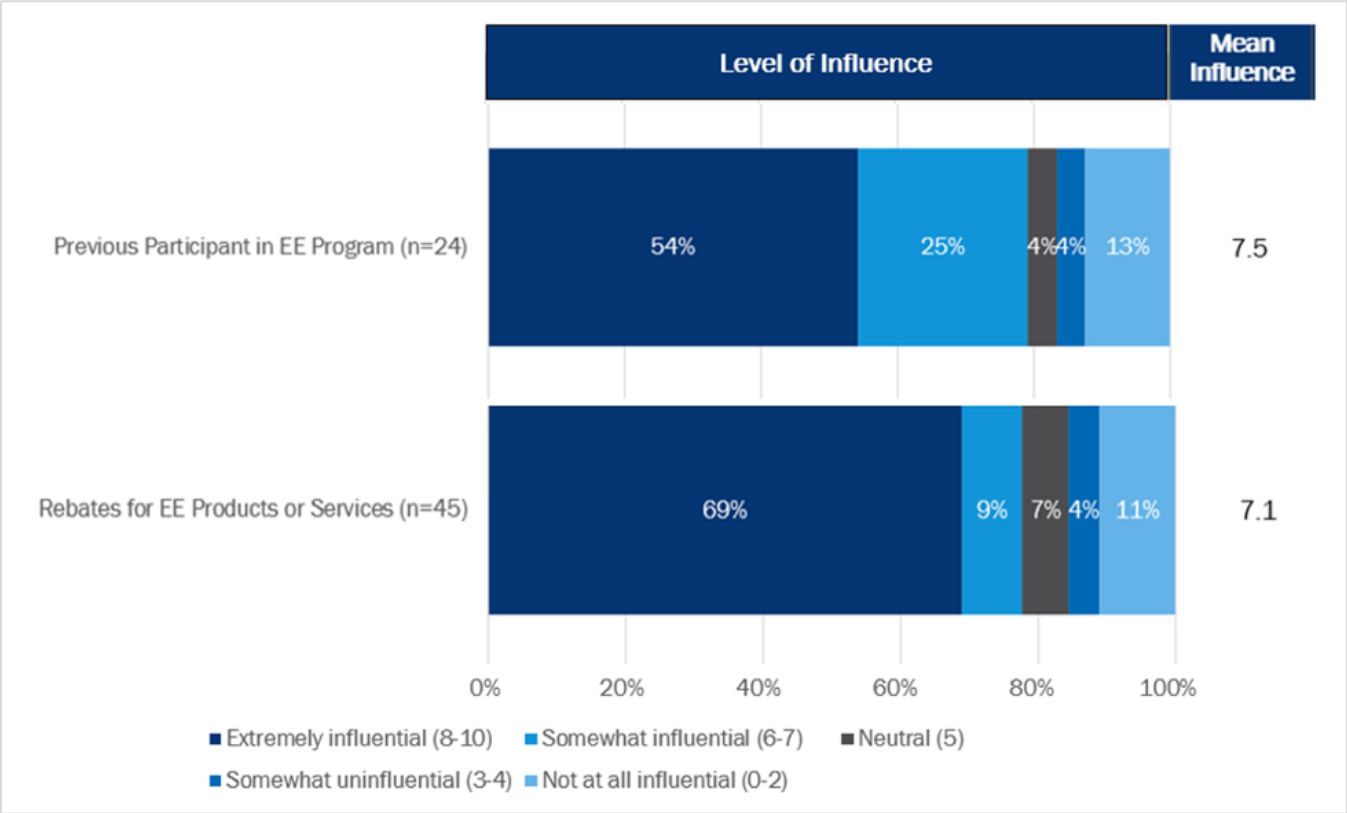
Figure 5. Influence of Non-Resource Activity on Energy Efficiency Upgrades (All Respondents)*



*Other non-resource activities comprised a catchall category for respondents to write in a customized response. These included online webinars, advice from an energy professional, and interaction with a property management company as an intermediary.

Among the 45 survey respondents who recalled receiving rebates for energy efficient products or services, 78% rated the rebate as being extremely or somewhat influential, yielding an average influence of 7.1 on a scale of 0 to 10 (Figure 6). This makes rebates just slightly less influential than community groups (8.1), contractor referrals (7.6), and in-home energy assessments (7.6).

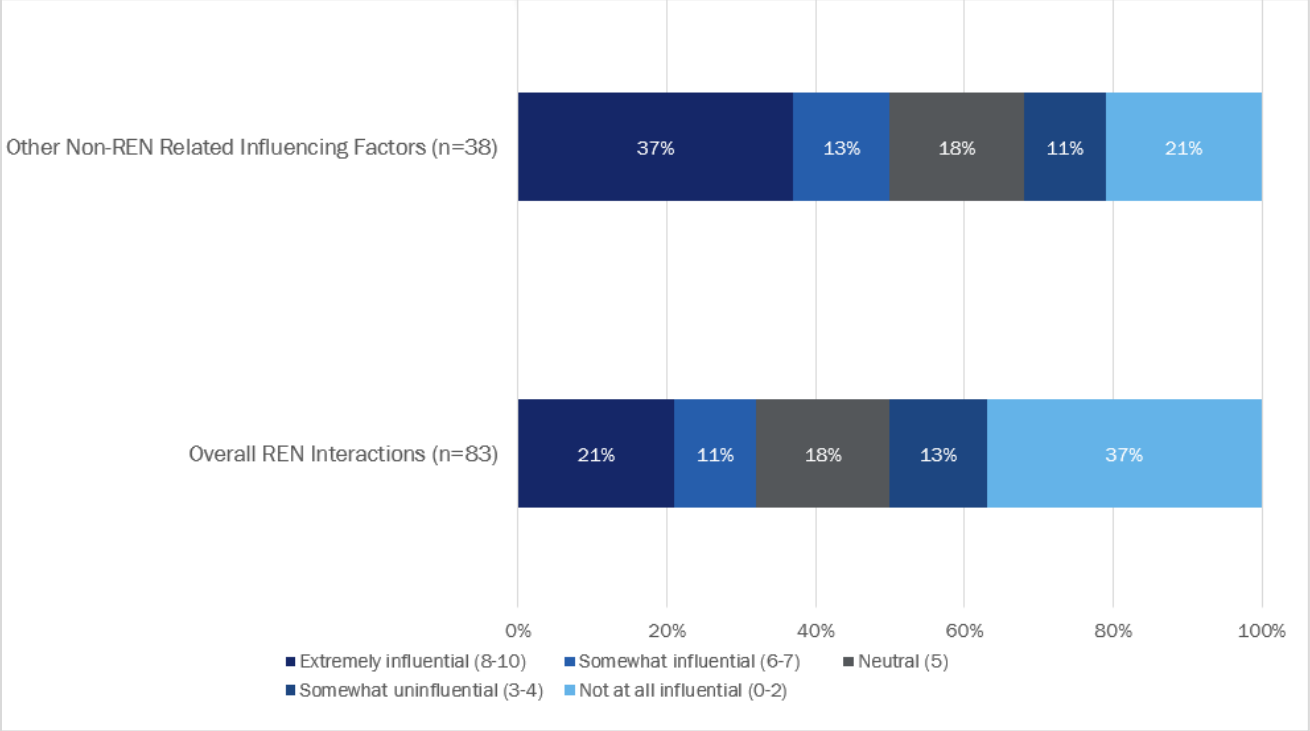
Figure 6. Influence of Resource Activity on Energy Efficiency Upgrades (All Respondents)



After identifying non-REN-related influences on their decision to install EE upgrades, respondents provided a comparative rating of the influence of their REN-related interactions relative to those non-REN factors. The most frequently mentioned non-REN-related factors included: saving money on the cost of energy, climate/environment considerations, comfort, state or local government requirements, family and social considerations, and doing the right thing.

When asked to allocate a total of 10 points between REN-related and non-REN-related influences, customers rated their overall REN interactions as having an average influence of 6.1 on a 10-point scale, while all other non-REN-related factors had an average combined influence of 3.9. About half of survey respondents rated the combined effect of all their REN-related activity engagements as being somewhat or extremely influential, while just under 20% rated the effect a neutral (Figure 7). These proportions compare favorably with the influence ratings respondents gave to non-REN-related factors.

Figure 7. Relative Influence of RENs on Energy Efficiency Upgrades (All Respondents)



The average influence of REN resource and non-resource activities on customer decisions to pursue energy efficient upgrades is summarized in Table 20 below.

Table 20. Mean Influence of REN Activities on EE Upgrades

REN Interactions and Activities	Total (BayREN & SoCalREN) n=137	SoCalREN SF n=37	BayREN SF & MF n=64	BayREN MF n=42	BayREN SF n=22	Single Family (BayREN & SoCalREN) n= 95
Non-Resource Activities						
Community Group (n=7)	8.1	9.5	6.3	6.3	7.0	9.0
Other Non-Resource Activity (n=4)	8.0	7.5	8.5	8.5	NA*	7.5
Professional In-Home Energy Assessment (n=17)	7.6	8.4	4.3	4.3	4.3	7.6
Contractor (n=31)	7.6	7.8	6.9	6.9	5.0	7.6
Energy Advisor Phone Conversation (n=12)	6.9	7.6	6.4	6.4	--	7.6
Community Event (n=11)	6.5	7.2	6.0	6.0	7.0	7.1
Multifamily Program Consultant Communications (n=5)	6.4	--	6.4	6.4	--	--
Word of Mouth (n=20)	6.4	7.0	5.4	5.4	5.3	6.7
Local Government (n=11)	6.3	9.3	5.1	5.1	3.5	7.0
Mail (n=33)	5.6	4.9	6.4	6.4	4.7	4.9

REN Interactions and Activities	Total (BayREN & SoCalREN) n=137	SoCalREN SF n=37	BayREN SF & MF n=64	BayREN MF n=42	BayREN SF n=22	Single Family (BayREN & SoCalREN) n=95
Online Home Energy Assessment (n=7)	5.6	5.7	5.0	5.0	5.0	5.6
Email (n=24)	5.2	5.0	5.6	5.6	5.3	5.1
Canvasing (n=11)	4.6	4.9	4.0	4.0	6.0	5.1
Social Media (n=12)	3.8	3.7	3.8	3.8	5.0	4.0
Resource Activities						
Rebate and/or Discount for Energy Efficient Products or Services (n=45)	7.5	7.7	7.2	7.2	4.8	7.3
Previously Participated in an Energy Efficiency Program (n=24)	7.1	6.6	7.7	7.7	8.5	6.9
Overall REN Activities vs Non-REN Factors						
All Overall REN Interactions (n=89)	6.1	6.4	5.6	5.6	3.0	5.9
Other Non-REN Related Influencing Factors (n=89)	3.9	3.6	4.4	4.4	7.0	4.1

Nearly three-quarters (72%) of the respondents who identified other factors that influenced their EE-upgrade decision (n=50) indicated that saving money was the most influential non-REN related factor in their decision (Table 21). BayREN and SoCalREN customers responded similarly.

Table 21. Other Factors Influencing to Energy Efficient Equipment Upgrades

Type of Influence	Total (BayREN & SoCalREN) n=50	SoCalREN (SF only) n=30	BayREN (SF & MF) n=20
Save money	72%	77%	65%
Help environment/climate	40%	40%	40%
Use less energy	38%	43%	30%
Replace failing equipment	22%	30%	10%
Do the right thing	20%	23%	15%
Other	12%	13%	10%
Replace aging equipment	8%	13%	0%
Improvements for tenants	8%	0%	20%
Required to do so	8%	0%	20%
Program administrator influence	6%	0%	15%
Less maintenance	4%	0%	10%
Comfort	2%	3%	0%
Family/Social Reasons	2%	3%	0%

Type of Influence	Total (BayREN & SoCalREN) n=50	SoCalREN (SF only) n=30	BayREN (SF & MF) n=20
Health and safety	2%	3%	0%
Help the grid	2%	3%	0%
Building improvements	2%	NA	5%
Increased control/ease of use	2%	NA	5%

7.4.2 BayREN Respondents Only

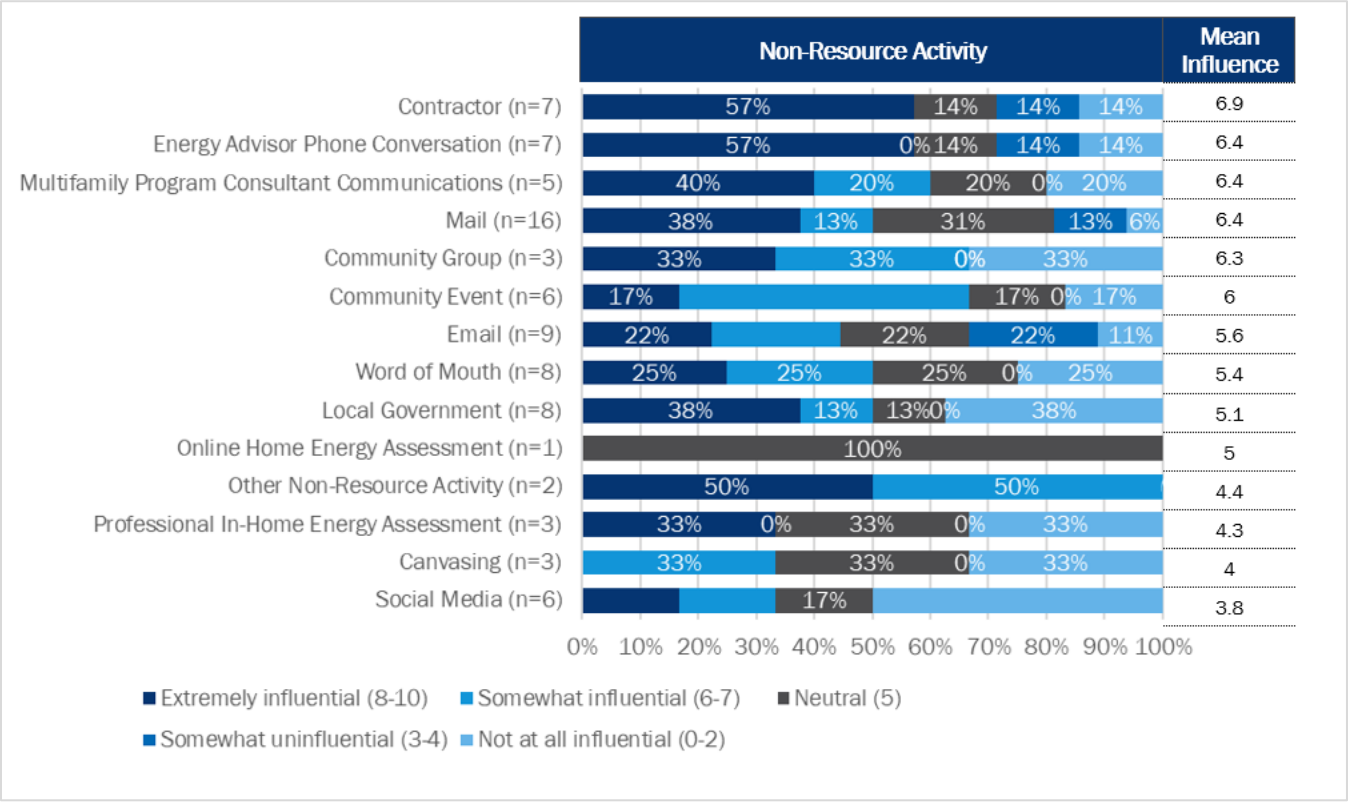
When the 64 BayREN single family and multifamily survey respondents were considered separately from SoCalREN respondents, n-sizes for each response category were quite small. Of all the 14 non-resource activities considered, only those people who reported interacting with BayREN by mail had more than 10 respondents who recalled that particular non-resource activity. For each of the remaining 13 non-resource activities, nine or fewer participants recalled engaging with BayREN in that way.

