BayREN

Multifamily Program Evaluation – Final

Photo source: https://www.bayren.org/multifamily-property-owners/building-improvements

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Executive Summary

BayREN's multifamily program (Bay Area Multifamily Building Enhancement, BAMBE) is an equity segment program that is open to all multifamily properties but focuses on areas that are often underresourced. 2023 marked an expansion to this focus with new incentive adders put in place by the program help overcome the split incentive barrier that occurs in rental buildings in burdened area and to help maximize benefits (energy, comfort, safety, etc.) to renters facing higher housing costs and environmental health and heat risks. The adders also help to better reach properties in areas typically underserved by energy programs.

Focus areas for BAMBE are:

- **Small Buildings:** Bay Area multifamily building owners who require a higher level of program assistance (i.e., smaller buildings with <50 units per building)
- **Equity:**
  - affordable housing communities, both deed-restricted and unsubsidized affordable housing (aka Naturally Occurring Affordable Housing, NOAH)
  - buildings with Section 8 residents (i.e., low-income households)
- **Burdened Homes:** buildings within specific census tracts where households are noted to be low income, burdened by extreme heat, or where residents have health problems (e.g., asthma) and are exposed to high levels of air pollution. [1]

The program requires installation of two or more energy efficiency and/or electrification measures and measures must be designed to save at least 10% of a building energy use. For project scopes including in-unit envelope measures (exterior wall insulation or windows), the savings threshold is reduced to 5%.

This research concentrated on assessing the program results within the areas of focus and if there was an indication that the new incentive adders were bringing about change. Program accomplishments included herein are from projects with claimed savings in 2022 and 2023 and projects in 2024 that are active (have a rebate reserved as of September 2024) but may or may not be completed in 2024 in time to claim savings. Note that this analysis does not reflect program impact for the full calendar year 2024—it only reflects accomplishments through Q3 of 2024 (the data was pulled for analysis on September 23, 2024). The actual number of projects that were active or complete by the end of Q4 2024 was more than 100, but the analysis was not re-done due to time constraints at the end of the year. Our findings indicate the following.

The program is reaching its intended target and having its intended effects.

- 90% of the program's projects are smaller buildings. In 2022 and 2023, 75% of the 56 projects were in smaller buildings (<50 units) with an average of ~36 units per building . For 2024, 90% of the buildings active in the program (71 projects) are less than 50 units with an average of 22 units per building.
- Two-thirds of the resident units are equity targeted participants (and growing). The percentage of resident units in equity targeted areas (as defined by the CPUC) doubled between 2022 and 2023 (from 24% to 58% of all units) with projects active in 2024 expected to reach almost three times what was served in 2022 (at 67% of all units). Projects in 2022 and 2023 included a population of 1,755 and 2,459 units respectively while projects active in 2024 have 2,497 units.
- 84% of resident units are in equity targeted or burdened zones in 2024. Of the 2,497 residential units that the program is working with in 2024, 75% are in an equity targeted or burdened zone and an additional 9% are in an equity targeted area only.

[1] Equity targeted participants is defined by the CPUC as program participant that meets CPUC-adopted criteria for being hard-to-reach, located in a disadvantaged community, OR underserved. The current program areas of focus noted here are the priorities for the program, but as shown later in the report, any 2024 equity targeted participants is already included in one or more of the focus areas noted herein.

- Special incentives are making a difference for resident installations. Prior to the inclusion of adders specifically designed to have measures installed in resident units, half of the projects included measures for residents and those residents received mainly low cost measures. After the adders were included, 94% of projects included resident measures and the rate of low cost installations dropped substantially while the rate of higher cost measure installations increased threefold or more.
- Electrification incentives are driving higher rates of installation. Fuel substitution measures are higher in 2024 than 2022/2023 with both residents and building owners benefiting from this type of measure.

The program is different from other 2024 MF programs active in California

- BAMBE is one of two programs that serve smaller properties in 2024. Of the 12 active multifamily programs active in 2024, BayREN is one of two programs (the other is the SoCalREN MF HTR program that is just beginning in late 2024) that focus on serving small properties. As noted above, BayREN targets properties with deed-restriction and/or less than 50 units and in 2024 was working with even smaller buildings (77% of buildings active in the program were less than 25 units).
- Historically, BAMBE has served a higher percentage of underresourced resident units than other programs (i.e., HTR, DAC, or considered local difficult to serve)**.** In the past four years (2020-2023), the BayREN program has provided energy upgrades to about 10,400 units and 89% of those (~9,300 units) are what has been tracked as underresourced. We have spotty information on resident units served within other programs, so cannot fully describe the historic uptake within MF buildings across all programs in this analysis. However, in 2023, four PA programs (including BAMBE) served a little over 12,000 resident units and ~60% of those units were considered underresourced while 92% of BayREN resident units (~2,200 out of ~2,400 units) were underresourced. [2]

Changes that the program may want to make are:

- Exploration of certain program processes. Specifically, whether…
    - …making program requirements more prominent on the multifamily landing page on the BayREN website will lead to higher rates of customers who complete installations (fewer customers who do not meet requirements will apply).
    - …having the TA move a "lead" to a "project" within the program tracking system rather than the person performing the intake improves the conversion of leads to completed projects.
    - …use of e-signatures reduces TA time spent on paperwork and improves customers satisfaction.
- Check that project tracking for equity is aligned with the CPUC. Equity indicators required by the CPUC require counts by defined areas. Appendix G describes how placement of a project within an equity targeted area occurred for this report. While we heard that the program is now tracking equity targeted customers, BAMBE may want to check that their process is similar to what was used in this report when describing CPUC related equity targeted participation. The program includes other categories such as small properties or Community Land Trust properties in their targeted population
- Monitor ongoing and future NEB studies. BAMBE should monitor two new studies as we expect they will help the program understand how to potentially calculate and track NEBs expected from installation of certain measures.

[2] The four programs were BayREN, SoCalGas, SoCalREN, and TCR. MCE served 653 units in 2023 but did not provide the number in HTR or DAC, so those units are not included in the total.

Overview of Multifamily Research

Background and Context

BayREN's multifamily program (Bay Area Multifamily Building Enhancement, BAMBE) is an equity segment program that is open to all multifamily properties (2-4 and 5+ units) in the nine-county Bay Area served by PG&E. The program has always served underresourced communities, and, in 2023, the program expanded this focus with a renewed push to serve smaller buildings. New special incentives (i.e., adders for burdened homes) were also put in place by the program to help overcome the split incentive barrier that occurs in rental buildings in burdened areas and to help maximize benefits (energy, comfort, safety, etc.) to renters facing higher housing costs and environmental health and heat risks.[3] The adders also help to better reach properties in areas typically underserved by energy programs.

Focus areas for BAMBE include:

- **Small Buildings:** Bay Area multifamily building owners who require a higher level of program assistance (i.e., smaller buildings with <50 units per building)
- **Equity:**
  - Deed-restricted affordable housing communities and unsubsidized affordable housing (aka Naturally Occurring Affordable Housing, NOAH)
  - buildings with Section 8 residents (i.e., low-income households)
- **Burdened Homes:** buildings within specific census tracts noted to be burdened by high rent and/or utility bills, extreme heat, or where residents have health problems associated with poor air quality (e.g., asthma) and are exposed to high levels of air pollution.[4]

The program requires installation of two or more energy efficiency and/or electrification measures and measures must be designed to save at least 10% of a building's modeled energy use. For project-scopes including in-unit envelope measures (exterior wall insulation or windows), the savings threshold is reduced to 5%.

Multiple organizations are involved in the implementation of BAMBE. The table below shows the organizations and roles for all of those involved.

Table 1. BAMBE Program Organizations and Roles

Organization	Role
StopWaste	BayREN member who designs and manages the program
County Staff	Markets the program (staff within all nine BayREN counties)
Frontier	Supports regulatory compliance and reporting as well as performing lead intake, project review, and CRM maintenance
AEA	Technical advisors who perform all aspects of project implementation after intake outside of San Francisco County (e.g., onsite survey, measures recommendations, support throughout the measure installation process, etc.)
SFE	Provides implementation services described above for the City and County of San Francisco
Slipstream	GIS mapping and research consultant (as needed)

[3] The split incentive barrier occurs when who pays for an energy efficiency upgrade (e.g., the building owner) does not benefit financially from the upgrade. This barrier tends to reduce how often building owners want to upgrade rental units.
[4] Equity targeted participants is defined by the CPUC as program participant that meets CPUC-adopted criteria for being hard-to-reach, located in a disadvantaged community, OR underserved. The current program areas of focus noted here are the priorities for the program, but as shown later in the report, any 2024 equity targeted participants is already included in one or more of the focus areas noted herein.