When BayREN customers used a scale of 0 to 10 to rate the relative influence of each non-resource activity independent of any other, their mean influence scores ranged from a high of 6.9 for the influence of contractors to a low of 3.8 for social media. The second most influential non-resource activities included phone conversations with energy advisors, multifamily program consultant communications, and email (Figure 8).

When the relative influence of each of BayREN's non-resource activities was compared to the influence of PA-sponsored resource activities, no single non-resource activity was rated as being more influential than previous program participation, which received an average score of 7.7, or rebates which rated an average of 7.1 (Figure 9). Moreover, when BayREN customers were asked to rate the combined influence of all their combined REN interactions on their decision to install energy efficient equipment (5.6) compared to any non-REN-related factors (8.5) that may have influenced their decision, the non-REN-related factors were considered to be more influential (

Figure 10). This finding stands in contrast to SoCalREN customers who found REN-related non-resource activities to be more influential than non-REN-related factors. Further detailed findings regarding SoCalREN customers are discussed in the next subsection immediately below.

Figure 8. Influence of Non-Resource Activity on Energy Efficiency Upgrades (BayREN)*



*Other non-resource activities comprised a catchall category for respondents to write in a customized response. These included online webinars, advice from an energy professional, and interaction with a property management company as an intermediary.

Figure 9. Influence of Resource Activity on Energy Efficiency Upgrades (BayREN)

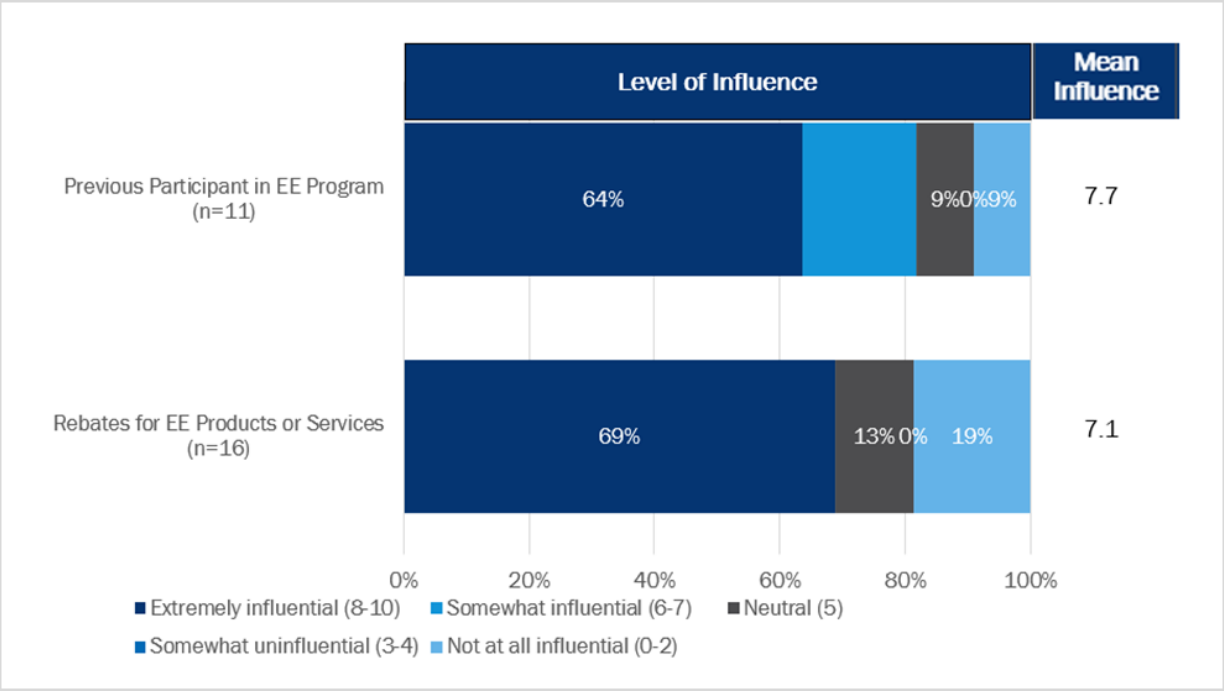
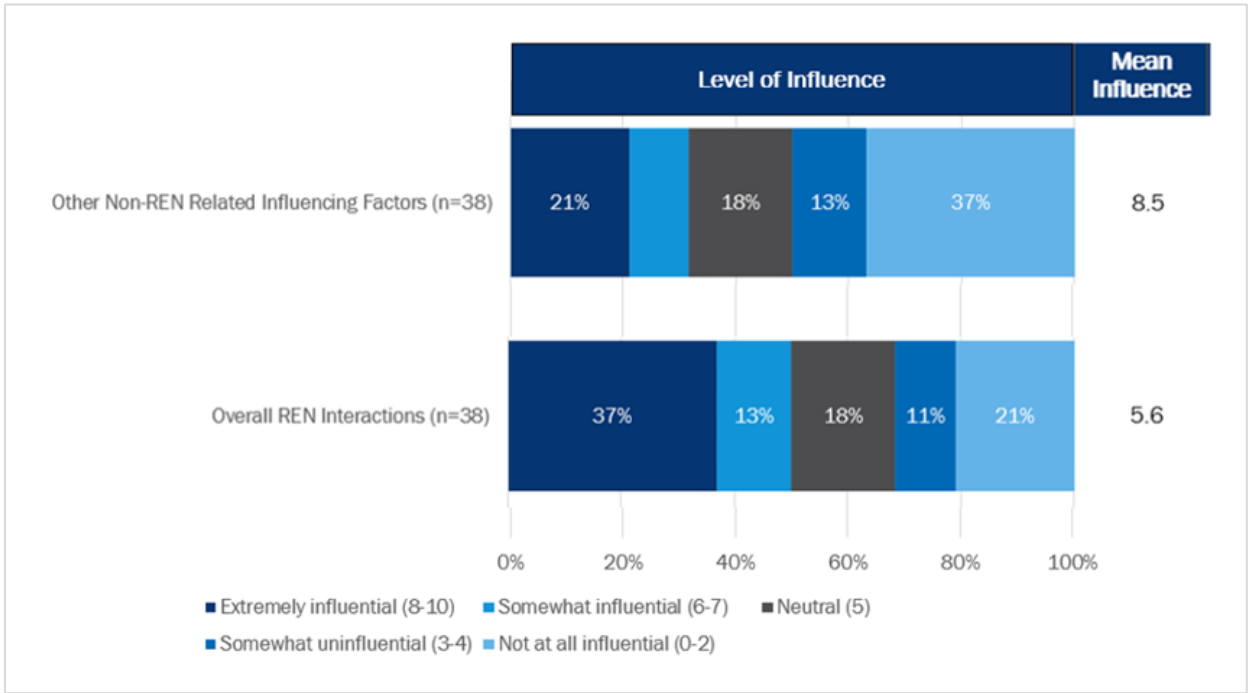


Figure 10. Relative Influence of BayREN on Energy Efficiency Upgrades (BayREN)

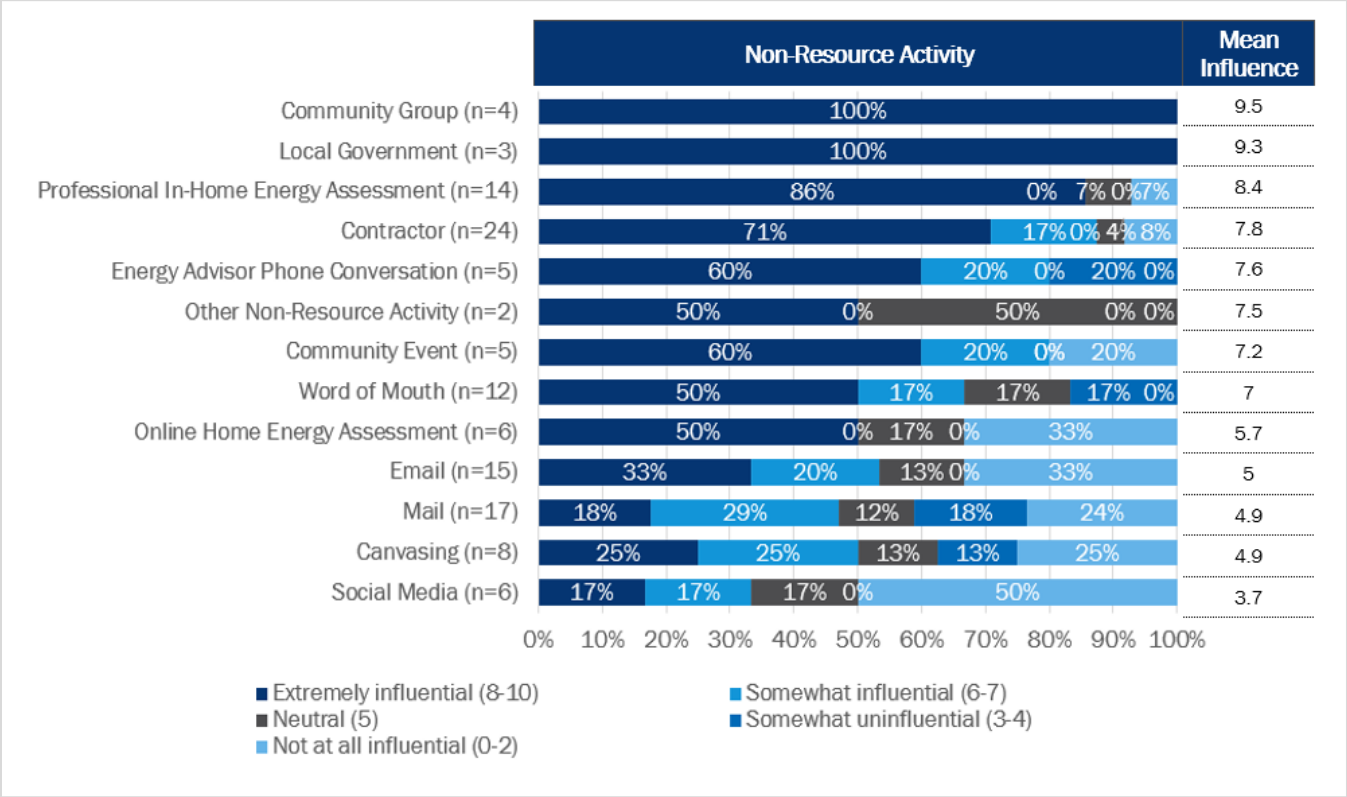


7.4.3 SoCalREN Respondents Only

When SoCalREN's customers were considered as a subset, n-sizes for each individual response category ranged from a low of three people who recalled interacting with local governments to 24 people who recalled talking to a contractor who mentioned an energy efficient equipment option. Of all the different non-resource activities, interactions with local community groups had the highest mean influence score at 9.5 on a scale of 0 to 10, while local government interactions and in home energy assessments were the next most influential at 9.3 and 8.4 respectively (see Figure 11). Moreover, 100% of respondents who recalled having non-resource interactions with community groups and local governments rated them as being as extremely influential.

When we asked SoCalREN respondents to rate the relative influence of SoCalREN-sponsored resource activity, they reported an average influence score of 7.7 for rebates and 6.6 for previous program participation (Figure 12). When we asked SoCalREN customers to consider the combined effect of all their REN-related interactions, they returned an average score of 6.4 for REN-related factors and an average influence score of 3.6 for non-REN related factors. In all, 59% indicated their combined interactions with SoCalREN to be somewhat or extremely influential, compared to 21% who rated non-REN related factors as being extremely or somewhat influential (Figure 13).

Figure 11. Influence of Non-Resource Activity on Energy Efficiency Upgrades (SoCalREN)*



* Other non-resource activities were a catchall category for respondents to write in a customized response. These included online webinars, advice from an energy professional, and interaction with a property management company as an intermediary.

Figure 12. Influence of Resource Activity on Energy Efficiency Upgrades (SoCalREN)

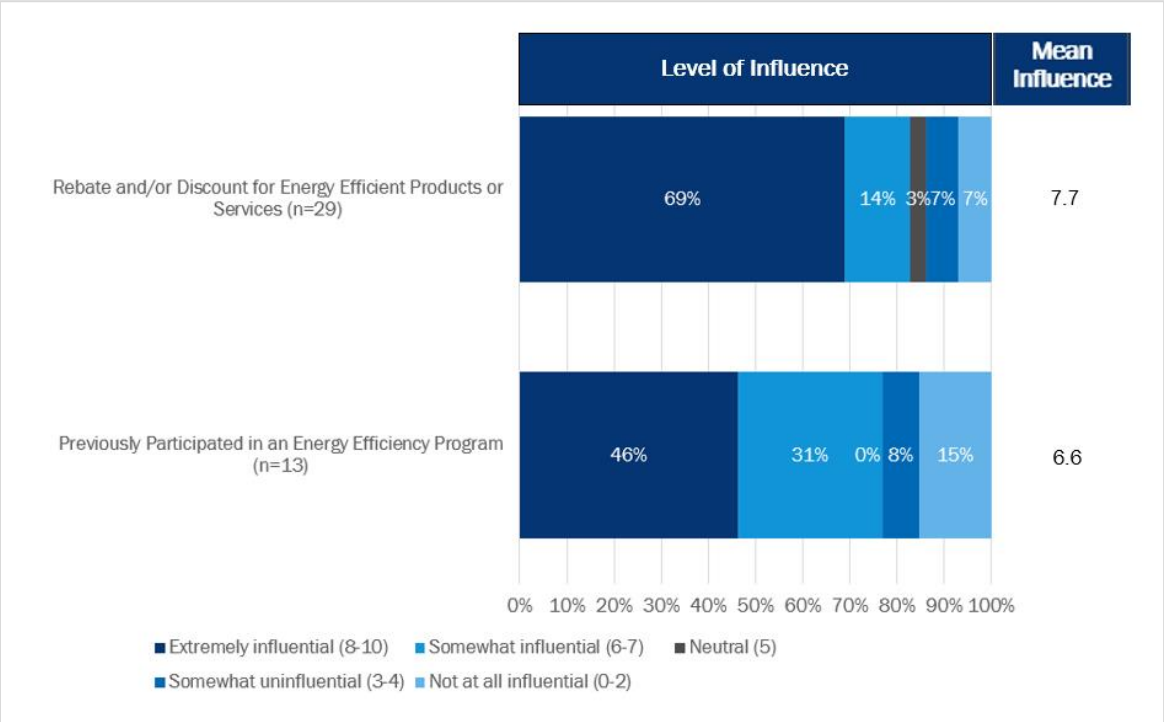
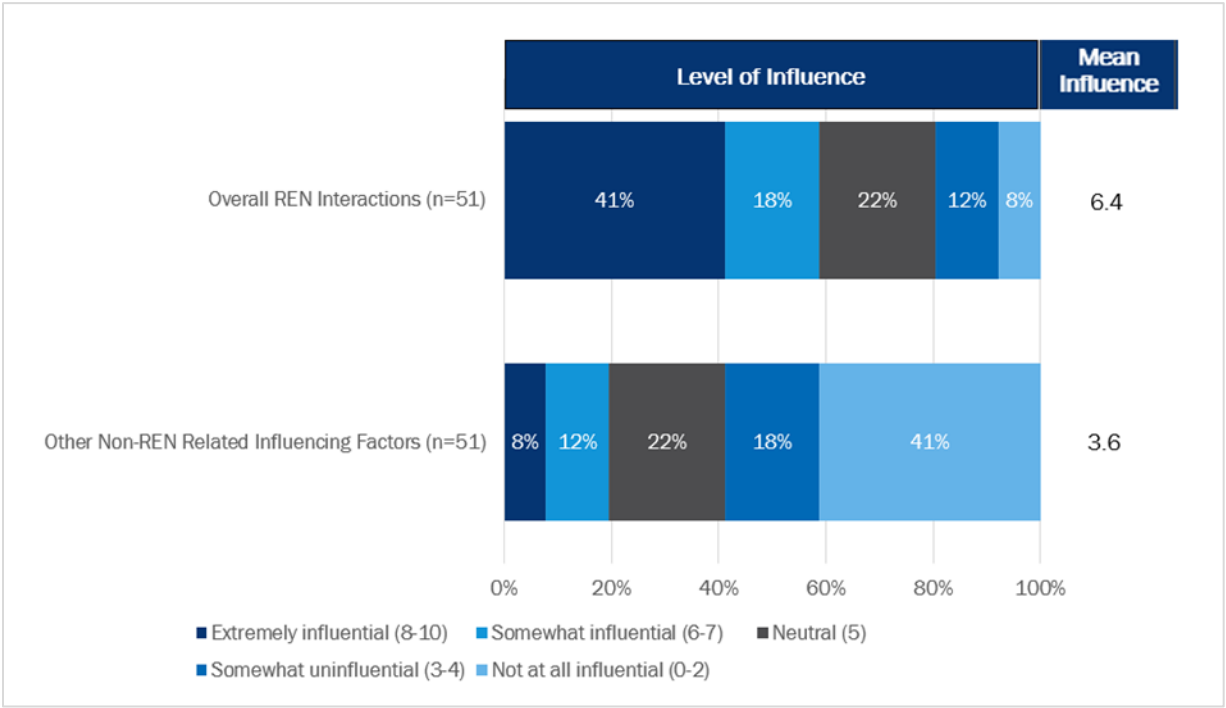


Figure 13. Relative Influence of SoCalREN on Energy Efficiency Upgrades (SoCalREN)



7.5 Factors Influencing Energy Saving Actions

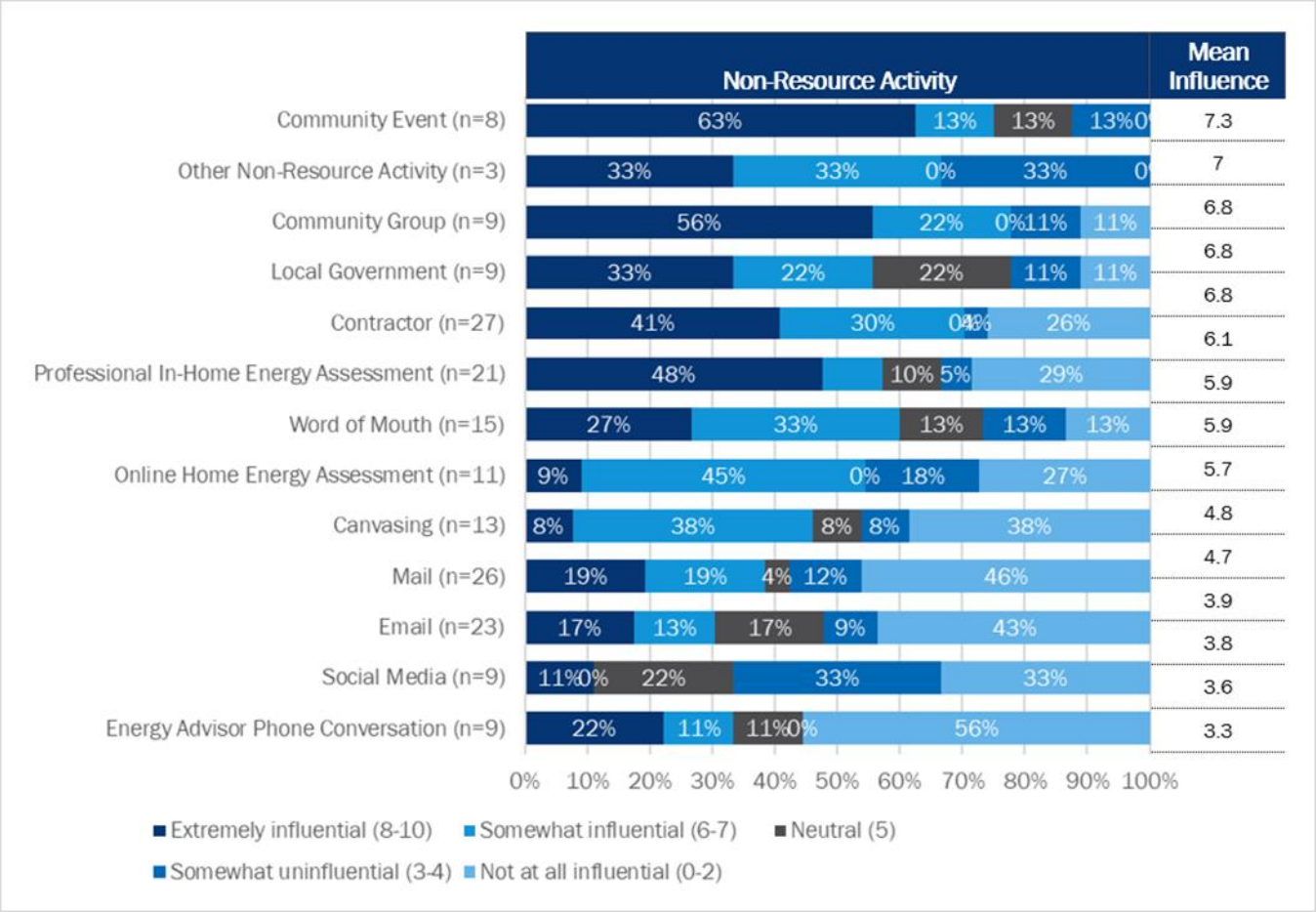
Single family participant respondents used the 0 to 10 scale described previously to rate the importance of the RENs' non-resource activities on their actions or behaviors toward saving energy (as distinct from their adoption of energy-saving equipment upgrades, presented in (Section 7.4). These energy saving behaviors included such things as turning off lights and electronics when not in use; changing or cleaning filters on dryers and HVAC equipment; using a toaster oven instead of a full-size oven, doing laundry with cold water, defrosting freezers, and opening and closing curtains or blinds to add a barrier to protect against outdoor heat or cold.

7.5.1 All Survey Respondents

Single family participants (n=95) most frequently reported engaging in the following non-resource activities: contractor referrals (n= 27), mail (n= 26), email (n=23), and professional in-home energy assessments (n=21). The most influential non-resource activity was EE-related community events, which had an average influence of 7.3, followed by interactions with community groups (6.8) and interactions with local governments (6.1) (Figure 14). It is worth noting that community events, community groups and local government interactions all had fewer than 10 survey respondents.[27]

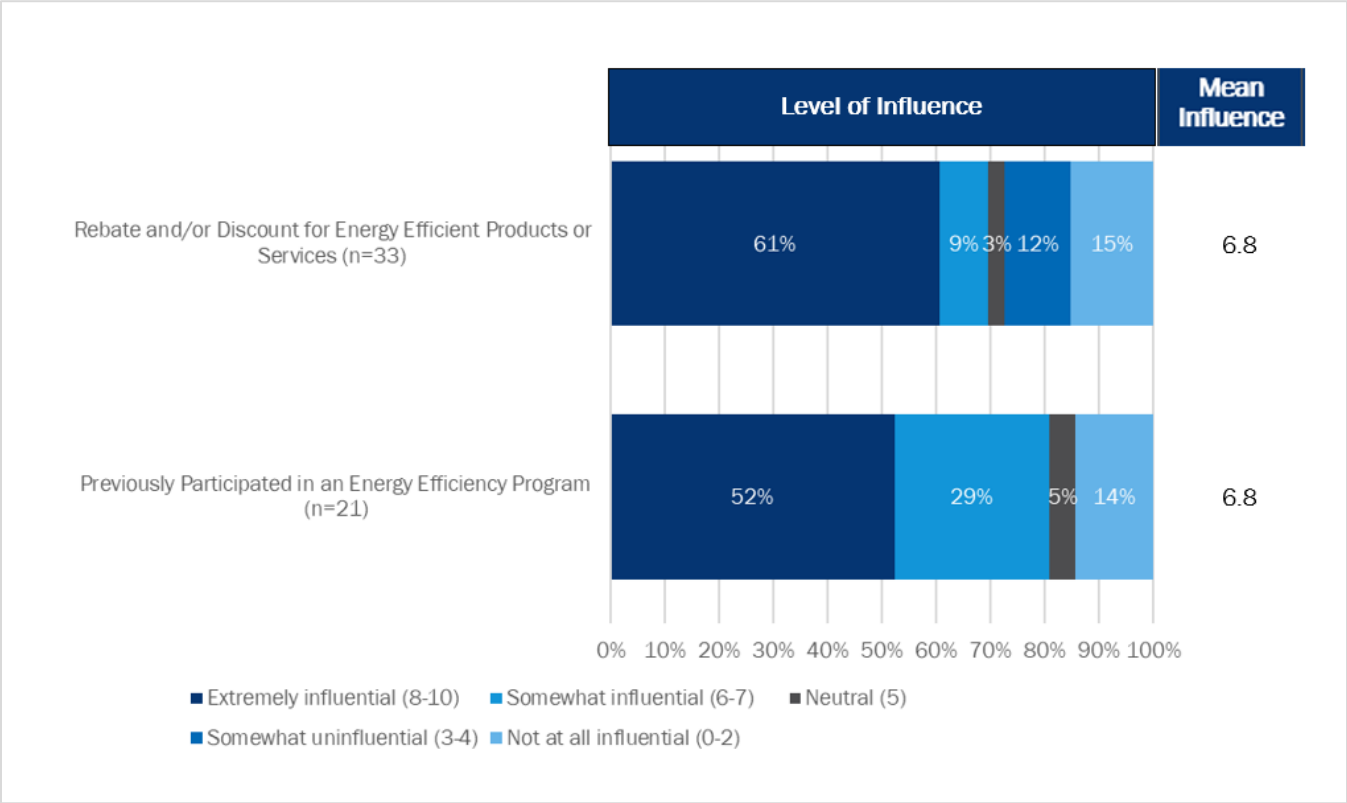
[27] Although "other" non-resource activities were collectively rated to have an overall mean influence score of 7/10, this is a catchall category where customers could enter activities that they considered to be outside of the primary options listed. These included online webinars and advice from energy professionals.

Figure 14. Non-Resource Activity Influence on Energy Efficiency Non-Upgrade Actions (All Respondents)



When we asked survey respondents about the relative influence of REN-sponsored resource activities, such as receiving rebates and previously participating in another EE program, both activities were rated with an average influence score of 6.8 (Figure 15). Community events were the only non-resource activity rated a higher influence at 7.3.

Figure 15. Influence of Resource Activity on Energy Efficiency Actions (All Respondents)



Survey respondents rated the combined effect of all REN-related activities to be slightly more influential on average (5.3 out of 10) than the non-REN related factors (4.7 out of 10) on their decisions to initiate an energy efficient action (Figure 16). In all, 44% reported that their combined REN-related interactions had been somewhat or extremely influential, compared to 30% who found other non-REN-related factors to be somewhat or extremely influential.

Figure 16. Relative Influence of RENs on Energy Efficiency Actions (All Respondents)

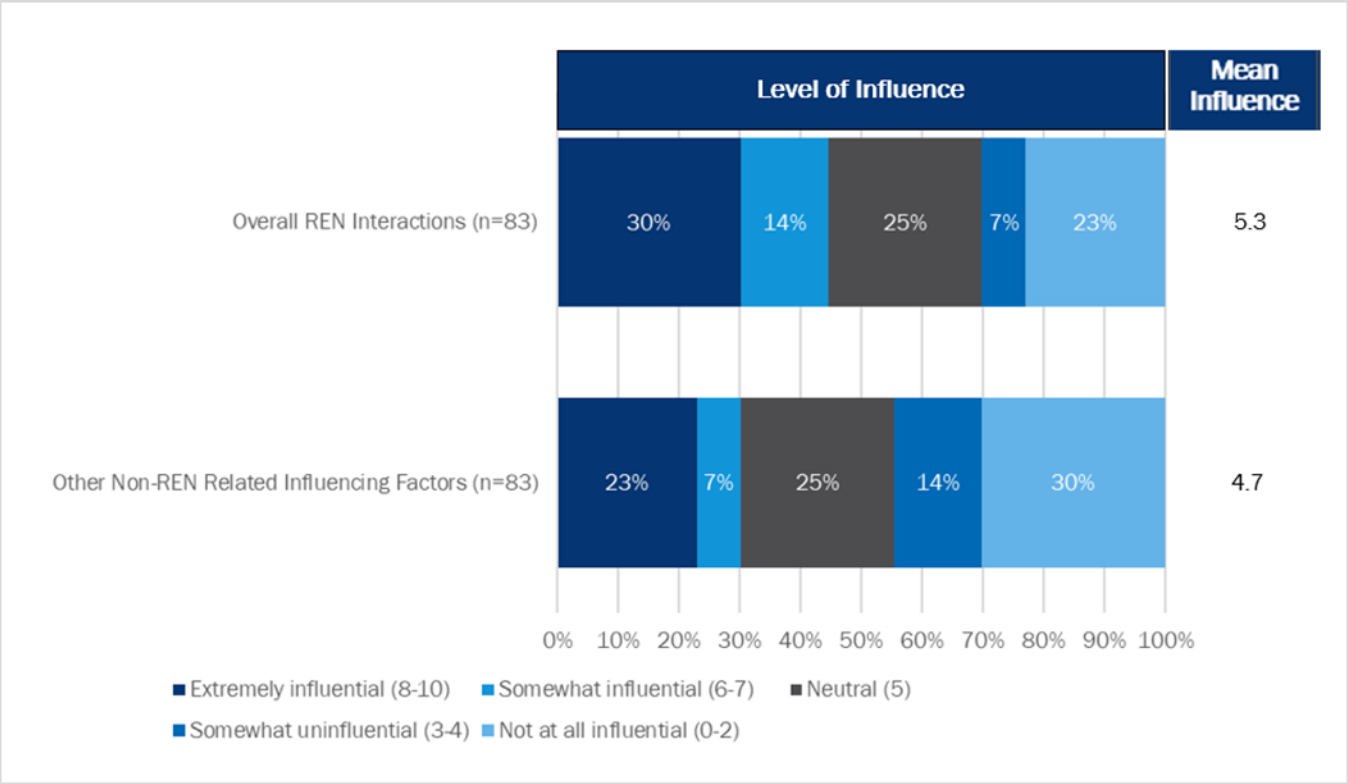


Table 22 provides the average influence of REN resource and non-resource activities on customer decisions to pursue energy efficient actions and behaviors.