Research Objective and Questions

Objective: To provide the program and stakeholders with knowledge of the program and inform future program efforts.

Key Research Questions:

The research questions for this effort are below and Appendix B shows where each question is answered within the report.

Is the program reaching their intended targets and having the intended effects?

1. Who is the program serving and how many residents and buildings are being served?
2. Is the targeting (through both marketing and incentive design) having the intended effect?
3. What are the expected non-energy benefits from this program and are they being seen by residents?

How does the multifamily program work and how is it different than other California programs?

4. What is the program theory and logic behind the multifamily program?
5. How does the BayREN program differ from other CA multifamily programs (and where is there overlap) and how might this inform near and long term program strategy?

What are changes that the program may want to make?

6. What existing research can the program leverage to calculate and track non-energy benefits?
7. What additional data could/should be collected to show the intended effects of the program (e.g., data collection from residents)?
8. What improvements could be made to the program to better serve multifamily residents and buildings? This includes determining what the program could do to better identify or support projects so that they go through the program.
9. What improvement can be made to increase program cost effectiveness, TSB, and project conversion? (answered as budget allowed)

Data Collection

The evaluation team of Grounded Research and Verdant gathered information from multiple sources to provide findings in this report. Specifically, we:

- Interviewed four (4) implementation team members (see data collection guide in Appendix C).
- Reviewed program tracking data with data from Q1 2022 through Q3 2024.
- Gathered information from implementation plans, annual reports, and CEDARS to perform a review of MF programs in California active in 2024.
- Performed logit regression modeling of past participation data to determine project characteristics that influence whether a project is active or inactive.

Future Research

In 2025, the evaluation team plans to explore how the program can best engage with residents. Specifically, we expect to conduct a survey to help the program understand if 1) non-energy benefits are accruing to residents and 2) the program could help empower residents to become involved in energy choices. Specific survey topics may include questions to:

- Determine residents perception of potential non-energy benefits (NEBs) and seek to monetize NEBs either through survey responses or application of methods outlined in other studies.
- Better understand and document the experience of renters living in buildings that have received energy efficiency and electrification upgrades through BAMBE. This type of information could inform/enhance program design or program offerings to better reach and serve target populations.

- Gather data so that the program could more effectively communicate the story of the program's impact by collecting data and testimonials from the people living in rental properties.
- Understand if benefits renters receive through the program beyond just energy savings can be maximized (e.g., determine if the renters know how to use the installed technology to increase comfort, cook culturally relevant cuisine, save on electricity bills, etc.).

Additional BAMBE research could include:

- Delving into all aspects of costs and benefits to help the program improve its cost effectiveness.
- If the program thinks that they are not obtaining sufficient project leads, explore the activities associated with barriers around awareness and knowledge and customer lack of time as noted in the program theory section below. This could take the approach of a building owner survey as well as a review of the marketing materials used by BayREN and county representatives.

Program Theory and Implementation

Program Theory

BayREN's BAMBE program conducts six program activities (shown in the table below) to overcome five barriers that exist for multifamily building owners, specifically: a lack of awareness and knowledge about what to do, a lack of time to do the work, insufficient operating budgets, split incentive barriers, and challenges with existing electrical panels. These barriers, and the program theory to overcome these barriers, are captured in the table below.

Table 2. Program Theory and Associated Activities

Multifamily Barriers* *(that tend to prevent the adoption of both energy efficiency and electrification measures)*	**BAMBE Program Theory** *(for overcoming the barrier)*	**Program Activities**
A lack of *awareness and knowledge* about what programs could help with upgrades or what measures could provide savings and/or increased comfort through upgrades.	Outreach from a trusted agent causes MF owners to express interest in the program.	Outreach from local governments.**
	Customized technical assistance and site-specific measures increase the awareness of opportunities and co-benefits and motivate owners to take a holistic approach to energy efficiency planning.	Energy survey reports specific to a property that provides information regarding potential energy savings and comfort/maintenance improvements.**
Owners of smaller properties *lack time and resources* to work through activities needed to perform upgrades.	Support by technical advisors throughout the process keeps projects moving to completion.	Extensive support of customers at all phases of a project.**
MF property *operating budgets* cannot fully support energy efficiency or electrification efforts.	Incentives (along with information specific to their property) persuade the owner to installation actions.	Base level incentives as well as higher incentives specific to electrification measures and burden zones.
The *benefits are split* between the property owner and the residents (split-incentives) and owners are hesitant to invest in upgrades that deliver utility bill savings for the resident rather than the owner themselves.	Incentives that pay more for resident measures causes resident installations.	Adder incentives specific to installation of resident measures
Electrification measures can require *costly changes to the electrical panel*	Incentives that help owner pay for panel upgrades will move a customer to make needed changes.	Incentives to support panel changes - "heat pump readiness".

**Barriers and theory based on discussions with BAMBE staff. Program activities from implementation plan.*
***The evaluation did not include research into these activities to understand whether these were in place as expected to support the theory.*

Key Program Activities

This section includes information about the implementation of each of the key activities noted in the program theory table above. Information is from the program process and procedures manual or directly from the program.

Outreach from local governments

The program uses local government knowledge to tailor marketing and outreach messages specific to the known issues for that county as well as contractors for program implementation. Outreach to property managers and owners can take many forms, such as:

- Direct outreach – mailers to property owners /managers (e.g., letter/postcard)

- Partnerships with organizations that serve small multifamily properties (e.g., rental housing and/or apartment associations)
- Partnerships with property management companies
- Educational activities – workshops and webinars
- Community engagement – events and conferences
- Contractors
- Digital presence (e.g., information on the web such as an online ad or social media)

Property Energy Upgrade Information to Customer

After program eligibility and legitimate interest are established, building owners/property managers receive information specific to their building(s) about the potential for energy upgrades (electrical or natural gas). This Energy Survey Report includes a list of the measures evaluated and prioritized by the customer and the technical assistant, the existing condition of the relevant equipment, percentages of estimated savings by measure, and efficiency specifications per measure. The report has five sections:

- Executive Summary – identifies work scope, with savings percentages by measure, total rebate amount, financing available, and next steps
- Program Details – rebate requirements, savings calculation methodology, and financing available
- Measure Descriptions – for each recommended measure, existing conditions and recommended improvements, with photographs as appropriate that include, at minimum, overall photo of the equipment in place and legible photos of any nameplates; may include additional recommended measures without calculated savings
- Minimum Combustion Safety Requirements – identifies any safety issues found during the site visit, along with steps for mitigating these issues
- Appendices – savings calculations and additional property photographs

Ongoing Customer Support

Technical advisors (TAs) work directly with the building owner/property manager throughout the program. They assess the building for potential energy savings, work with the owner/manager to develop a scope of work for energy efficiency and/or electrification measure installations, provide guidance as needed to help the owner/manager obtain contractors for installation, and verify the building after measure installation to ensure compliance with the approved project scope and installation specifications. Upon request, TAs offer financial analysis (estimated and for information only) of the scope of work as needed so that the owner/manager has actionable insights regarding payback, return on investment and other financial metrics needed for investment decisions.

Base Level Rebates and Special Rebates

BAMBE provides different avenues for the building owner to obtain rebates and includes special rebates to drive specific installations. As shown in Figure 1, there are the base rebates that occur only if the building includes 2 or more energy upgrades designed to reduce energy usage by at least 10%. For project scopes including in-unit envelope measures (exterior wall insulation or windows), the savings threshold is reduced to 5%. These rebates are paid by the residential unit. The program also includes specific rebates for electrification measures and buildings in specific census tracts. (Summary information on rebates are included below while Appendix F includes more details.)

Figure 1. How BAMBE rebates are calculated

Source: BAMBE 2023 flyer

The community rebates are geographic adders for buildings located in census tracts disproportionately impacted by air pollution and asthma, high heat, and high housing costs. Table 3 has details showing the range of measures that the building must install in order to obtain one of the adders (a building only needs to install one of the measures noted to obtain the rebate).

Table 3. Special Community Rebate Details

Special Community Rebate	Resident-benefitting measures	Potential Resident Benefit
Housing Burden Adder	Refrigerator, dishwashers, in-unit hard-wired lighting fixtures, in-unit washing machines, in-unit duct sealing, in-unit duct insulation, smart thermostat, or toilet	Reduced resident utility bills
Heat Burden Adder	Windows; insulation; and/or in-unit heat pumps that add or improve air conditioning	Increased comfort and resilience to high heat events
Health Burden Adder	Installation of windows; in-unit heat pump electrification; in-unit HPWH electrification; and/or induction cooktop electrification	Improved indoor air quality and a reduction in asthma attacks

Rebates to Support Panel Changes - "Heat Pump Readiness

In addition to the base rebate, in 2023, the program expanded its electrification incentives. Among other rebates, the program provides $5,000 per property for common area electric panel upgrades and $1,000 per apartment for in-unit electrical subpanel upgrades in support of future electrification.

Findings

These findings describe program accomplishments, feedback from the TAs, co-leveraging of incentives, and differences between BAMBE and other MF programs active in California at the time of the research (e.g., early 2024).

Program Accomplishments

This report focuses on the program accomplishments covered by projects with claimed savings in 2022 and 2023 and projects through Q3 2024 that are active but may or may not be completed in 2024 in time to claim savings.[5] Note that this does not reflect program impact for the full calendar year 2024 (the data was pulled for analysis on September 23, 2024). The actual number of projects that were active or complete by the end of Q4 2024 was more than 100, but the analysis was not re-done due to time constraints at the end of the year.

Specifically:

- **2022 Projects** – 20 paid projects that the program included in the 2022 claimed savings provided to the CPUC.
- **2023 Projects** – 36 paid projects that the program included in the 2023 claimed savings provided to the CPUC.
- **2024 Projects** – 71 projects that the program was actively working with in 2024. Note that because 2024 data was not fully available at the time of this report, the data presented represent a high likelihood of installation rather than confirmed installation. As of the writing of this report:
    - 30 projects are, or are likely to be, completed in 2024. These include projects with the program tracking labels: Paid (28), Post Install QA Approved/Pending Rebate Claim (2)
    - 41 projects may not be completed until 2025. These include projects with the labels: In Construction (22), and Rebate Reservation Approved (19).

The findings regarding the 2024 projects are included because these projects have moved far enough through the process to be relatively sure that the projects and associated measure installations will be completed (although the program may claim savings in 2024 or 2025).

The program is reaching small buildings

The program is working with about the same number of resident units in 2024 as 2023 but is trending towards smaller buildings that have fewer resident units per building. (Table 4)

Table 4. Number of Projects, Buildings, Resident Units: 2022–2024

Year	Projects	Buildings	Units	Average Units per Building
2022 (claimed)	20	56	1,755	39
2023 (claimed)	36	143	2,459	34
2024 (active, not yet claimed)	71	176	2,497*	22

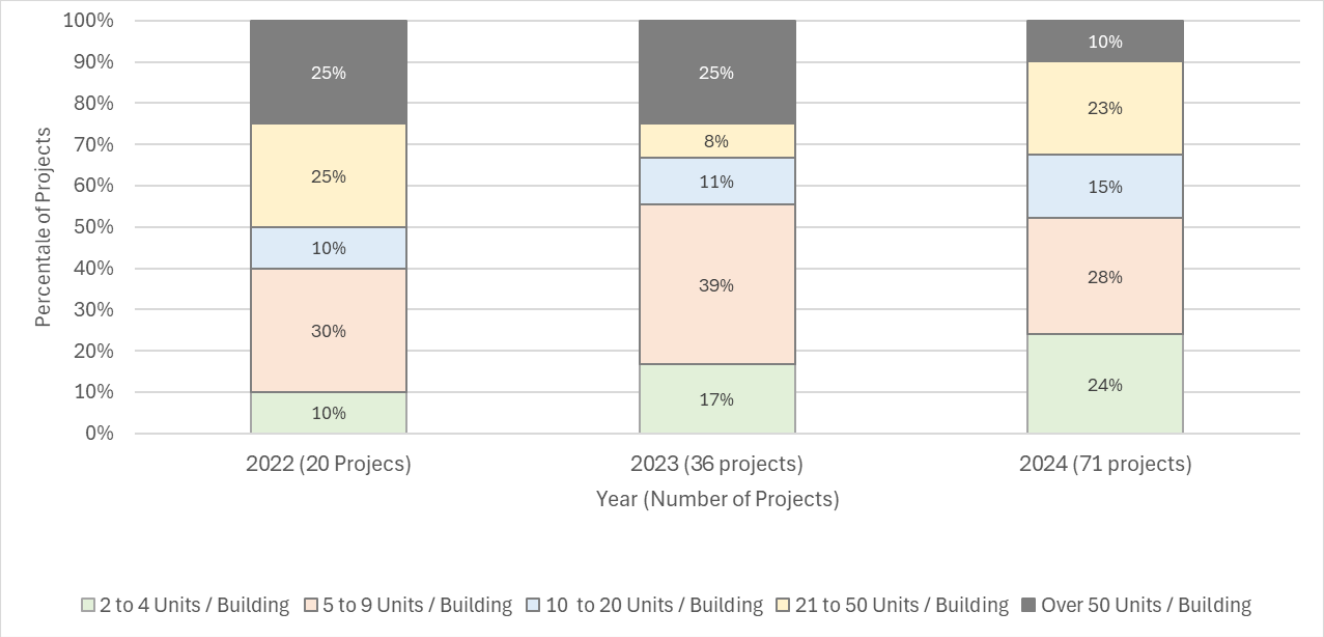
Source: Program Tracking Database

**Note that this analysis occurred using data through Q3 2024. The total 2024 projects that the program will claim after end of year close out may include fewer units.*

As shown above, the average number of units in the buildings that BAMBE serves (22 in 2024) is lower than the targeted 50 units or less, and the average is going down over time. The majority of projects that the program works with are buildings that have less than 25 resident units per building (60% in 2022 and 77% in 2024). (Figure 2)

[5] "Claimed" means that the savings are shown within the claimed table in CEDARS. We provide the claimed 2022-2023 energy savings in Appendix A for completeness, but energy savings is not the focus of this report.

Figure 2. Number of Projects by Number of Resident Units per Building



Source: Program Tracking Database

The program is serving equity-targeted populations

The properties served by BAMBE can be categorized into three main groups:

- **Equity Targeted:** As defined by the CPUC, equity targeted projects are either located in a disadvantaged community (DAC), within an underserved community (i.e., within a census tract where the median income is at or below 80% of the statewide average median income, AMI), or are hard-to-reach (HTR).[6] For BAMBE, we include two equity labels to allow for differentiation between the various ways that a project fits into the CPUC definition of equity.
    - Equity (LI Census Tract) are projects within a low income census tract (i.e., an underserved tract).
    - Equity (Affordable Housing) are projects within deed-restricted affordable housing or projects where the property manager self-reports Section 8 residents (i.e., underserved households).[7]
- **BAMBE Burdened Zone:** Projects where residents are expected to be burdened by housing costs, health issues related to air pollution, or extreme heat and have the potential to receive incentive adders.
- **Not Equity Targeted or within Burdened Zone:** Projects that do not fall into either of the above categories.

While the burden zone adders were available to projects that started in 2023, the projects claimed in 2023 include projects that began before the special adder incentive change. As such, many 2023 projects did not have the opportunity to use the special burden incentives, thus 2023 data are not fully representative of the uptake of the adders and 2024 begins to provide a better idea of the effect of the adders.