Table 22. Mean Influence of REN Activities on EE Actions

REN Activities Interactions	Single Family (BayREN & SoCalREN) n=95	SoCalREN SF n=73	BayREN SF n=22
Non-Resource Activities			
Community Event	7.3	7.5	6.5
Other Non-Resource Activity	7.0	7.0	NA
Community Group	6.8	6.8	6.8
Local Government	6.1	5.8	6.4
Contractor	5.9	6.0	5.0
Professional In-Home Energy Assessment	5.9	6.4	4.7
Word of Mouth	5.7	5.2	6.6
Online Home Energy Assessment	4.8	5.7	3.3
Canvasing	3.9	3.8	4.5

REN Activities Interactions	Single Family (BayREN & SoCalREN) n=95	SoCalREN SF n=73	BayREN SF n=22
Mail	3.8	4.1	1.3
Email	3.6	3.8	2.8
Social Media	3.3	3.3	3.3
Energy Advisor Phone Conversation	3.3	3.4	3.0
Resource Activities			
Rebate and/or Discount for Energy Efficient Products or Services	6.8	6.7	7.3
Previously Participated in an Energy Efficiency Program	6.8	6.5	7.3
Overall REN Activities vs Non-REN Factors			
All Overall REN Interactions	5.3	5.4	4.8
Other Non-REN Related Influencing Factors	4.7	4.6	5.3

7.5.2 BayREN Respondents Only

When BayREN's 22 single family customers were considered separately from SoCalREN's single family customers, n-sizes for each of the individual non-resource activities were quite small with no individual non-resource activity having more than seven respondents for that category. With that caveat of small numbers in mind, PA-sponsored resource activities, including previous program participation and receiving rebates, proved to be more influential than any individual non-resource activity with an average influence score of 7.3 out of 10 as shown Table 22, above). While only six BayREN customers indicated that their energy saving actions had been influenced by a resource activity, they all felt that previous program participation had been either extremely or somewhat influential in initiating an energy saving behavior. On the other hand, five out of six felt that the rebate they received had been influential. The most influential non-resource activities among BayREN customers were interactions with EE related community group activities (6.8), followed by word-of-mouth (6.6), community events (6.5), and local government (6.4).

When we asked survey respondents about the relative influence of BayREN-sponsored resource activities, such as receiving rebates and previously participating in another EE program, both activities were rated with an average influence score of 7.3 (Figure 17).

We also asked BayREN respondents to rate the influence of their REN-related interactions on their decision to initiate an energy saving action relative to any other factors that were non-REN-related. They rated other non-REN related factors as more influential with a mean score of 5.3 compared to a mean score of 4.8 for all overall REN interactions. Among the 16 customers who responded to this question, only 38% found their interactions with BayREN to have been somewhat or extremely influential compared to 46% who found non-related factors to be somewhat or extremely influential (

Figure 18).

Figure 17. Influence of Resource Activity on Energy Efficiency Actions (BayREN)

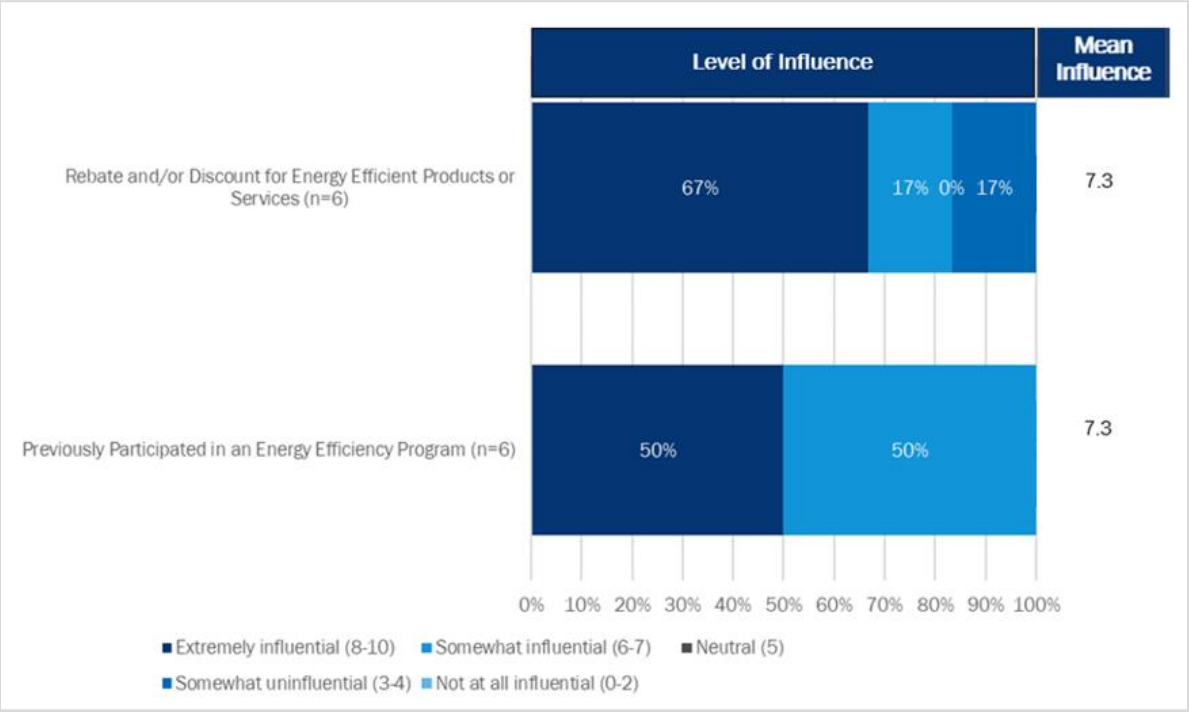
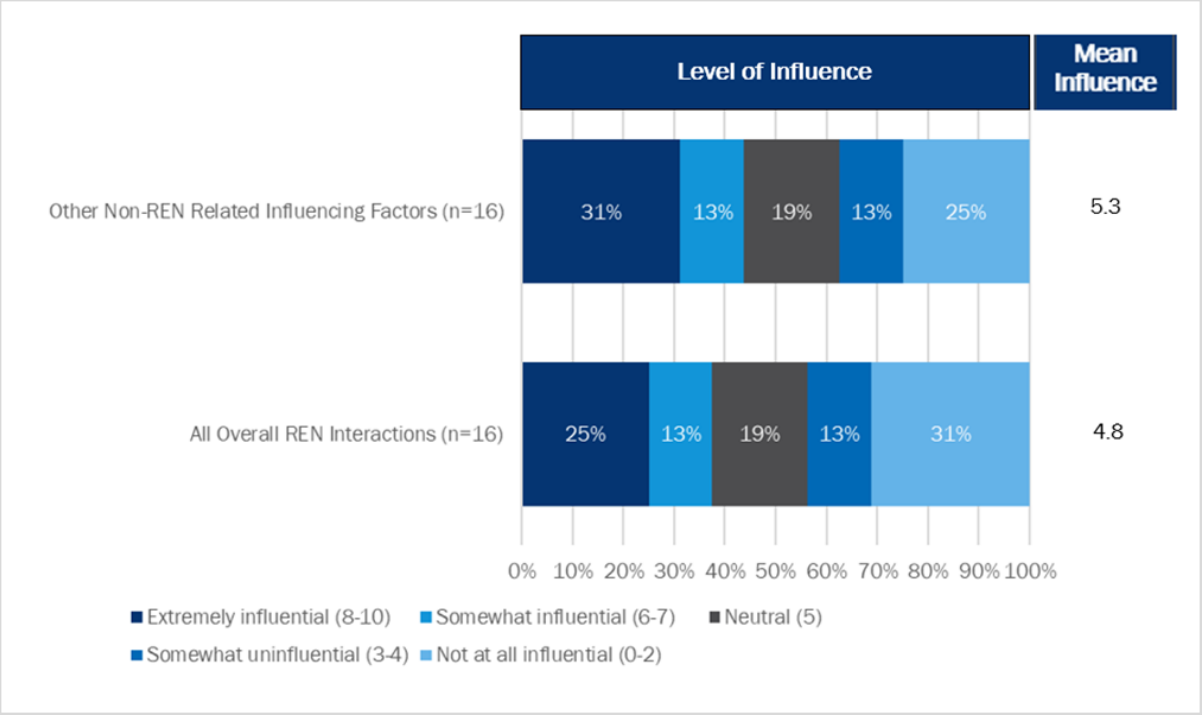


Figure 18. Relative Influence of BayREN on Energy Efficiency Actions (BayREN)



7.5.3 SoCalREN Respondents Only

While SoCalREN had a robust 73 customers who responded to the survey question, the number of respondents per non-resource activity varied from a high of 24 customers who recalled a contractor mention to a low of four customers who recalled interacting with a local government group. For SoCalREN customers the top three most influential non-resource activities were community events (7.5), community groups (6.8), and professional in-home energy assessments (6.4) (Figure 19). For comparison purposes we also asked these customers to rate the influence of rebates which had an average score of 6.7, and previous program participation which scored 6.5 on our 0 to 10 scale (Figure 20). When asked to consider the combined influence of all non-resource activities, 46% of SoCalREN survey respondents indicated their overall REN interactions to be somewhat or extremely influential in the initiation of at least one EE related action or behavior, rendering an average influence score of 5.4. Conversely, 27% rated other non-REN related factors as being somewhat or extremely influential, rendering an average influence score of 4.6 (Figure 21).

Figure 19. Influence of Non-Resource Activity on Energy Efficiency Actions (SoCalREN)

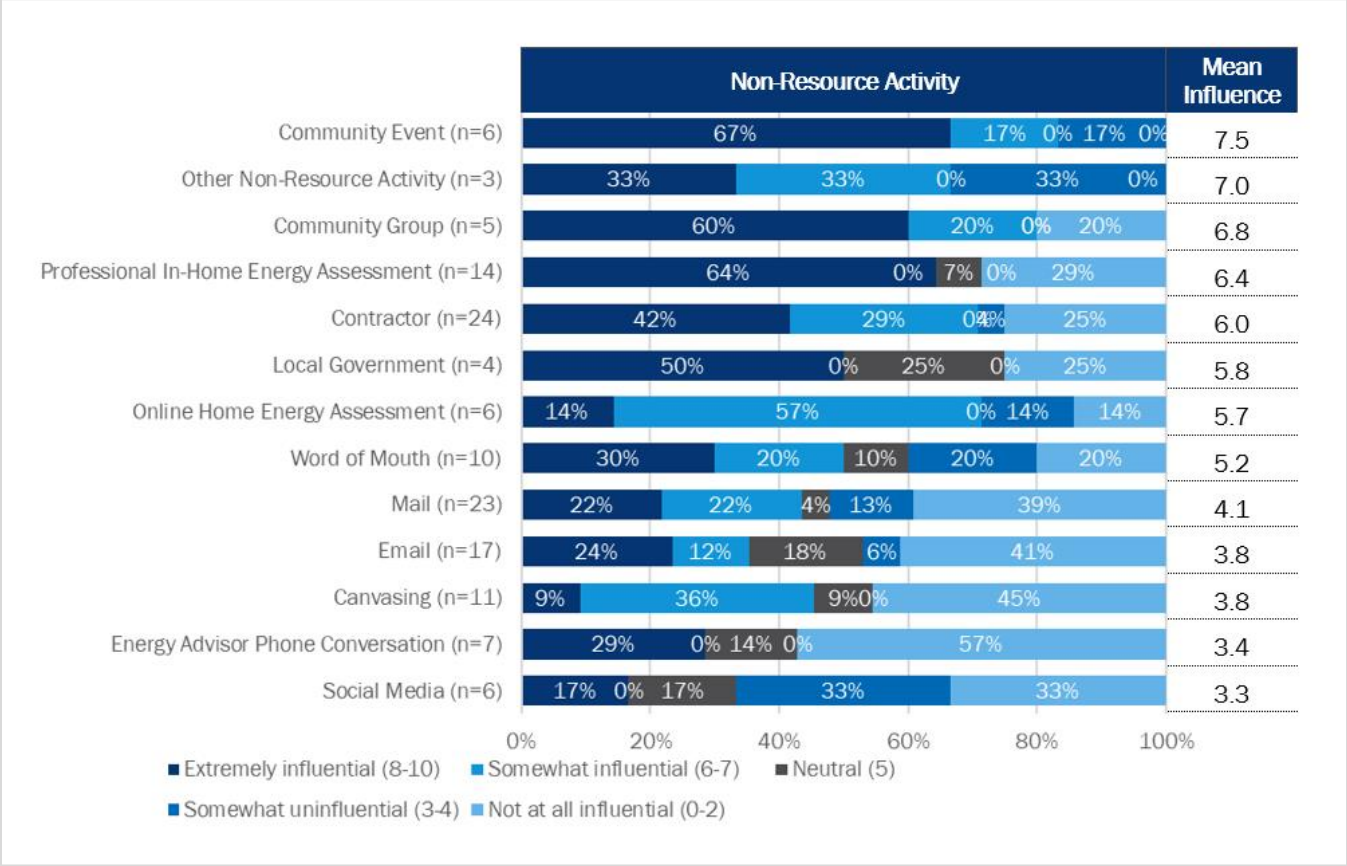


Figure 20. Influence of Resource Activity on Energy Efficiency Actions (SoCalREN)

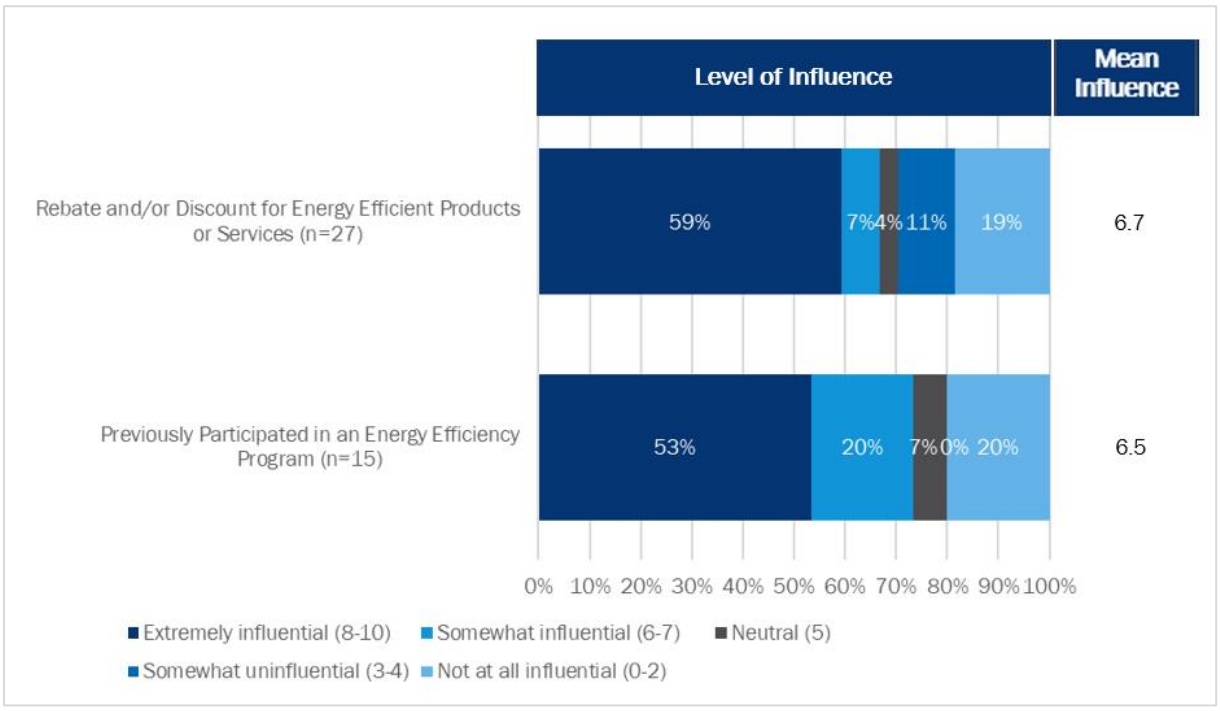
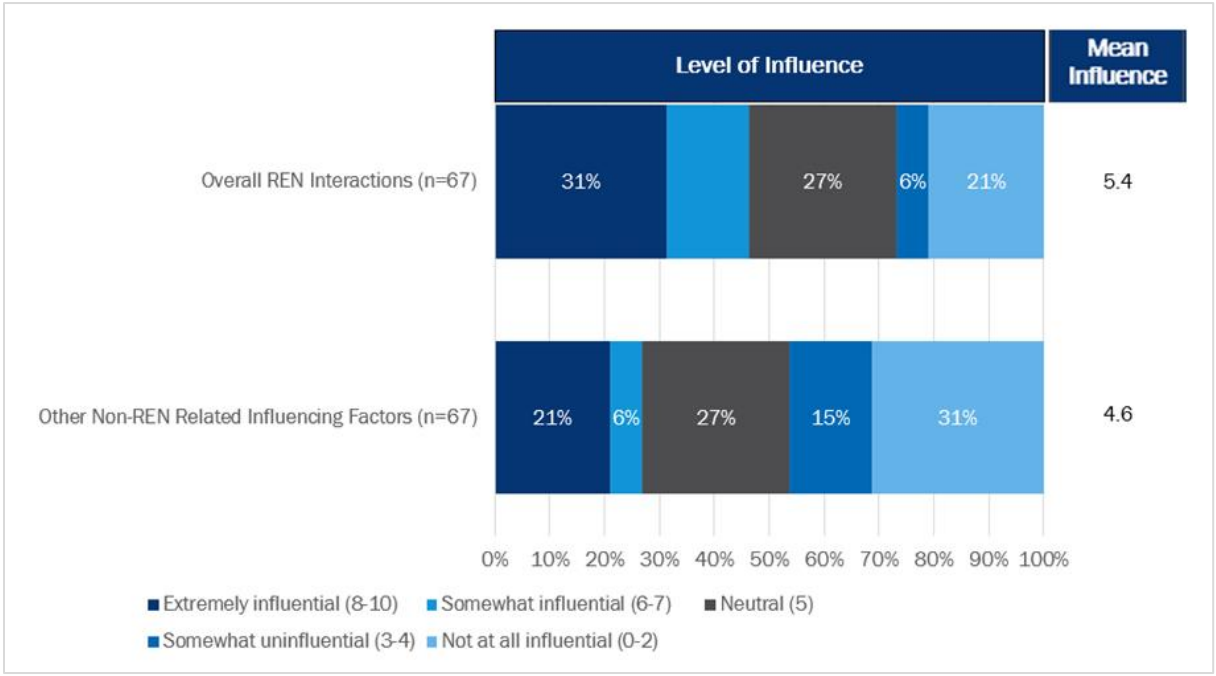


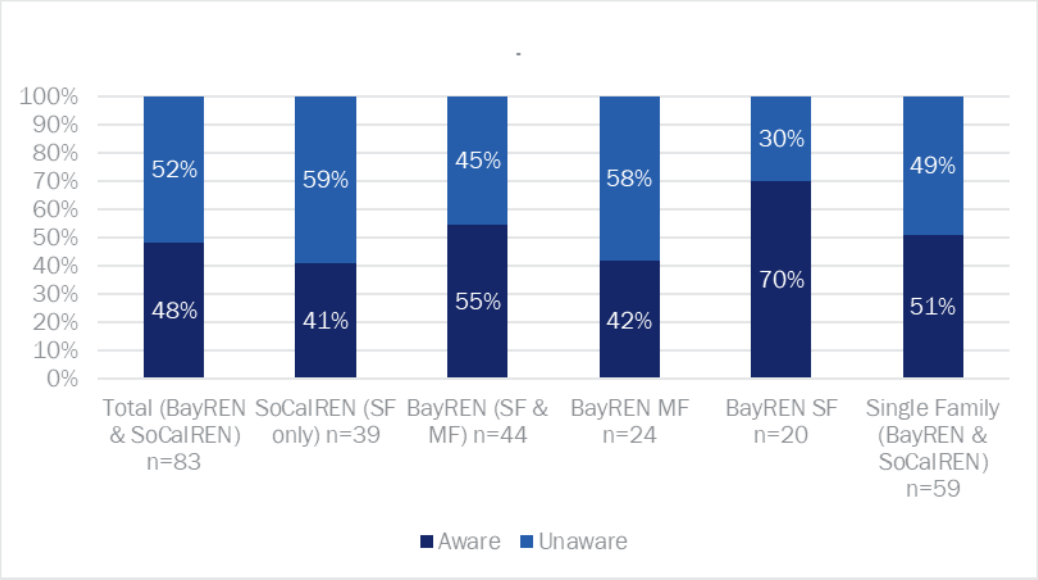
Figure 21. Relative Influence of SoCalREN on Energy Efficiency Actions (SoCalREN)



7.6 Awareness of Energy Efficiency Programs

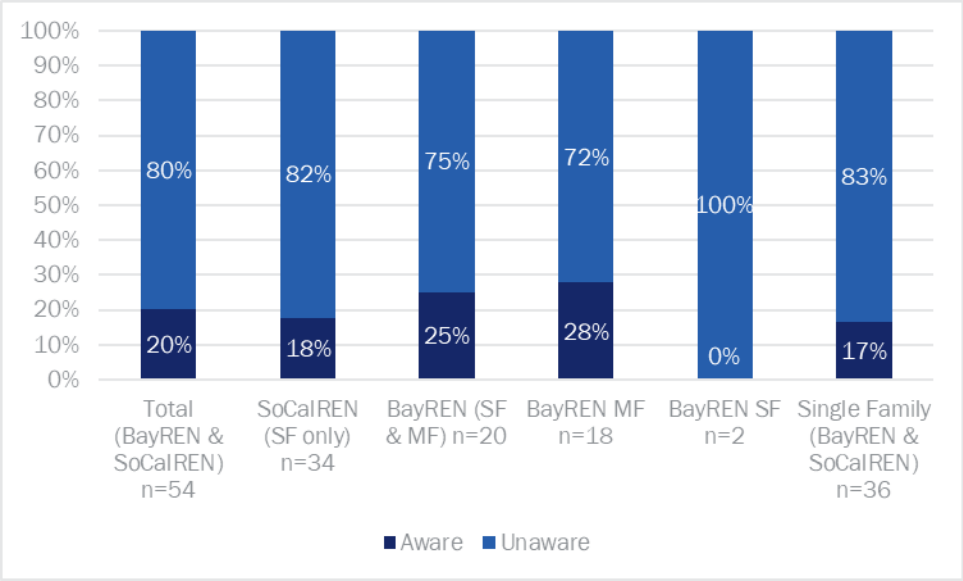
Awareness of EE programs or the lack thereof does not factor heavily into non-resource activity participants' decisions to save energy via equipment upgrades or behavior changes. Nearly half (48%) of the 83 survey respondents who reported they had not participated in EE programs indicated that they nonetheless were aware of them (Figure 22). Respondents who were aware of, but had not participated in, EE programs attributed their lack of participation to ineligibility of the equipment they installed, the immediate need for equipment; and the hassle of going through the application process for incidental equipment expenses. Some respondents also noted that they had already installed the equipment upgrades offered by EE programs.

Figure 22. Non-Program Participant Awareness of Energy Efficiency Programs



Even among the 55 survey respondents who reported receiving PA-sponsored rebates or incentives for the EE equipment they installed, awareness of other EE programs was low, with only 20% of BayREN and SoCalREN customers indicating they knew of other California energy related organizations that offer rebates or incentives for the installation of energy-efficient equipment. No BayREN single family customers indicated they were aware of any other EE programs, however BayREN's multifamily customers had a slightly higher awareness than SoCalREN single family customers (Figure 23).

Figure 23. Rebate Program Participant Awareness of Other Energy Efficiency Programs



Among the 36 survey respondents who had heard of other EE programs, 36% named a program administrator (BayREN, SCE, PG&E, etc.), 28% mentioned a specific EE measure (insulation, appliances, solar, etc.), and 22% described a general type of EE program offering (rebates, appliance recycling, tax credits, etc.), while only 17% could actually name a specific EE program (Energy Upgrade CA, Savings by Design, etc.). While many of these respondents could not name a specific program, their responses indicate that they are generally aware of the existence of EE programs, suggesting they could seek them out if motivated to do so.

Table 23. Types of EE Programs Mentioned by Participants

Type of Mention	Total (BayREN & SoCalREN) n=36	SoCalREN (SF only) n=15	BayREN (SF & MF) n=21
Program Administrator	36%	27%	43%
Program Name	17%	13%	19%
Type of Offering	22%	33%	19%
Measure	28%	53%	14%
Other	3%	7%	0%
Don't know	11%	7%	14%

When asked where they first heard about the EE program they were thinking of, nearly one-third (31%) indicated that they learned about it from an energy provider or utility website, while 18% learned about it from a community group, and another 18% learned about it on their energy bill. An additional 16% heard through word-of-mouth, while contractor mentions, social media and interactions with local governments garnered single digit percentage responses each.

Table 24. Primary Source of Information for Energy Programs

Primary Information Source on Energy Efficiency Programs	Total (BayREN & SoCalREN) n=49)	SoCalREN (SF only) n=19	BayREN (SF & MF) n=27
Energy Provider or Utility Website	31%	21%	33%
Energy Bill	18%	26%	15%
Community Group	18%	32%	7%
Word-Of-Mouth	16%	5%	26%
Contractor	4%	5%	4%
Social Media	4%	5%	4%
Local Government	2%	0%	4%

7.7 Factors Influencing Decisions to Participate in EE Programs

Survey findings suggest that financial considerations are the biggest barrier to participation among respondents who have not participated in EE programs. An overwhelming majority of customers mentioned a financially oriented factor that, if overcome, would spur their participation in an EE project. The two most frequently mentioned reasons were wanting bigger rebates and incentives (41%) and looking for lower out-of-pocket costs for EE equipment (15%) (Table 25). A further 9% of customers said that receiving advance information about the project's cost effectiveness would be important in their decision-making process.

Table 25. Factors Influencing Participation Decisions Among Non-EE Program Participants

Reason Cited (Multiple Response)	Total (BayREN & SoCalREN) n=66	SoCalREN (SF only) n=29	BayREN (SF & MF) n=37
Bigger cashback/rebates/incentives	41%	38%	43%
Low/no out-of-pocket EE equipment costs	15%	17%	14%
Free installation	2%	3%	0%
Tax credit	5%	0%	8%
Lower energy bill	5%	3%	5%
Actual project cost effectiveness	5%	7%	3%
Information on options and cost-effectiveness and efficiency of equipment upgrades	9%	7%	11%
Do it yourself installs	2%	3%	0%
Improved program communication	3%	0%	5%

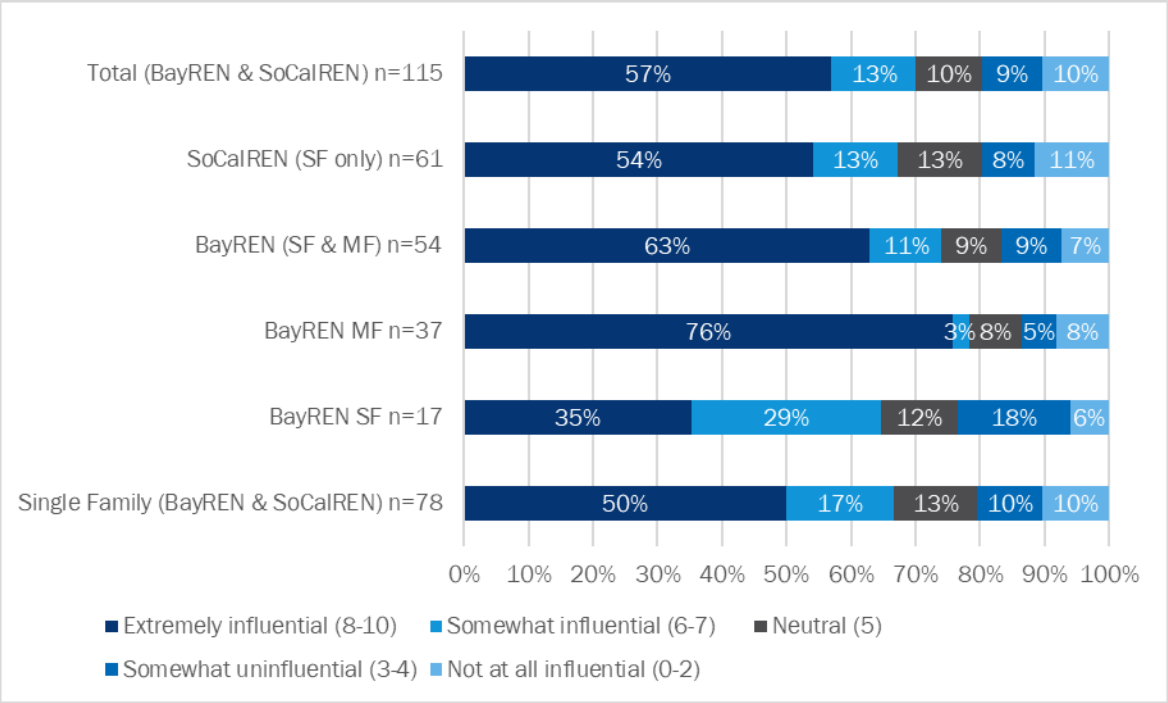
Reason Cited (Multiple Response)	**Total (BayREN & SoCalREN) n=66**	**SoCalREN (SF only) n=29**	**BayREN (SF & MF) n=37**
Information on helping the environment	3%	3%	3%
Word-of-mouth endorsement	3%	3%	3%
Accredited trustworthy contractors	2%	3%	0%
Easier program qualification	3%	0%	5%
Streamlined application process	2%	0%	3%
Streamlined permit process	2%	0%	3%
Other	9%	7%	11%
None	5%	7%	3%
None, property is already energy efficient	6%	10%	3%

7.8 Satisfaction with REN Non-Resource Program Activities

Survey respondents are generally satisfied with both the quality of the energy related information they received from their respective RENs and with the energy saving activities they associate with the RENs.

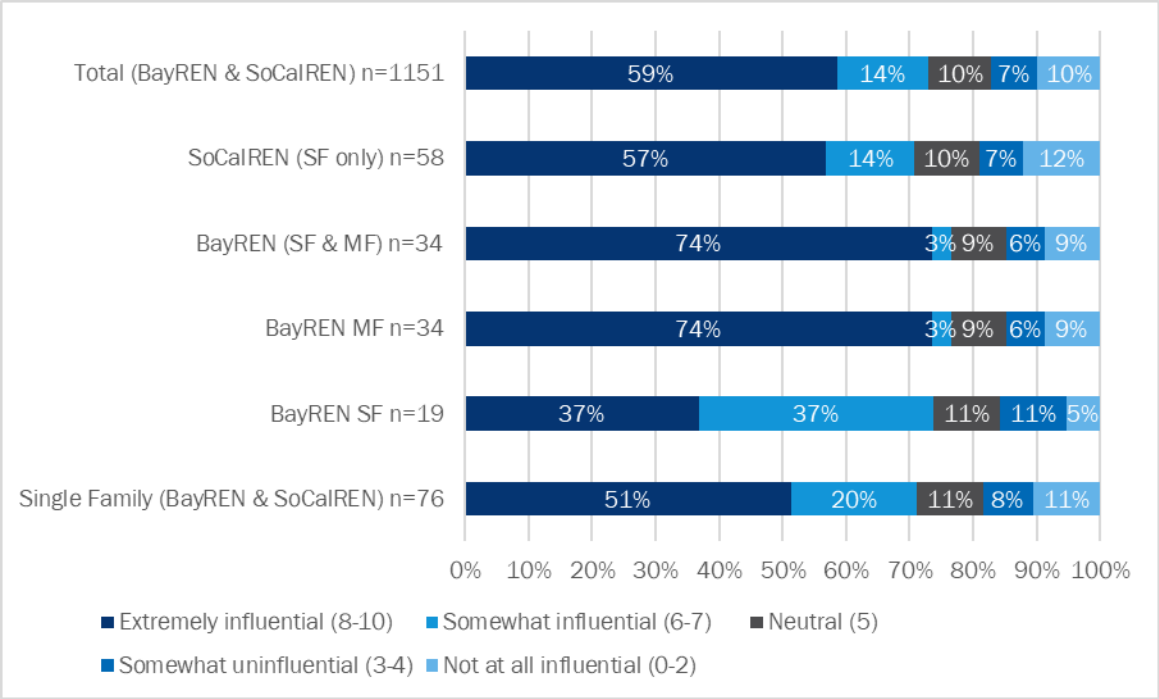
Seventy percent of all survey respondents indicated that they were either somewhat or extremely satisfied with the energy related information they received, and of these, 57% were extremely satisfied (Figure 24). Overall, survey respondents rated their satisfaction at an average of 7.8 on a scale of 0 to 10.