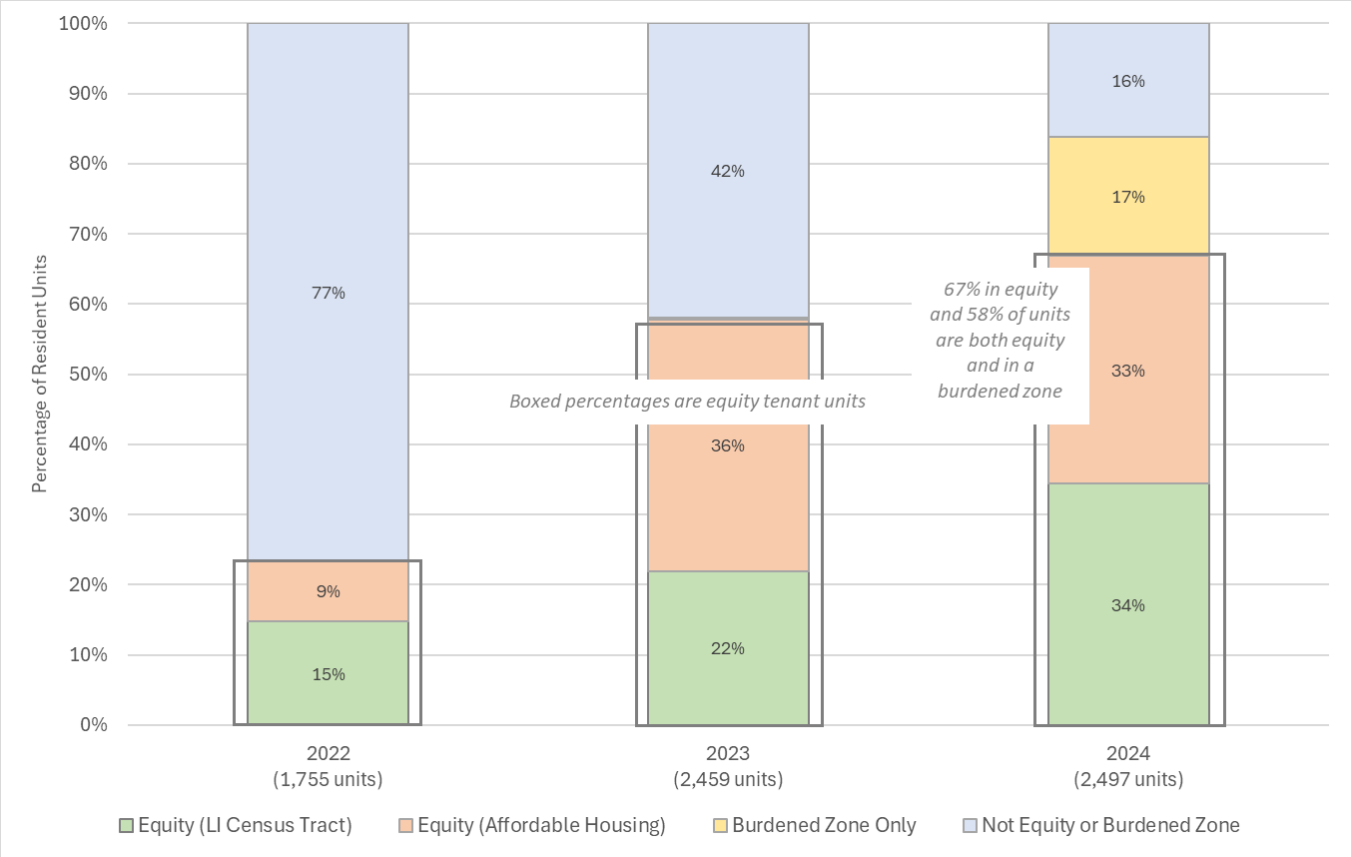
Figure 3 shows that in 2024 the program is working with substantially more equity targeted projects than were claimed in 2022 (24% in 2022 vs 67% active in 2024). Many of the projects in burden zones (housing, health, or

[6] Because the program works directly with the property owner or manager they do not have the ability to gather data on language spoken in the units, an additional data point is needed to assign a HTR designation for renters outside of a DAC. While there may be HTR units within the projects, none are called out in this analysis.

[7] The program includes other categories for underresourced properties that are broader than the CPUC definitions. Specifically, the program includes smaller properties, Homeowner Associates or co-ops, Community Land Trust or limited equity housing cooperatives, or nonprofit organizations.

heat) also occur in equity targeted areas (see Figure 5 later in the report for the breakout of units by burden zone).

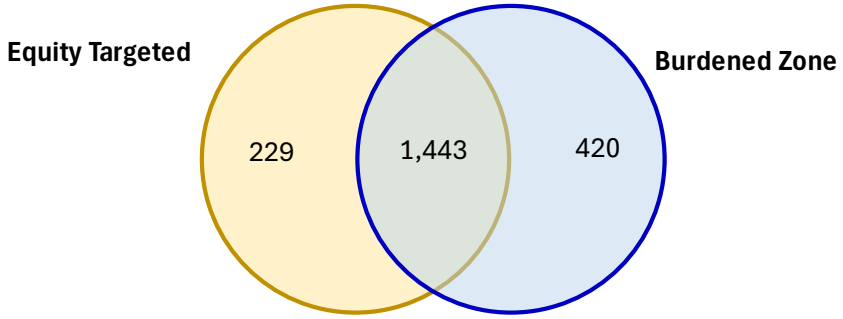
Figure 3. Percentage of Resident Units by Equity Targeted and Burdened Zones



Source: Project Tracking Database and census tracts to determine if equity targeted

In Figure 3, we show percentage by equity targeted and burdened zones as distinct. However, the majority of homes in burdened zones are also within an equity targeted area supporting the idea that the changes in incentive design (made in 2023) are bringing in desired projects (i.e., burdened zone projects) (Figure 4).

Figure 4. Projects Active in 2024 by Broad Category



Total of Tenant Units in a Noted Category = 2,092 (84% of all tenant units in 2024 active projects)

Source: Project Tracking Database and census tracts to determine if equity targeted.
Total of 2,497 resident units with 405 units (16%) outside of equity targeted or burdened zone

At the time of our analysis, the program did not have distinct information on projects that the CPUC labels as underserved (one of the key components of an equity targeted group). However, we learned that BAMBE now tracks underserved. In the figure above, we used address to determine the underserved equity targeted areas. (See Appendix G for a short description of how we determined the location and mapped to the census tract for this report.)

The program has the potential to provide non-energy benefits to residents

Energy efficiency measures provide energy savings benefits, but often also provide non-energy benefits (NEBs). Among potential NEBs, customers could see a reduction in asthma attacks or a reduction in heat-related health issues during extreme heat events. Many of the BAMBE measures have the potential to engender NEBs. [8] (Table 5)

Table 5. Potential NEBs from BAMBE Measures

Potential NEB	NEB arises from...	Examples of measures in BAMBE that support the NEB
Reduced financial stress	Any measure that saves on utility bills	HVAC
Enhanced comfort	Measures that keep a home cooler or warmer when it is hot or cold outside Measure that reduce noise within the home	Insulation; windows; air sealing
Improved health	Measures that keep a home cooler or warmer when it is hot or cold outside Measures that reduce the level of indoor or outdoor air pollution in the home	Insulation; windows; air sealing; induction cooktops

The program is serving homes in burdened areas

NEBs can occur in any project but BAMBE is expressly trying to support these NEBs through their adders. However, a project could be designated to be within a health burden zone but choose not to install the requisite measures for this adder (see Table 3 for required measures) and so would not obtain the adder nor any NEBs. Of the 36 projects completed in 2023, six (6) projects had the potential to receive the adders (i.e., they were located in a burdened zone and received a technical assessment report after the adders were available). Of the six (6), four (4) installed the measures required to allow 65 resident units to obtain the NEBs and three (3) of the four (4) received additional rebates.[9]