Figure 24. Non-Resource Participant Satisfaction on Information Received



Survey respondents were also satisfied with be energy saving activities that they associated with their respective RENs. Across both RENs, 73% of respondents indicated that they were either somewhat or extremely satisfied, with an average satisfaction rating of 7.1 on a 0 to 10 scale. Customer reasoning for the the REN-specific satisfaction scores is discussed in more detail below.

Figure 25. Non-Resource Participant Satisfaction with Energy Saving Activities



7.8.1 BayREN

More than one-third (35%) of satisfied BayREN customers mentioned the REN's helpful, professional, knowledgeable program staff. Survey respondents also cited receiving helpful information (7%), saving money (7%), and saving energy (6%) as reasons for their satisfaction. A further 13% of satisfied customers mentioned that their scores had been somewhat diminished by the fact that the energy saving information that they received was "nothing new." The "nothing new" remark was also a common refrain among 6% of neutral customers, who also mentioned unclear or insufficient information (2%) and a desire for higher incentives (4%). Among dissatisfied BayREN customers, poor follow-through was the most frequent reason (7%,) while nothing new (6%) garnered almost as many responses. Table 26 provides a full list of customer remarks, including tallies of reasons why customers did not provide a higher score even though they were generally satisfied.

Table 26. Reasons for BayREN Satisfaction Scores

Reasons for Satisfaction Scores on Information Received (Multiple Response)	Percent (n=54[a])
Satisfied (6 to 10)	
Helpful, professional, knowledgeable program team	35%
Nothing new	13%
Helpful information	7%
Saving money	7%

Reasons for Satisfaction Scores on Information Received (Multiple Response)	Percent (n=54[a])
Saving energy	6%
Easy to do	4%
Good for environment	4%
Love BayREN	4%
Too much bureaucracy	4%
Unclear or insufficient information	4%
Wanted less expensive upgrades	4%
Clear understandable program materials and intake	2%
Didn't want to do everything needed to get rebate	2%
Glad to participate	2%
Good advice, not applicable	2%
Incentive not enough	2%
Need better outreach	2%
Valuable service	2%
Wanted more information	2%
Website	2%
Other	2%
Neutral (5)	
Nothing new	6%
Incentive not enough	4%
Good information	2%
Unclear or insufficient information	2%
Did not qualify	2%
Dissatisfied (0 to 4)	
Poor follow through	7%
Nothing new	6%
Too much bureaucracy	4%
City mandated upgrades	4%
Too much contact	2%
Contractor upselling	2%
Incentive not enough	2%

Reasons for Satisfaction Scores on Information Received (Multiple Response)	Percent (n=54[a])
Did not qualify	2%
Ineffective	2%

[a] Excludes respondents who were unsure or who declined to respond.

Below is a sample of customer responses:

- "Because BayREN are extremely responsive and available to answer all my questions at any time and have worked closely with me to get badly needed measures for our properties which need upgrades but have no budgets."
- "Appreciated the advice and assessment but wish the improvements were easier and more affordable to implement."
- "Clearly presented and easy to apply."
- "From the initial phone inquiry, to BayREN's final inspection of the work done, I was communicated with very well, they inspected our building very carefully, provided a great report, helped me to understand the implications of each upgrade…honestly, I didn't know about on-demand hot water recalculation pumps. Our building was built in the 50s, to 1950 standards. BayREN helped me understand the energy improvements that could be made, and then helped with the cost."
- "Lots of generic info that I already knew about. most special programs did not apply to me. Not much actionable that meant money/energy savings for me, a middle class homeowner."
- "Overall, we're very appreciative of the consultation and the availability of the consultants at AEA. Sometimes the information they provide or the way they provide it can be a little confusing. Also, sometimes all the various organizations (BayREN, BAMBE, StopWaste, HomePlus, Savings by Design, BAMCAP, MUP…etc.) can be confusing. Recently when reaching out to people about additional properties, I received calls from different agents of initial contact and that was confusing."
- "Provide soft copy of the presentations to attendees."
- "Their inspection report went beyond the energy improvements that could be assisted with financially through their program…they suggested ongoing improvements for us to do on our own, including replacing appliances, heaters, adding bathroom fans, etc., and as our units become available, we follow their suggestions. We have improved 10 of 14 units."
- "BayREN offers good information. However, rebates seem to depend on property owners making several upgrades at once. In my case, I had already made several small upgrades (that I was not sure I could document) and remaining small upgrades were insufficient to qualify for rebates. If I were contemplating a large upgrade, I would definitely check back to see about rebates."
- "I already knew what the house needed but had to pay for this pointless assessment in order to comply with Berkeley laws."
- "I consulted with your on line program, filled out the paperwork, had a rep from PG&E come out and do a site inspection, and visually go into every apartment, to tell me what I needed to replace for the

rebates, etc. then I never heard anything back from you or them. That was probably over a year or two ago."

- "My home was already very efficient, not much they could have told me."
- "Everything I was told was obvious and fully understood before your efforts. The rebates offered were not nearly sufficient to encourage action. The resulting energy savings would have been very small."

7.8.2 SoCalREN

Satisfied SoCalREN customers cited three predominant reasons for their high satisfaction ratings including saving money, saving energy, and appreciating the information that they received regarding EE and the cost effectiveness of various measures. Unclear or insufficient information was the most frequently cited reason for a neutral score. Unclear or insufficient information also topped the list of reasons among customers who said they were dissatisfied, followed by insufficient rebates and incentives. Table 27 provides a full list of customer remarks, including tallies of reasons why customers did not provide a higher score even though they were generally satisfied.

Table 27. Reasons for SoCalREN Satisfaction Scores

Reasons for Satisfaction Scores on Information Received (Multiple Response)	Percent (n=61[a])
Satisfied (6 to 10)	
Saving money	18%
Appreciated information regarding EE, energy, and cost savings	16%
Saving energy	10%
Dissatisfied with rebates	5%
Generally satisfied	5%
Good for environment	5%
Liked rebate	3%
Not seeing much difference	3%
Not sure	3%
Other	3%
Wanted more information	3%
Good reps at community event	2%
Happy with contractors	2%
Increased awareness regarding EE, energy, and cost savings	2%
Increased comfort	2%
Satisfied with REN	2%
Would have done it anyway	2%

Reasons for Satisfaction Scores on Information Received (Multiple Response)	Percent (n=61[a])
Neutral (5)	
Unclear or insufficient information	5%
Not much influence	3%
Best information came from contractor	2%
Liked rebate	2%
Nothing new	2%
Saving energy	2%
Wanted different measures	2%
Wanted more cost effectiveness analysis	2%
Dissatisfied (0 to 4)	
Unclear information	7%
Incentive not enough	3%
No value	3%
Nothing new	3%
Already knew info	2%
Change in terms mid project	2%
Dislike government	2%
Not enough savings	2%
Not interested in saving energy	2%
Not much influence	2%
Only used once	2%
Poor job	2%
Too much marketing and outreach	2%
Wanted vetted contractors	2%
Waste of tax dollars	2%

[a] Excludes respondents who were unsure or who declined to respond.

Below is a sample of customer responses.

- "Representatives who spoke to the community event were very knowledgeable, very persuasive, and in general they were excellent speakers."
- "The information was good quality and seemed reliable, not marketing based."
- "Program terms changed between when I accepted the proposal to when work was finalized. It caused

- major issues with my relationship with contractor."
- "Contractor has since told me that the rebates through the program were a mess administratively and subsequently discontinued without my project getting the rebates! My contractor had to eat not getting the rebates!!"
- "It saved me money both in the equipment and energy costs."
- "Not sure which communications are from which organization or utility."
- "I implemented more than they recommended way before I even heard of them."
- "Straightforward and easily understood information."
- "I just believe that if the home energy assessment could have spelled out the rebates more it should have helped."
- "You want me to say that SoCalREN has been effective and I think it is a waste of taxpayer dollars!"
- "Great incentives for California residents to reduce energy use."

7.9 Suggestions for Improvement of Energy Efficiency Related Activities

Fifty-nine of 137 respondents (43%) provided suggestions for improving their respective RENs' EE activities.

7.9.1 BayREN

Among the 48% of BayREN respondents that provided suggestions, the most prevalent suggestion was to provide more information about the range of EE equipment upgrades that customers can choose from and the relative cost effectiveness of each choice (19%), followed by larger rebates (13%) (Table 28). The remainder of suggestions were provided by only one or two respondents each. Note that approximately 6% of respondents to this question also mentioned that BayREN should "keep up the good work".

Table 28. Suggestions for Improvement of BayREN Programs/Activities

Suggestions for Improvement (Multiple Response)	Percent (n=31[a])
Information on options and cost-effectiveness and efficiency of equipment upgrades	19%
Bigger cashback/rebates/incentives	13%
Better customer communication/marketing	6%
Better follow up	6%
Less red tape	6%
Better rebate information	6%
Faster rebates	3%
Easier qualification	3%

Suggestions for Improvement (Multiple Response)	Percent (n=31[a])
Faster easier implementation	3%
Information on helping the environment	3%
List of approved contractors	3%
Pre-eval of eligibility prior to visit	3%
Programs for small upgrades	3%
Should be based on income, demographics	3%
Available measures should include solar	3%
Wider measure selection	3%
Other	6%

[a] Excludes respondents who declined to respond.

A sampling of verbatim customer remarks includes the following:

- "BayREN should include details on how a participant can apply for reinstatement in the program. The information should be included in the communication that advises the participant of his termination from the program. Receiving a notice of termination without an option for reinstatement does not inspire a participant to seek reinstatement or pursue other energy efficiency programs (the author of this comment is not a professional real estate developer; he is a small-time, family investor, if you need to know)."
- "I recommend follow up inquiries with property owners who have made initial inquiries and especially property owners who scheduled surveys."
- "Fulfill the rebate by following through with what I need to do to actually receive the rebate."
- "It would be way easier if the funds were paid in a different format. The rebate thing is tricky as we have no money to front to vendors and so have to work out in advance that they can wait for payment until after the rebate."
- "I think that the person who comes to assess the home should come with tangible resources and useful information about cost savings programs, etc. And I don't mean just a short pamphlet on the program. But give specific advice to homeowners about what they would best qualify for and should pursue. Not just recommendations for things that they probably already know."
- "Maybe have a page with a spreadsheet that explains all of the different components of the programs."
- "Provide a survey of the homeowner's current situation before the visit. You could save yourselves and the homeowners time if it turns out that, like in my case, there is really not much more to do towards energy efficiency."
- "Ongoing programs that make it easy to apply for small upgrades."
- "Do an initial intake and provide targeted guidance based on salary, demographic info, etc."
- "Attic installation should be offered for building with electric heaters too."

7.9.2 SoCalREN

More than half (57%) of the 39% of SoCalREN customers who offered suggestions recommended improvements to customer communications and marketing, followed by faster rebate processing (11%) (see Table 29). The remainder of suggestions were each offered by a single customer.

Table 29. Suggestions for Improvement of SoCalREN Programs/Activities

Suggestions for Improvement (Multiple Response)	Percent (n=28[a])
Better customer communication/marketing	57%
Faster rebates	11%
Allow renters to apply for rebates	4%
Change the program name	4%
Encourage more switching from gas to electric	4%
Improve infrastructure	4%
Information on options and cost-effectiveness and efficiency of equipment upgrades	4%
List of approved contractors	4%
More free measures	4%
More rebate money	4%
Provide programs for seniors, low income customers	4%
Other	7%
Not sure	4%

[a]Excludes respondents who declined to respond.

A sampling of verbatim customer remarks includes the following:

- "Widen the rebates available, make them easier to find, and make them instant. Allow renters to apply for them. I bought Energy Star appliances for a rental house which I use to this day but have never been able to claim a rebate."
- "Conduct outreach presentations at reputable community organizations (churches, schools, city recreation centers, etc.)."
- "Promote the programs with a simple, comprehensive outreach and then let an informed public decide. Quality over quantity. When funding for a program is renewed, and/or qualifications for an individual consumer are amended, make that known and let it be. Credit the ability of individuals to make informed decisions (even) in the absence of constant reminders."
- "Keep offering rebates. They are a powerful incentive, but not enough people know about them. No one I know had a clue rebates were available. The insulation that was installed made a huge difference in my home and again no one that I know realizes how much insulation reduces energy consumption."

- "Monthly list of rebates by email will help."
- "Show quantitative benefit in terms of dollars saved to take a certain action – for example in helping to determine purchases. For example, fueleconomy.gov was a site that I evaluated in purchasing the car that I indeed bought. I looked at the metric of "cost over 5 years" and this information did guide my decision."
- "Provide a list of certified/licensed contractors that have gone through stringent auditing of their performance and business practices."
- "The most important aspect is the availability of rebates throughout the year. It's unfortunate that funding sometimes disappears by the year end. Discounts or rebates are very important, especially when making decisions on costly energy efficient household equipment."

8. Engineering Analysis Results

Table 30 presents the first-year electric and natural gas savings associated with the surveyed single family and multifamily customers who installed EE equipment after interacting with BayREN or SoCalREN through non-resource activities. Among all 137 survey respondents, the combined gross savings are 1,934.2 MWh and 22,200 therms. The combined net savings are 1,604.1 MWh and 11,541 therms. When the 73 SoCalREN single family customers were considered independently, they generated gross savings of 293.4 MWh and 1,428 therms and net savings of 179.5 MWh and 716 therms. When only the 64 BayREN single family (n=22) and multifamily (n=42) customers were considered, they collectively produced gross savings of 1,640.7 MWh and 20,772 therms and net savings of 1,424.6 MWh and 10,826 therms.

Table 30. Electric and Natural Gas First-Year Savings Among 137 Survey Respondents by REN and Program Type

Survey Respondent Type	1st Year Gross Electric Savings (kWh)	1st Year Net Electric Savings (kWh)	1st Year Gross Gas Savings (Therms)	1st Year Net Gas Savings (Therms)
SoCalREN (single family only)	293,426	179,448	1,428	716
BayREN (single and multifamily)	1,640,744	1,424,619	20,772	10,826
BayREN (multifamily)	1,581,142	1,378,991	20,611	10,817
BayREN (single family)	59,602	45,628	161	9
Single family (SoCalREN and BayREN)	353,028	225,076	1,589	725
Total	**1,934,170**	**1,604,067**	**22,200**	**11,541**

Table 31 presents the same first-year gross and net savings from the installation of rebated EE equipment and non-rebated EE equipment installed by BayREN and SoCalREN non-resource activity participants. This disaggregation of rebated versus non-rebated equipment is based on whether customers reported to have received a rebate from one of the California PAs. For rebated measures, all 137 survey respondents produced gross savings of 1,453.5 MWh and 7,213 therms and net savings of 1,279.4 MWh and 2,381 therms. For non-rebated measures, the 137 survey respondents produced gross savings of 480.7 MWh and 14,986 therms and net savings of 324.7 MWh and 9,160 therms.