Table 6. 2023 Projects in Burden Zones with Potential for Adders*

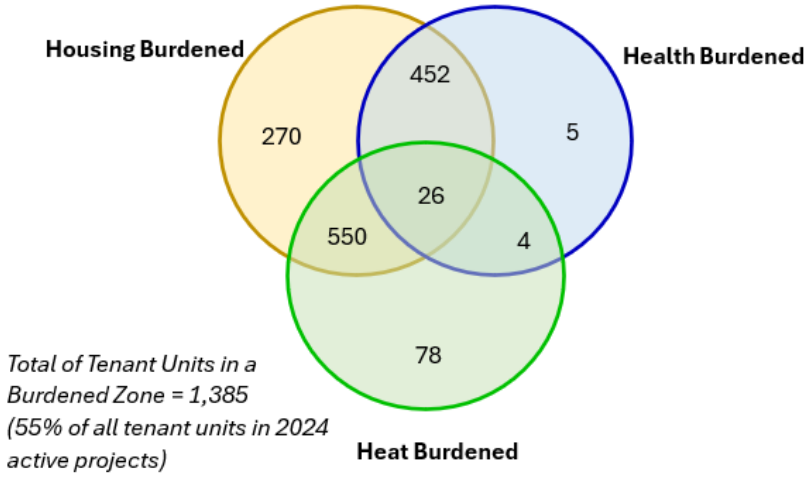
Burden Zone	Total projects in zone	Projects that installed required resident measures	Resident units benefitting	Notes on the measure in project
Housing Burden Zone	4	2	9	One project installed both in-unit hard-wired lighting fixtures and refrigerators while the other installed in-unit hard-wired lighting fixtures.
Health Burden Zone	3	1	56	The one project installed in-unit heat pumps as a fuel substitution measure.
Heat Burden Zone	1	1	4	The project installed attic insulation. (this project also counted under the housing burden zone)
Total Unique	***6***	***3***	***65***	

**The project counts are only for the projects that had the opportunity to obtain an adder as determined by completion of a technical assessment report in 2023.*
Source: Project Tracking data

[8] The evaluation team expects to ask residents about potential NEBs through a survey that may be fielded in 2025.
[9] The one site that did not receive additional rebates installed wall insulation.

In 2024, slightly more than half of the projects active in the program are located in one or more burdened zones and plan to install the required measures, meaning that many residents have the potential to reduce bills and receive NEBs.

Figure 5. Projects Active as of Q3 2024 by Burdened Zone and with Required Measures Expected to be Installed



Source: Project Tracking Database

The program expects to understand whether the potential NEBs are seen by residents via a resident survey planned for 2025. Additionally, there are two California studies that could support BAMBE as they seek to calculate non-energy benefits.

- Study 1 (managed by SCE) is underway to determine NEBs within the low-income residential community. This study is surveying previous Energy Savings Assistance (ESA) participants to determine the incidence of benefits relating to health, comfort and safety of their home. Since ESA can install measures in both single and MF homes, we expect that MF residents may be included in the study. However, there is nothing in the plan that indicates results will be differentiated by dwelling type. Results are expected to be public in March-April 2025.[10]
- Study 2 (managed by SoCalGas) will describe how to estimate NEBs (and provide useful secondary data as needed) within the non-low income sectors. The Request for Proposal was released in November 2024 with an estimated start date of March 2025. BayREN may want to review the research plan once it becomes available (possibly available in May 2025) to see if the research will include study specific to MF resident units or cover NEBs of interest to the program.

Measures installed benefit both resident units and common areas

While the program works directly with building owners/managers, measures installed can provide benefits to both the building owner and the residents. The choice of what to install is up to the building owner/property manager. As shown in Table 7, the 56 projects with claimed savings in 2022 or 2023 installed measures in both resident units as well as areas where financial savings would accrue only to the owner (and insulation where the savings could benefit either based on where installed). [11]

[10] The Study 1 report and the Study 2 research plan should both be available on the public documents area https://pda.energydataweb.com/#!/

[11] We exclude 2024 from this list of measures as some measures can be dropped even as projects move through construction and there are many 2024 projects not yet completed. However, we do include a few specific measures from 2024 later in the report.

Table 7. Installed Measures in 2022/2023 by Who Benefits with Potential Bill Reductions from the Measure*

End Use	Resident (In-Unit)	Building Owner (Common Areas)
DHW	In-Unit Heat Pump Water Heater	Central Heat Pump Water Heater
	In-unit washing machines	Laundry/Common Area HP Water Heater
	Dishwashers	Central washing machines
	Bathroom faucet aerators	DHW heaters/boilers
	Kitchen faucet aerators	Variable speed recirculation pump
	Low flow showerheads	Time and/or temperature controls (DHW recirculation pump)
	Thermostatic shower valve	DHW boiler control
	Pipe insulation for DHW**	Domestic hot water heater/boiler
		Insulation Jacket
Space Cooling / Heating	In-Unit Heat Pump HVAC	Central Heat Pump HVAC
	Thermostat	Common Area Heat Pump HVAC
	Windows	Thermostatic radiator valves (TRVs)
	In-Unit Electrical Upgrades (Heat Pump Readiness)	Common Area Electrical Upgrades (Heat Pump Readiness)
		Hydronic/steam system controls
		Natural gas furnace
		Heating boiler
		Pipe insulation**
	Insulation (attic, wall, crawlspace) *will benefit both, depending on where insulation is installed and location of resident unit (e.g., top floor resident unit may see more benefit from attic insulation than bottom floor resident unit)*	
Lighting	In-unit hard-wired lighting fixtures	Common area, garage, exterior lighting fixtures/ controls
		Common area bulbs
Other	In-Unit Laundry Dryer	Pool heater
	Refrigerators	Variable speed pool pump
	In-Unit Electric Cooking	
	Toilets	

** Who sees bill benefits based on evaluation team knowledge of measures*
*** Program tracking does not indicate where these measures were installed. Placed into resident or building owner column based on probable location*
Source: Program Tracking Data

Resident Unit Benefits - Out of 4,214 resident units in 2022 and 2023, 2,463 (58%) received measures where residents could obtain bill benefits (and potentially NEBs). However, for 2023, the measures that could help residents reduce their bills were generally lower cost measures associated with domestic hot water, DWH (e.g., faucet aerators).

The inclusion of adders for measures that help reduce resident bills (and provide NEBs) appears to be changing the choices of the building owner/property manager. For projects active in 2024 (with 2,497 resident units and 94% of those with potential measures in the units), building owners/property managers are continuing to choose to install lower cost items but at a lower rate and are choosing to install higher cost items that could reduce resident bills.

About half of the resident units received certain lower cost measures in 2022/2023 while many fewer are expected to receive these same measures in 2024. Conversely, substantially more residents are expected to receive higher cost items in 2024 such as heat pumps or induction cooktop. In all cases, the electric panel support also included installation of a heat pump. However, there were heat pumps installed without also using the electric panel support. (Table 8)

Table 8. Comparison of Select Resident Measures in 2022/2023 to 2024

Type of Measure	Example measures	2022-2023 *(n=2,463 resident units receiving any measure)*	Projects active in 2024 *(n=2,350 resident units receiving any measure, if project is completed)*
Lower Cost	Low-flow showerheads	54%	42%
	Bathroom faucet aerators	51%	24%
	In-unit hard-wired lighting	47%	31%
Higher Cost *(all fuel sub measures)*	In-unit Heat Pump (HVAC)	10%	27%
	In-unit HPWH	0.5%	26%
	In-unit induction cooktop	0.7%	12%
Electric Panel Support	In-unit Heat Pump Readiness	4%	36%

Source: Program Tracking Database

Common Area Benefits - In 2022-2023, 95% of all projects included measures that benefited owners. In 2024, this dropped slightly to 87% (i.e., 62 out of 71 projects had measures where the owner could benefit). Common area measures that affect domestic hot water maintained their prevalence across the two periods, although more central HPWHs are expected in 2024 than seen 2022/2033. The program is installing less lighting in common areas in 2024 and expects to provide electric panel support to twice as many common areas. (Table 9) Possible reasons for the reduction in lighting in common areas (from program staff) include:

- Many buildings already have LED lighting in common areas, so upgrades would not be needed/would not generate significant savings.
- Common area lighting is not specifically incentivized, only in-unit lighting upgrades qualify for adder/multiplier.
- The program is serving smaller buildings so there are not as many cases of lots of 24-hour lighting in garages/hallways/common areas where lighting upgrades would be needed/generate significant savings.

However, for common areas across the three years, some owners took advantage of the electric panel support without also installing heat pumps (17 projects), many projects included both a panel upgrade and heat pumps (29), and other projects performed heat pump upgrades without the electric panel support (25 projects).