While a majority of the 1,604.1 MW overall net savings came from the installation of EE equipment through PA resource programs, 20% of the electric savings (324.7 MWh) came from the installation of EE equipment outside of PA resource programs. Nearly four-fifths (79%) of the overall 11,541 net therm savings came from non-rebated EE equipment (9,160 therms), largely due to the notable difference in savings between BayREN's rebated and non-rebated multifamily measures.

Table 31. Rebated and Non-Rebated Electric and Natural Gas First-Year Savings Among 137 Survey Respondents by REN and Program Type

Survey Respondent Type	1st Year Gross Electric Savings (kWh)	1st Year Net Electric Savings (kWh)	1st Year Gross Gas Savings (Therms)	1st Year Net Gas Savings (Therms)
Rebated Measures				
SoCalREN (single family only)	34,872	18,994	1,153	639
BayREN (single and multifamily)	1,418,591	1,260,361	6,061	1,742
BayREN (multifamily)	1,390,501	1,236,636	6,106	1,783
BayREN (single family)	28,090	23,725	(46)	(41)

Survey Respondent Type	1st Year Gross Electric Savings (kWh)	1st Year Net Electric Savings (kWh)	1st Year Gross Gas Savings (Therms)	1st Year Net Gas Savings (Therms)
Single family (SoCalREN and BayREN)	62,962	42,720	1,107	598
Rebated Measures Total	**1,453,463**	**1,279,356**	**7,213**	**2,381**
Non-Rebated Measures				
SoCalREN (single family only)	258,553	160,453	275	77
BayREN (single and multifamily)	222,153	164,258	14,711	9,083
BayREN (multifamily)	190,641	142,356	14,504	9,033
BayREN (single family)	31,512	21,902	207	50
Single family (SoCalREN and BayREN)	290,065	182,356	482	127
Non-Rebated Measures Total	**480,707**	**324,711**	**14,986**	**9,160**
% Savings from Non-Rebated Measures	**25%**	**20%**	**68%**	**79%**

9. Attribution Analysis Results

This section presents average attribution ratios for BayREN and SoCalREN non-resource activities. It also presents the total first-year gross and net electric and gas savings attributable to each of their programs, as well as the savings disaggregated by rebated and non-rebated EE equipment.

Collectively, all survey respondents attribute more than one-third of the energy savings associated with the EE measures that they cited to the non-resource activities of the RENs' single and multifamily programs. However, none of the savings discussed below are claimable since any savings attributable through a PA program have already been claimed and there is currently no mechanism for the RENs to claim the savings from the non-PA program installations.

9.1 Average Attribution Ratios for Non-Resource Activities

The RENs have a combined attribution ratio of 0.41 (Table 32). SoCalREN's single family program and BayREN's multifamily program have attribution ratios close to the combined average (0.43 and 0.42, respectively). BayREN's single family program has an attribution ratio of 0.22.

Table 32. Average Attribution Ratios by REN and Program Type

Survey Respondent Type	Attribution Ratio
All Respondents (SoCalREN and BayREN)	0.41
SoCalREN (single family only)	0.43
BayREN (single and multifamily)	0.38
BayREN (multifamily)	0.42
BayREN (single family)	0.22
Single family (SoCalREN and BayREN)	0.40

The evaluation team chose to provide simple averages for the attribution ratios rather than ratios weighted by savings to illustrate the combined influence of the full range of non-resource activities by the RENs. In our calculations of savings attributable to each of these non-resource activities presented in the next sub-section, the team relied on customer-level attribution ratios and savings values.

9.2 Savings Attributable to Non-Resource Activities

To estimate the electric and gas first-year savings attributable to the non-resource activities among the surveyed customers, the evaluation team applied customer-level attribution ratios to their first-year savings calculated from the engineering analysis. We then summed the savings for customers who participated in the different non-resource activities to arrive at the electric and gas savings attributable to each of the non-resource activities. The application of customer-level attribution ratios to the savings estimated from the engineering analysis allows us to gain an understanding about how influential the different REN non-resource activities are on single family and multifamily customer decisions to install EE equipment.

For all survey respondents, the combined gross savings attributable to the RENs' non-resource activities are 1,015.1 MWh and 11,277 therms, while the combined net savings are 877.1 MWh and 5,189 therms (Table 33). For surveyed BayREN single family and multifamily customers, their attributable combined gross savings

are 894.3 MWh and 10,408 therms, while combined net savings are 778.7 and 4,889 therms. For surveyed SoCalREN single family customers, their attributable combined gross savings are 120.7 MWh and 869 therms, while combined net savings are 98.4 and 300 therms.

Table 33. Overall Attributable Electric and Natural Gas First-Year Savings by REN and Program Type

Survey Respondent Type	1st Year Gross Electric Savings (kWh)	1st Year Net Electric Savings (kWh)	1st Year Gross Gas Savings (Therms)	1st Year Net Gas Savings (Therms
SoCalREN (single family only)	120,734	98,422	869	300
BayREN (single and multifamily)	894,335	778,680	10,408	4,889
BayREN (multifamily)	879,648	767,213	10,342	4,881
BayREN (single family)	14,687	11,466	65	8
Single family (SoCalREN and BayREN)	135,421	109,889	934	308
Total	**1,015,069**	**877,102**	**11,277**	**5,189**

Table 34 presents the attributable first-year gross and net savings from rebated EE equipment and non-rebated EE equipment installed by BayREN and SoCalREN non-resource activity participants. This analysis provides information to the CPUC about the impacts of RENs' activities that do not directly lead to claimed savings. Particularly important are the savings from EE equipment installations that were not carried out through a PA resource program, as these savings would not be accounted for in the California EE portfolio since there is no currently approved mechanism for claiming savings arising from non—PA program installations.

Among surveyed participants, 16% (138 MWh) of attributable first-year electric savings come from non-rebated measures. However, when it comes to first-year gas savings, the 95% of attributable net therm savings (4,907 therms) from non-rebated measures far exceeds that coming from rebated measures (282 therms). As noted in the engineering analysis section above, much of this was due to the notable differential in therm savings between rebated and non-rebated measures for BayREN's multifamily program. From this analysis, it is clear that a sizable number of customers who participate in REN non-resource activities and go on to complete an EE project are not being reflected in CPUC EE portfolio data either because customers did not apply for rebates or because inadequate data tracking makes it difficult to link non-resource activity-based customer contacts with the resulting energy efficiency projects. Consequently, sizable percentages of REN-related electric and gas net savings are not accounted for in the California EE portfolio, unless they were incidentally incorporated into spillover analyses conducted of the IOU resource programs.

Table 34. Attributable Electric and Natural Gas First-Year Savings by REN and Program Type

Survey Respondent Type	1st Year Gross Electric Savings (kWh)	1st Year Net Electric Savings (kWh)	1st Year Gross Gas Savings (Therms)	1st Year Net Gas Savings (Therms)
Rebated Measures				
SoCalREN (single family only)	14,961	8,013	532	268
BayREN (single and multifamily)	822,178	731,122	2,462	14
BayREN (multifamily)	813,762	724,011	2,476	26
BayREN (single family)	8,416	7,111	(14)	(12)
Single family (SoCalREN and BayREN)	23,378	15,124	518	256

Survey Respondent Type	1st Year Gross Electric Savings (kWh)	1st Year Net Electric Savings (kWh)	1st Year Gross Gas Savings (Therms)	1st Year Net Gas Savings (Therms)
Rebated Measures Total	**837,140**	**739,135**	**2,994**	**282**
Non-Rebated Measures				
SoCalREN (single family only)	105,773	90,409	337	32
BayREN (single and multifamily)	72,157	47,558	7,945	4,874
BayREN (multifamily)	65,886	43,202	7,867	4,855
BayREN (single family)	6,271	4,356	79	20
Single family (SoCalREN and BayREN)	112,044	94,764	416	52
Non-Rebated Measures Total	**177,929**	**137,966**	**8,283**	**4,907**
% Savings from Non-Rebated Measures	**18%**	**16%**	**73%**	**95%**

10. NMEC Applicability Assessment

While evaluators have used billing data analysis and submetering to estimate the impacts of EE programs, more recently the CPUC has advocated for the use of Normalized Metered Energy Consumption (NMEC) to conduct these impact evaluations when applicable. Part of the scope of this study is to consider whether the evaluation team could use an NMEC approach to quantify the benefits of REN non-resource activities on the EE portfolio in the future. This section describes the evaluation team's initial assessment of the viability of using NMEC, including a review of NMEC requirements and what tracking data and protocols the evaluation team would require to successfully employ NMEC in this arena. Our research and exploration of these topics draws upon parallel research efforts conducted under the Group B contract in support of the Workforce Education & Training research sector. This evaluation team is preparing a white paper for the CPUC as part of Deliverable 26: WE&T and Installation Improvement Evaluation Study (forthcoming).[28]

As with other methods of impact analysis, NMEC studies compare energy consumption data from before and after an EE intervention. However, unlike billing analysis, NMEC studies draw upon actual energy metering data obtained directly from the customer's meter. The potential applicability of NMEC has in part led the CPUC to call upon PAs to design and implement pay for performance EE programs based upon customers' actual consumption data. PAs and other interested parties are currently defining common ground rules for the application of NMEC methods and in the process of designing or redesigning customer resource programs to accommodate NMEC evaluation. To the best of our knowledge, NMEC has not yet been used to evaluate any PA non-resource activities.

The use of NMEC in California has been shaped by a number of legislative mandates, regulatory rulings, guidance documents, discussions in working groups, and suggested procedures, including Evaluation, Measurement and Verification (EM&V) policies, such as the California Evaluation Protocols[29] and the CPUC's Energy Efficiency Policy Manual.[30] The most recent legislation, signed into law in 2015, includes California Assembly Bill (AB) 802 and Senate Bill (SB) 350, both of which discuss new standards for verifying energy reduction and establish the need to measure energy savings based on consumption data tracked at the meter. In 2015, the CPUC also issued a ruling concerning EE rolling portfolios, policies, programs, evaluation, and related issues pertaining to high opportunity EE projects or programs (HOPPs).

Since 2015, additional rulings, decisions, policies, articles, and whitepapers have addressed NMEC and provide more targeted procedures than the guidance and policies issued before. Three documents that appear relevant include the California Public Utility Commission's (CPUC) Rulebook for Custom Program and Projects Based on NMEC[31]; a document that addresses NMEC requirements and procedures for individual projects (site level) in commercial sector customer facilities[32]; and another document that provides recommendations around population-level approaches.[33] Further, a January 2019 Ruling[34] was issued further acknowledging that NMEC methods could apply to both site-level and population-level analysis. While these are among the

[28] *Assessment of NMEC Methodology for WE&T Evaluations*, White Paper in development to support CPUC Contract Group B: Deliverable 26 Year 1 Study, forthcoming October 2019.
[29] California Energy Efficiency Evaluation Protocols, State of California Public Utilities Commission, April 2006.
[30] CPUC EE Policy Manual, Version 5 (July 2013)
[31] Rulebook for Custom Program and Projects Based on Normalized Metered Energy Consumption (NMEC). Version 1. Release Date: 23-March-2018. Applicable to programs and/or projects proposed after adoption of CPUC adopted Business Plans.
[32] Normalized Metered Energy Consumption Savings Procedures Manual, Version 1.01, ET15SCE1130 Report. Prepared by Emerging Products, Customer Service, Southern California Edison. December 2017.
[33] Normalized Metered Energy Consumption Working Group Recommendations for Population-Level Approaches. Common Spark Consulting. June 20, 2019.
[34] The CPUC issued further guidance on NMEC methods (January 2019) in an Administrative Law Judge's Ruling on Certain Measurement and Verification Issues, Including Third Party Programs.

most relevant directives related to NMEC methodologies, discussions regarding NMEC are still evolving, particularly in the CPUC-organized NMEC working group, and additional ground rules and guidelines may be applicable.

These various rulings and decisions place some practical limits on the uses of NMEC as a tool for measuring energy consumption. Chief among these, particularly from the perspective of assessing the impacts of any non-resource activities, are a reasonable expectation of multiyear savings and the ability to discern clearly detectable impacts at the meter. Evaluators must carefully consider both of these factors when contemplating the idea of using NMEC to assess any savings associated with non-resource activities, which, unlike resource programs, are 1) more likely to be one time or episodic behavioral interventions with a lower probability of driving persistent savings, and 2) are less likely to be clearly associated with a direct action that may produce sizeable enough savings at the meter to be distinguishable from other measures, actions, or exogenous factors. While these are not insurmountable obstacles in the use of NMEC for the assessment of non-resource activities, they do highlight the importance of a program and research design that takes this into account. As such, we feel that it is essential that any effort to apply an NMEC-based evaluation to a set of non-resource activities must do so by incorporating an embedded NMEC evaluation plan within the larger program design and implementation planning at the onset of the program launch rather than as an ad hoc evaluation approach retroactively applied to non-resource activities that have not been undertaken with such an analysis in mind.

With this essential caveat clearly established, we can discuss other program and research design requirements and limitations in the application of an NMEC-based analysis to REN non-resource activities.

10.1 NMEC-Related Program and Research Design Requirements

NMEC studies generally rely on either site-level or population-level approaches. Site level NMEC is an energy savings calculation approach that "describes how to determine site-specific saving" for "individual buildings (not groups of buildings).[35] This typically refers to analysis of individual projects (or groups of projects) within commercial sector buildings/facilities. Site-level NMEC can apply at the primary meter or submeter level. Population level NMEC is "an energy savings calculation approach in which results are based on energy usage data observed at the meter and aggregated across a portfolio/program/population rather than a modeled engineering forecast or deemed value." Notably, "population NMEC programs are those in which savings are claimed for an aggregate or portfolio of sites with similar characteristics."[36] Both of these NMEC study types have requirements associated with them. There are also more general EM&V protocols and procedures that evaluators should consider. These include: length of analysis period; establishing a direct savings link expected magnitude of savings; net impacts (non-resource activity influence); complexities introduced by PV generation, electrical storage, or electric vehicles; self-selection bias; and double counting. Each of these are discussed in more detail below.

10.1.1 Length of Analysis Period

The length of the analysis is one of the most important factors to consider when assessing our ability to use NMEC data in the evaluation of the impact of non-resource activities. NMEC savings claims are expected to be based on at least 12 months of post-installation usage data. The baseline period is the 12-month period leading up to the EE intervention or retrofit. The CPUC Rulebook states that the monitoring period shall last a total of 24 months for projects containing behavior, retro-commissioning, operational, maintenance and repair

[35] Normalized Metered Energy Consumption Savings Procedures Manual, Version 1.01, ET15SCE1130 Report. Prepared by Emerging Products, Customer Service, Southern California Edison. December 2017. Page 1.
[36] Normalized Metered Energy Consumption Working Group Recommendations for Population-Level Approaches. Common Spark Consulting. June 20, 2019. Page 2.

measures.[37] With these time frames in mind, and with the amount of time required to incorporate an NMEC approach into a non-resource activity program design and evaluation, it would be not feasible to complete such an evaluation until after the three year window for this evaluation effort.

10.1.2 Linking Non-Resource Activities to a Meter

Of almost equal importance is the requirement for a direct savings link. According to California Energy Efficiency Evaluation Protocols, "producing savings directly means that the link between the program activity and savings is clear, straightforward and relatively fast." Establishing a direct link between an EE intervention and the savings that it generates is a foundational to any EE program that accepts ratepayer funds and it is generally considered a central element in program design and implementation. However, the administration of non-resource activities by their very nature often falls outside of resource program design and implementation. Consequently, such links are more challenging to establish.

To use an NMEC approach to evaluate non-resource activities, REN program staff and evaluators must first link the training intervention to a meter within the PA's service territory. For example, to link any potential savings to a workshop or training effort, program implementation staff would need to (1) track individual participants (i.e., the specific people who received the training and not the companies they work for); (2) categorize the type of energy saving activity that the workshop or training is meant to induce; and (3) link that participant to a meter where the REN or evaluators may eventually be able to pull data.

From a data tracking perspective, this requires REN staff to track the types of energy saving actions that individual workshops or trainings attempt to induce and to develop a process and infrastructure for capturing trainee information (including the type of position, company, and tasks the trainee performs in their work) as well as account information for the customer site where the energy savings actions occurred.

Linking other types of non-resource activities, such as marketing and outreach, to customer meters would require the collection of similar data, which may or may not be practical or feasible in other settings such as fairs, meetings, webinars, and other public events. Furthermore, establishing a connection between exposure to a non-resource activity and a physical address with a customer meter, is still only the first step in establishing a link to actual energy savings as a result of that non-resource activity.

10.1.3 Expected Magnitude of Savings

The 2015 CPUC ruling on HOPPs states that projects should maintain a minimum threshold of expected savings for normalized metered energy consumption projects at 10% of annual consumption.[38] The CPUC Rulebook further states that "programs targeting savings that comprise less than 10% of annual consumption must provide a rationale and explanation in the Implementation Plan of how savings will be distinguishable from normal variations in consumption."[39] Because non-resource activities by their nature are more loosely associated with claimable energy savings than traditional resource activities, they are also less likely to generate 10% annual energy savings as a direct result of the non-resource intervention. While the 10% target savings threshold is not a firm limit, prior to any evaluation by the Opinion Dynamics evaluation team, RENs

[37] Rulebook for Custom Program and Projects Based on Normalized Metered Energy Consumption (NMEC). Version 1. Release Date: 23-March-2018. Applicable to programs and/or projects proposed after adoption of CPUC adopted Business Plans. Page 13.
[38] Assigned Commissioner and Administrative Law Judge's Ruling Regarding High Opportunity Energy Efficiency Programs or Projects (12/30/2015), Attachment A, page 6.
[39] Rulebook for Custom Program and Projects Based on Normalized Metered Energy Consumption (NMEC). Version 1. Release Date: 23-March-2018. Applicable to programs and/or projects proposed after adoption of CPUC adopted Business Plans. Page 9.

would need to provide an appropriate rationale including an explanation of how their program planned to detect smaller levels of savings.

10.1.4 Persistence of Savings

While evaluators can establish persistence of savings for physical equipment based on the measure's effective useful life, any savings claims associated with behavioral changes must be determined through an impact analysis, which under California rules are generally limited to one or two years of savings persistence. Any effort to evaluate potential energy savings associated with non-resource activities, using NMEC or not, will necessarily require a research design to establish persistence. Codes and standards activities may prove to be the most appropriate type of non-resource program type in this regard.

10.1.5 Net Impacts (Influence of Non-Resource Activity)

California EM&V requirements stipulate that net impact evaluations must meet minimum levels of rigor, such as collecting primary data to calculate 300 site-level net-to-gross ratios (NTGRs) and an assessment of the portion of the participating population that would have adopted the energy conservation measure (ECM) in the absence of the program. A "basic" level of rigor for net impact evaluations includes the use of participant self-reports (i.e., surveys of program participants). Similar standards would reasonably apply to an assessment of any impact non-resource activities, including those using an NMEC-based approach. As such, REN non-resource efforts and any accompanying research design would necessarily need to take this into account.

10.1.6 Complexities introduced by presence of PV generation, electrical storage, or electric vehicles

As with all energy consumption studies, NMEC analysis is intended to ascertain ultimate energy savings at the customer's meter. Any factors that can influence this consumption, including PV generation, storage, and the presence of electric vehicles complicates all forms of (i.e., both site- and population-level) analysis. Given the growing adoption of solar panels, battery storage and electric vehicles, any research design must be able to identify and eliminate these factors from the meter data. This factor again demonstrates the importance of embedding any NMEC-based research efforts within the REN's program design and implementation from the beginning.

10.1.7 Self-Selection Bias

California EM&V evaluation efforts have long recognized the importance of addressing self-selection bias, which exists in any voluntary program. In the realm of EE this means customers taking actions to change their energy consumption may naturally be doing so in ways that are different from those who are not interested. This is particularly relevant for any customers who self-select into a non-resource activity. While this is true for any type of evaluation effort of non-resource activities, it applies to an NMEC-based analysis as well.

10.1.8 Double Counting

Lastly, as with any effort to establish energy savings, using NMEC data to determine non-resource activity savings must be done in a manner that ensures those savings have not been counted elsewhere. For example, if the installation of a measure has been claimed by one PA program, an effort to determine the impact of a non-resource activity such as workforce education and training would need to tease out and separate the effect of the training from any savings associated with the measure installation.

10.2 NMEC-Related Data Collection

To support an NMEC study, REN staff would need to develop a reliable and accurate process for collecting the supporting data. Resource programs that use an NMEC or other consumption-based approach for evaluating program impacts have an existing process and set of tools for collecting description data to compliment consumption data. The RENs would need to apply these processes to non-resource efforts as well. As such, REN staff would need to gather information about household characteristics, appliance information, and other details to help facilitate a model specification that can estimate savings for a specific non-resource intervention. Table 35 presents salient data fields that evaluators would require to appropriately use the NMEC approach to examine the impacts of non-resource activities.

Table 35. Customer Data Needed to Support NMEC Study

Data Type	Description
Intervention Information	Description of the non-resource activity, including type, date, location, intended audience, purpose, content, etc.
Participant information	Name, contact information, capacity (private individual or employee), role (in company), primary energy related activities, etc.
Account information	Account number, site address, and other information used to identify the customer.
Program participation	Information about other PA programs they may have enrolled in in the past.
Building characteristics	Basic information about the site (e.g., fuel type, building type, heating/cooling equipment, etc.).
Other energy-related details	Other changes that the customer may have made to their home that would affect their energy-usage.
Non-routine events (for site-level NMEC Study only)	Information about various "non-routine events" that may have contributed to anomalous swings in energy consumption during the evaluation period.

10.3 NMEC Applicability Assessment Conclusions

The use of NMEC holds considerable promise for the evaluation of energy saving activities in California, and many PAs are on track to incorporate NMEC into their resource program designs. However, as is the case with the evaluation of non-resource activities in general, the ability to utilize an NMEC-based approach to ascertain savings for non-resource activities lags considerably behind. At this point, we feel the most appropriate approach may be to observe developments in the use of NMEC in the evaluation of resource programs and withhold any attempts to do so for non-resource activities until such time as RENs have developed program designs that are clearly intended for its use.

11. Findings and Recommendations

The REN's non resource activities are having a positive impact on the California energy efficiency portfolio, and energy savings arising from these efforts are likely under-counted. While a sizable percentage of customers who participate in REN-sponsored non-resource activities go on to install energy efficiency upgrades and adopt energy saving behaviors, data tracking limitations make it difficult to determine the full extent of the impacts associated with these REN efforts. Establishing a consistent set of metrics and data tracking practices for non-resource activities will improve the evaluability of non-resource activities and provide for greater insights into their contributions to the statewide EE portfolio.[40]

Additional findings and recommendations arising from the research and evaluation activities conducted to support the Year 1 Assessment of California RENs Study are discussed below. Note that not all findings have an associated recommendation.

Finding #1: Based on the results of the attribution analysis, the evaluation team found sizeable unclaimed energy savings that are in part attributable to REN non-resource activities. Of the total attributable first-year net electric savings (877.1 MWh) from installed EE equipment, 16% (138 MWh) resulted from customers who were exposed to REN non-resource programs installing EE equipment outside of a PA resource program. The gas savings attribution percentage was appreciably greater. Of the total attributable first-year net gas savings (5,189 therms) from installed EE equipment, 95% (4,907 therms) resulted from installing EE equipment outside of a PA resource program. Much of this was due to the notable differential in therm savings between rebated and non-rebated measures for BayREN's multifamily program. From this analysis, it is clear that a sizable number of customers who participate in REN non-resource activities and go on to complete an EE project may not be reflected in CPUC EE portfolio data either because customers did not apply for rebates or because inadequate data tracking makes it difficult to link non-resource activity-based customer contacts with the resulting energy efficiency projects. Consequently, sizable percentages of REN-related electric and gas net savings are not accounted for in the California EE portfolio, unless they were incidentally incorporated into spillover analyses conducted of the IOU resource programs.

Recommendation: Establish a consistent set of metrics and data tracking practices for non-resource activities that in turn feed into standardized REN databases that align with CPUC databases to make future efforts to measure and evaluate REN non-resource activities more effective.

Finding #2: Based on the evaluability assessment of BayREN and SoCalREN's non-resource activity data, the evaluation team found the data to be partially complete. To the extent possible from the data provided, the team was able to quantify the benefits of selected REN non-resource activities. While BayREN's data was more complete and better organized than SoCalREN's, generally speaking, the team found the quality of both RENs' non-resource program data to be inconsistent, and their datasets lacking a standardized set of fields to be tracked.

> **Recommendation:** The evaluation team recognizes that the very nature of certain non-resource activities is not conducive to standardized data collection (for example, live outreach campaigns that rely on customer intercepts such as tabletop events). **However, RENs should gather detailed participant information for audits, technical assistance visits, workshops, referrals to other programs, and other similar activities that allow for the collection of this information.** Information that would

[40] Although an evaluation of non-resource activities associated with non-REN program administrators was not the subject of this study, the evaluation team suggests that establishing a standardized set of common metrics and data tracking practices for all non-resource activities across the California EE portfolio would be worth careful consideration.

improve the evaluability of non-resource activities includes: customer name, email address, service address, dates of participation in the non-resource activity, and all associated customer IDs used by the PAs. Such data would facilitate customer identification in REN records and the matching of those data in the CPUC program database. As data quality and completeness improve, evaluators can more fully capture the attributable energy savings from non-resource activities. Analyses of this sort go far to demonstrate the benefits of non-resource activities, particularly those offered by PAs with a more local or community focus, such as CCAs.

Finding #3: The channeling analysis matched 25% of BayREN records and 1% of SoCalREN records with CPUC participant data for PA resource programs – collectively 23% of all REN non-resource participants across all REN programs and other non-resource activities. These percentages provide a lower bound for the number of REN non-resource participants that went on to participate in PA resource programs. Our estimates are constrained by data limitations; the actual percentages of such REN participants are likely much higher. Upon completion of this analysis, the evaluation team concluded that BayREN customer data was sufficiently aligned with CPUC records for the team to develop a sample of survey respondents for the non-resource activity participant survey, but SoCalREN's was not.

> **Recommendation: If the RENs and the CPUC are interested in a more comprehensive accounting of the impacts of REN non-resource activities on the California EE portfolio, the evaluation team recommends the RENs use a standardized method and format for recording non-resource activity participant data, for at least those activities where data can easily be tracked.** For example, when residents and businesses receive energy assessments, attend presentations and workshops, and receive referrals to resource programs, the RENs should capture contact names, business names, email addresses, phone numbers, and mailing addresses, along with customer IDs in a standardized digital format. The CPUC program database requires the RENs to provide their resource program data in a standardized format and we recommend that this same format, when possible, is applied to the tracking of non-resource activity participants.

Finding #4: Sixty-six percent of the respondents (91 of 137) indicated completing at least one EE equipment upgrade at their single or multifamily property since interacting with either BayREN or SoCalREN through a non-resource activity between 2016 and 2018. Breaking this down by REN, 71% of SoCalREN's and 61% of BayREN's combined single family and multifamily customers indicated completing upgrades during that time. Based on this information, it is evident that REN-related non-resource activities are contributing to PA-sponsored EE projects and there are likely additional projects in the CPUC program data that may be linked to REN non-resource activities. However, given the challenges in establishing a link between REN non-resource activity efforts and CPUC program data discussed in Findings #2 and #3, this correlation may be difficult to establish.

> **Recommendation:** We recommend consistent use of the REN data flag within program data and in concomitant non-resource activity tracking by RENs, IOUs and third-party implementers, as it would make it far easier to align REN and other PA program records. This would help to ensure that REN efforts are more accurately and appropriately tracked and credited to ultimate energy savings.

Finding #5: Survey respondents are generally satisfied with both the quality of the energy related information received from their respective RENs (mean 7.8 out of 10) and with their REN's energy saving activities (mean 7.1). Satisfaction is higher for BayREN customers, with average satisfaction scores of 7.3 for the quality of EE information received and 7.7 for EE activities, compared to SoCalREN customers who provided average satisfaction scores of 6.9 for EE information and 7.0 for EE activities.

Finding #6: Forty-three percent of all survey respondents (59 of 137 respondents) provided suggestions for improving their respective RENs' EE activities. In all, 48% of BayREN customers and 39% of SoCalREN customers provided suggestions. Among BayREN respondents, the top two suggestions were to provide more information on the range of potential EE upgrades and the cost effectiveness of each choice (19%) and provide additional funding for rebates and incentives (13%). Meanwhile, more than half (57%) of SoCalREN customers recommended improvements in customer communication, marketing, and rebate processing (11%).

Finding #7: REN non-resource activities have moderate influence on customer decisions to install EE equipment and engage in energy saving behaviors, with degree of influence varying across non-resource activities. Among all 137 survey respondents, more than half (55%) found the REN-sponsored non-resource activities to be either somewhat or extremely influential in their decision to install EE equipment, with a mean score of 6.1 compared to a mean score of 3.9 for the combined effect of any other non-REN related influencing factors. For SoCalREN customers, interactions with community groups and with local government were the most influential activities, while for BayREN customers, community group interactions and attendance at community events were strongly influential. The divergence in these findings across the two RENs likely arises from differences in program design and implementation.

11.1 Conclusion

The REN's non resource activities are having a positive impact on the California energy efficiency portfolio, and energy savings arising from these efforts are likely under-counted. While a sizable percentage of customers who participate in REN-sponsored non-resource activities go on to install energy efficiency upgrades and adopt energy saving behaviors, data tracking limitations make it difficult to determine the full extent of the impacts associated with these REN efforts. Establishing a consistent set of metrics and data tracking practices for non-resource activities will improve the evaluability of non-resource activities and provide for greater insights into their contributions to the statewide EE portfolio.[41]

[41] Although an evaluation of non-resource activities associated with non-REN program administrators was not the subject of this study, the evaluation team suggests that establishing a standardized set of common metrics and data tracking practices for all non-resource activities across the California EE portfolio would be worthy of careful consideration.

For more information, please contact:

Aaiysha Khursheed, Ph.D.
Principal Consultant, Opinion Dynamics

858-401-7638 tel
akhursheed@opiniondynamics.com

Matthew Joyce
Director, Tierra Resource Consultants

303-579-3344
matthew.joyce@tierrarc.com

Opinion Dynamics

Boston | Headquarters
617 492 1400 tel
617 492 7944 fax
800 966 1254 toll free

1000 Winter Street
Waltham, MA 02451

San Francisco Bay
510 444 5050 tel
510 444 5222 fax

1 Kaiser Plaza
Suite 445
Oakland, CA 94612

San Diego
858 270 5010 tel
858 270 5211 fax

7590 Fay Avenue
Suite 406
La Jolla, CA 92037

Portland
503 287 9136 tel
503-281-7375 fax

3934 NE MLK Jr. Blvd.
Suite 300
Portland, OR 97212