Table 9. Comparison of Select Common Area Measures in 2022/2023 to 2024

		2022 – 2023 *(n=53 projects where common areas received any measure)*		Projects active in 2024 *(n=62 projects where common areas received any measure), if project is completed)*	
Type of measure	**Measures**	Top three measures across these years	% of 53 projects	Top three measures in this year	% of 62 projects
DHW	Variable speed recirculation pump	✓	38%	✓	23%
	Central Heat Pump Water Heater (fuel sub measure)	✓	36%	✓	55%
Lighting	Common area, garage, exterior lighting fixtures/controls	✓	34%		18%
Space Conditioning	Wall insulation		17%	✓	23%
Electric Panel Support	Common Area Heat Pump Readiness		25%		53%

Source: Program Tracking Database

Feedback on Program Processes (from TA interviews and a review of program data)

This section touches on the areas of marketing, lead conversion, length of all processes, and potential for inclusion of resident protections.

Potential participants are not aware of requirements prior to intake

As described previously, property managers or owners express interest in the program via the BayREN website.[12] On the website, they are made aware that:

- the program requires installation of two or more energy efficiency and/or electrification measures,
- measures must be designed to save at least 10% of a building energy use, and
- rebates are paid after installation.

However, while the website includes these three program requirements and states that the rebates are not paid upfront, TAs reported that customers were not aware of these requirements prior to the pre-screening intake (step B in Figure 6 below). The program may want to explore how to better call out what is required of customers to participate in the BAMBE program which may ultimately decrease the number of interest forms that do not move into projects.

Many leads do not turn into projects

The program contacts customers who have completed an online intake assessment. Results of the online form and discussion with the customer cause the program to refer the customer to the program most appropriate to their needs. This may be the BAMBE program, the statewide Energy Savings Assistance program, the MCE MF program or financing programs such as PACE.[13] (See Appendix D for the flow of the program's processes.)

For customers that fit with the BAMBE requirements, the pre-screening intake process moves a customer from a "lead" to a "project" and TAs then begin to work with the customer (building owner or property manager). Currently, the pre-screening intake is a distinct process that is handled by a knowledgeable person, but not one of the technical advisors. It is a relatively quick process that may lack sufficient interaction with the customer to determine how invested the customer is to move forward with a project. To obtain a better idea of the conversion of a lead to a project, additional qualification may be beneficial prior to calling a lead a project. This could take the form of the technical advisor changing the status of a customer from a lead to a project after the preliminary scope.

Program processes can take a long time and projects drop out along the way

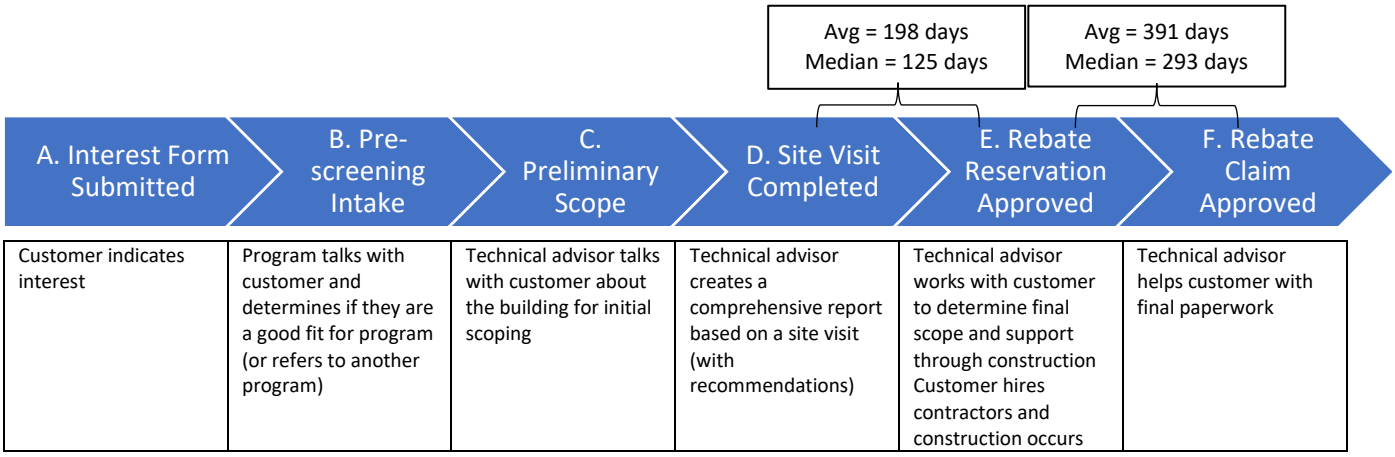
Once a customer passes through the pre-screening intake process, they move through four distinct activities. As shown in Figure 6, a multifamily project can take a long time (an average of a little over a year from site visit to rebate claim approval).[14]

[12] https://www.bayren.org/mf/interest-eligibility

[13] At the time of this report, PG&E did not have a multifamily program. MCE had a multifamily energy savings program (MCE01) with a relatively small 2024 budget ($0.76 million) as well as a multifamily strategic energy management program (MCE01c) that has an even smaller 2024 budget ($0.42 million). PG&E was just ramping up the Energy Savings Assistance (ESA) Northern Multifamily Whole Building Program (2024 budget unknown). This ESA program is a low-income program that is overseen through a different regulatory structure than the BAMBE program.

[14] The average number of days was relatively unaffected by inclusion of electrification measures. Thirty (30) of the 56 projects with claimed savings in 2022 or 2023 included an electrification measure. The average between construction start and rebate claim approval was about 5% shorter with electrification measures (22 days shorter on average than other projects).

Figure 6. Program Steps, Average and Median Days between Select Steps



Source: 2023-2024 Program Tracking Database for processes and days in certain steps. N=66 projects for D to E, 71 projects for E to F.

The TA provides various services depending on where a customer is within a project. For the comprehensive TA report, the technical assistance provided is from a purely technical point of view and does not try to sell anything specifically to the customer. Additionally, feedback from the TAs indicate that the education that occurs from the comprehensive report helps the building owner think about in-unit upgrades and how the upgrades could help attract renters to their properties.

However, building owners often drop out prior to completion. TAs indicate multiple reasons the projects drop such as:

- *Incentives are not enough for some property owners to pursue energy efficiency or electrification measures.*
- *Customers apply just to see what is available and drop when they learn about the programs specific requirements (e.g., two measures installed and 10% savings).*
  - *For example, one TA received an email about clothes washers/dryers and another site just wanted common area lighting.*
  - *Repeat customers face challenges in qualifying for the 10% savings due to existing efficiency from previous participation.*
- *Owners want to see if the rebate will cover the full amount and when they figure out the program won't cover that but only cover about 20% [in some cases], then they go away.*
- *Customers think that applying for a program is sufficient and they don't have to be in touch with the program after that.*
- *The project has already completed construction. For example, the plumbing contractor told the owner that the rebate would be available after the work was done (which is not true).*
- *Customers do not respond initially or the TA has been intensely involved with a customer over time and then the customer just disappears.*
- *The customers priorities change or have funding issues.*

As the customer moves through a project, they have different forms to sign that the TA has to print out, obtain a signature and then scan for program files. One TA noted that if the program moved to e-signatures for program documents, it may make it easier for the customer (and the TA). As of summer 2024, (after our discussion with the TA's) the program moved to Adobe e-signature.

TAs expressed that some building owners may be hesitant to participate if there are resident protections

Besides the existing program requirements, we explored with the TAs the possibility of including resident protections such as rent control after upgrades and learned that this approach could cause projects to drop.

Specifically, TAs do not have this type of conversation with customers, but one TA indicated that customers may be hesitant to participate while another indicated that this would add to the existing barriers to participation.

Co-leveraging of Incentives

BAMBE is co-leveraging funding from multiple programs. In 2022-2023 BAMBE provided $4 million in incentives and co-leveraged ~$2.5 million in other program rebates to support their projects, in some cases using incentives from more than a single program. The co-leveraged value increased in 2024 to ~$4 million. As shown in Table 10, the Low Income Weatherization Program (LIWP) and TECH (combined or separately) provided a substantial level of incentives to BAMBE participants.

Table 10. Co-leveraged Programs and Incentives (2022/2023 and 2024)

Co-leveraged Programs	2022-2023			2024		
	Projects	*BAMBE Incentives*	*Co-Leveraged Incentives*	*Projects*	*BAMBE Incentives*	*Co-Leveraged Incentives*
LIWP, TECH	7	$ 594,550	$ 1,468,617	6	$ 530,300	$ 881,976
LIWP	5	$ 693,720	$ 744,140	8	$ 893,800	$ 532,194
TECH	9	$ 292,950	$ 214,600	10	$ 2,185,750	$ 718,800
Santa Clara Energy Efficient Rehab Program, SCP	1	$ 31,500	$ 31,500	0	$ -	$ -
LIWP, SCP	0	$ -	$ -	1	$ 374,350	$ 995,701
TECH, SCP	0	$ -	$ -	1	$ 46,000	$ 42,900
SGIP	0	$ -	$ -	11	$ 595,500	$ 92,000
LIWP,TECH, SOMAH	0	$ -	$ -	1	$ 345,000	$ 900,000
Other	0	$ -	$ -	1	$ 87,000	$ 62,000
No co-leveraged program	*34*	*$ 2,413,650*	*$ -*	*32*	*$ 2,023,455*	*$ -*
Total	56	$ 4,026,370	$ 2,458,857	71	$ 7,081,155*	$ 4,225,571

**Note that this analysis occurred using data through Q3 2024. The incentives from the total 2024 projects that the program will claim after end of year close out may include fewer units and so lower incentives.*

TAs expressed that co-leveraging is influential but can be challenging

BAMBE technical advisors (TAs) noted that co-leveraging is very influential in moving forward with a project and views co-leveraging as a vital component of their work that significantly enhances the likelihood of project and program success.

- According to one TA, "*Co-leveraging of incentives is hugely important for a client to move forward. There are a lot of projects (affordable and market rate) that come in through the portal*[15] *and when they find that BAMBE covers a fraction of the cost of the upgrades, they mostly drop off. Very few carry forward and of these the most motivated ones are those that have co-leveraged other incentives like LIWP and/or TECH.*" The TA also noted that:
    - Another important aspect of co-leveraging incentives is that projects tend to maximize their energy savings by expanding their scope of work. Typically, the expanded scope of work will

[15] As noted in the program activities section, MF building owners/property managers express interest in the program through an online portal.

include heat pump DHW and/or HVAC (both central and in-unit) and in-unit appliance/lighting upgrades. Otherwise, projects come in with narrow scopes if only leveraging BAMBE.

- Another TA indicated that "*Co-leveraging multiple funding sources is essential for securing project financing and incentivizing progress. Many owners are reluctant to pursue projects, as BAMBE incentives alone often don't sufficiently reduce costs.*" The TA also noted that:
  - Projects not in the Housing Burden Zone or Heat/Health Burden zones frequently drop out after reviewing the pre- or post-site memo and incentive levels.
  - Retrofit decisions are typically driven 90% by financial factors, with the remaining 10% focused on using familiar systems to minimize training. As a result, owners rarely choose retrofits that are more expensive than traditional installations solely for environmental reasons; the efficient or electrification options usually need to be significantly cheaper. Achieving this often requires multiple incentives, as BAMBE incentives typically cover only about 30% of installation costs.
  - Many projects leverage 2-3 incentive programs to make electrification and energy efficiency financially feasible.

However, it takes time and effort to successfully co-leverage a project.

- As described by one TA, "*Because I want projects to successfully move forward to rebate reservation by maximizing their energy savings, I put in a decent amount of time speaking to project teams about additional relevant incentives (e.g. LIWP, TECH, IRA, HEEHRA) that can be layered and then follow up with website links to these programs. Also, when I receive communication on new funding cycles (e.g., TECH, HEEHRA), I spend time reaching out to potential project teams to notify them of the new cycle and answer any questions.*

  The BAMBE program recently requires us to report the most accurate co-leveraged incentive amounts which takes time to follow up to get the numbers. LIWP is based on GHG reduction and so varies from rebate reservation time to closeout (with scope expansion/reduction) and the closeout process can take considerably longer time than BAMBE's closeout. So, this takes a decent time to follow up and input."
- Another TA indicated that "*The effort required for co-leveraging depends on the additional incentive stream. Key considerations include whether the incentive is managed internally by [my firm], if additional modeling or site visits are necessary, and whether it requires changes to the scope of work."*
  - *"… external programs like PG&E's CESHP and ESA have varying and often unclear requirements, leading to confusion for some owners and contractors. This can result in TAs managing different compliance pathways to help maximize incentives while keeping stakeholders engaged, since BAMBE and PG&E programs cannot incentivize for the same measures*."
  - This TA also explores additional programs, such as EV charging and solar, based on owner interests. They noted that although TECH has an impact on BAMBE timelines, it requires minimal effort since contractors handle the application process.

Based on the TA feedback, characteristics of co-leveraging has components that are easy and those that are challenging as shown in Table 11.

Table 11. Co-leveraging of Incentives, ease and challenges

Ease of co-leveraging when...	Challenges to co-leveraging when..
There is a site assessment for both programs (e.g., LIWP), then the technical staff in both programs can exchange/and check site information	Other programs become oversubscribed quickly (e.g., TECH), placing projects on waitlists
The programs share similar standards (e.g., LIWP)	Other programs take time for the certification process and must use certified contractors (not requirements for BAMBE)
The incentives are straightforward (e.g., TECH)	Other programs have strict/short timelines for construction (and BAMBE projects may or may not be able to align with that timeline)
	Incentives in the non-BAMBE programs are adjusted at close-out stages due to final installations
	External programs have ambiguous requirements

Additionally, some projects have significant renovation that involves time for prep e.g., abatement, and the measures (which may use co-leveraged funds) typically occur last resulting in a much longer timeline. BAMBE staff have noticed that some retrofit projects are hesitant to apply for any other funding than BAMBE. These projects then have narrow scopes so as to keep within their budgets by often omitting heat pump DHW and HVAC upgrades.

The analysis of past projects supported findings about the importance of co-leveraging

Our analysis of past projects that dropped out of the program indicates the *Incentive Per Unit* is the most significant predictor of whether a project would be inactive, where the larger the incentive per unit, the more likely the project would be to remain active (or, as noted in the analysis, the less likely a project would become inactive). (See Appendix H for the complete memo of the statistical analysis.)

According to the TA feedback and our statistical analysis, it will be important to continue to help determine incentives outside of BAMBE to support projects so that they go through the program with as broad a set of measures as possible.

Program Differences from other MF Programs

BAMBE is similar in several ways to other 12 MF programs that were active in 2024 (i.e., many target HTR/DAC, provide incentives across many end uses as well as incentives for electrification). However, the program focuses on smaller buildings and serves underresourced residents [16] See Appendix I for the full memo describing the MF landscape within California.

BayREN is one of two programs that serve smaller properties in 2024. BayREN is one of two programs (the other is the SoCalREN MF HTR program that is just beginning) that focus on serving small properties. BayREN targets properties with less than 50 units. (Table 12)

Table 12. MF Program Targeted Populations by Program Segment

	Targeting*				
Program Name	**Small (<50 units)**	**HTR**	**DAC**	**Independently owned**	**Other**
Equity Segment Programs					
BayREN	✓		✓	✓	HOA or co-op; within a Bay Area Healthy Homes Initiative Pathway area
SoCalGas Whole Building		✓	✓		
TCR MF		✓			
Resource Acquisition Segment Programs					
MCE MF					Deed restricted
MCE SEM					Any MF
SoCalGas MF Alliance		✓	✓		
SDG&E Reznet		✓	✓		
SoCalREN MF		✓		✓	
SoCalREN HTR MF	✓		✓		Includes manufactured home
Market Support Segment Programs					
California Energy-Smart Homes All Electric Residential Program		✓	✓		This is a new construction program that includes a MF component

[16] This information is based solely on data available in implementation plans or on relevant websites and may be updated when new IPs are created.

Program Name	Targeting* Small (<50 units)	HTR	DAC	Independently owned	Other
Low Income Energy Savings Assistance (ESA) Programs					
Multifamily Energy Savings Program – Northern					Income-qualifying properties and residents. For deed-restricted properties, must house at least 65% of residential with incomes at or below 250% of Federal Poverty Guidelines (FPG); for non-deed restricted properties, this is 80% below 250% of FPG. Residents may qualify even if the property does not.
Multifamily Energy Savings Program – Southern					Same a MFES Northern

Source: Program Implementation Plans on CEDARS; information from relevant websites
**Data in this table may be updated if new IPs are created*

Historically, BAMBE served a higher percentage of underresourced resident units than other programs (i.e., HTR, DAC, or considered local difficult to serve) [17]**.** BayREN consistently provides installations to resident that are in areas that are considered underresourced. BayREN has been offering a multifamily program since 2014 and has been tracking the number of units they serve, although the focus on (and tracking of) underresourced began in 2020. In the past four years (2020-2023), the BayREN program has provided energy efficiency upgrades to about 10,400 units and 89% of those (~9,300 units) are what has been tracked underresourced (annually, the percentage ranges from 83% to 100%).

We have spotty information on resident units served within other programs, so cannot fully describe the historic uptake within MF buildings across all programs in this analysis. However, as shown in Table 13, we know that in 2023, four PA programs (including BAMBE) served a little over 12,000 resident units and that ~60% of those units were considered underresourced[18] and 92% of BayREN resident units (~2,200 out of ~2,400 units) were underresourced.

[17] Underresourced were previous described by BayREN as within "Local Difficult to Serve (LDTS) and was a BayREN value metric and defined as Bay Area populations considered underserved by the Bay Area local government members. For the BayREN MF program, LDTS were defined in 2020 as residents within buildings that have less than 100 units, a deed-restricted or naturally occurring affordable property (i.e., using the LIWP definition and demonstrates low-income eligibility without a regulatory agreement), has an ownership structure such as a HOA or co-op or is located in a DAC. As shown in Table 12, the program is currently targeting similar buildings. (BayREN is in currently adjusting the LDTS value metric based on the new equity indicators.)

[18] The four programs were BayREN, SoCalGas, SoCalREN, and TCR. MCE served 653 units in 2023 but did not provide the number in HTR or DAC, so they are not included in the total.

Table 13. # of Resident Units Served by Year and % that are Underresourced

PA	Program ID	# of Resident Units Served*				Total (for available data)	% of Underresourced Served				Total (for available data)
		2020	2021	2022	2023		2020	2021	2022	2023	
Equity Programs											
BayREN	BAYREN02	3,945	2,302	1,755	2,417	10,419	83%	87%	100%	92%	89%
TCR	TCR-Res-02	NA	Starting	Unknown	219	219	NA	NA	NA	67%	67%
Resource Acquisition Programs											
SoCalGas	SCG3889	9,004	1,807	1,268	4,961	17,040	9%	90%	52%	48%	32%
SoCalREN	SCR-RES-A1	Unknown	12,812	16,623	4,491	33,926	Unknown	51%	50%	60%	52%
Subtotal		*12,949*	*16,921*	*19,646*	*12,088*	*61,604*	*31%*	*60%*	*55%*	*62%*	*53%*
MCE	*MCE01*	*422*	*Unknown*	*784*	*653*	*1,859*	*Unknown*				
Total		13,371	---	20,430	12,741	63,463	---				

Source: Annual Reports or Common Metrics

**The number of BayREN units served in 2022 and 2023 shown here are ~1% lower than what was in the program tracking database. As this was a small percentage of the units served, we did not seek to determine why.*

Conclusions and Recommendations

This research concentrated on assessing if the program activities were supporting the theory regarding difficulty of MF customer operating budgets to support energy efficiency, split incentives, and electrification. This included how well the program results corresponded to their areas of focus and if there was an indication that the new incentive adders were bringing about change. Our findings indicate the following.

PROGRAM FOCUS AREAS

The program is reaching equity targeted participants. The number of resident units in equity targeted areas (as defined by the CPUC) doubled between 2022 and 2023 with projects active in 2024 expected to reach three times what was served in 2022.

The program is filling gaps through their areas of focus. BAMBE has successfully filled a gap in MF programs within Northern California by serving a high percentage of small MF buildings, where 77% of projects active in 2024 have less than 25 units per building.

SPECIAL INCENTIVES

Special incentives make a difference for resident installations. Prior to the inclusion of adders specifically designed to have measures installed in resident units, half of the projects included measures for residents and those residents received mainly low cost measures. After the adders were included, 94% of projects included resident measures and the rate of low cost installations dropped substantially while the rate of higher cost measure installations increased threefold or more.

Electrification incentives are driving higher rates of installation. Fuel substitution measures are higher in 2024 than 2022/2023 and both residents and building owners are experiencing this type of measure.

We recommend that the program:

- **Explore certain program processes. Specifically, whether…**
  - …making program requirements more prominent on the multifamily landing page on the BayREN website decreases the number of customers who may not participate.
  - …having the TA (rather than program staff) move a "lead" to a "project" within the program tracking system improves the conversion of leads to completed projects.
  - …use of the new e-signatures reduces TA time spent on paperwork and improves customers satisfaction.
- **Begin to track projects based on equity as defined by the CPUC.** Equity indicators required by the CPUC require counts by defined areas. Appendix G describes how placement of a project within an equity targeted area occurred for this report. While we heard that the program is now tracking equity targeted customers, BayREN may want to check that their process is similar to what was used in this report.
- **Monitor ongoing and future NEB studies**. These studies will help the program understand how to potentially calculate and track NEBs expected from installation of certain measures.

The remainder of the report provides seven appendices.

Appendix A. Energy Savings
Appendix B. Map of Research Questions to Findings
Appendix C. Implementation Team In-depth Interview Guide
Appendix D. Multifamily Process Flow Chart
Appendix E. Calculation of Special Adders
Appendix F. BAMBE Rebates
Appendix G. Determining Census Tract and Mapping to DAC/Underserved
Appendix H. Attrition Analysis Memo
Appendix I. MF Landscape Memo

Appendix A. Energy Savings

The focus of this report is not about program energy savings, but we include the claimed savings from the 2022 and 2023 programs years for completeness. In 2022 and 2023, 56 projects saved 45.7 GWh and 1.9 million (MM) Therms.

Table 14. Energy Savings and TSB

Year	# of Projects	Lifecycle Gross GWh	Lifecycle Gross MM Therms	TSB
2022	20	13.0	0.8	$ 1,233,270
2023	36	32.7	1.1	$ 1,991,820
Total	**56**	**45.7**	**1.9**	$ 3,225,090

Source: Claimed Savings in CEDARS

Average Effective Useful Life (EUL) for 56 projects is 11.4 years for GWh and 17.9 years for MM Therms; divide lifecycle by EUL to obtain first year savings

NTGR for 56 projects is 0.96 for MWh and 0.75 for M Therms; multiply gross savings by NTGR to obtain net savings

Appendix B. Map of Research Questions to Findings

Research Area	*Research Question*	*Location in Report*
Is the program reaching their intended targets and having the intended effects?	1. Is the targeting (through both marketing and incentive design) having the intended effect?	Participation by BAMBE focus areas (p. 9)
	2. Who is the program serving and how many residents and buildings are being served?	Participation by BAMBE focus areas (p. 9)
	3. What are the expected non-energy benefits from this program and are they being seen by residents?	BAMBE Focus Area of Burdened Zones (12) to the extent that NEBs could be present. Absent a resident survey (planned for 2025), the question of whether the NEBs are seen by cannot be directly answered.
	4. What existing research can the program leverage to calculate and track non-energy benefits?	BAMBE Focus Area of Burdened Zones (12)
	5. How can the program best engage with residents:	
	1. to help the BAMBE program understand if benefits are accruing to residents.	
	2. to help empower residents to become involved in energy choices (i.e., moving from simply informing residents, to empowering them to use newly installed equipment to increase comfort and decrease bills, and gauge potential program design changes to involve residents/renters more meaningfully in energy upgrade projects to helping them be involved)?	This is not answered in the report as it is an effort via the resident survey that is expected to continue into 2025
How does the multifamily program work and how is it different than other California programs?	6. What is the program theory and logic behind the multifamily program?	Program Theory section (p. 6)
	7. How does the BayREN program differ from other CA multifamily programs (and where is there overlap) and how might this inform near and long term program strategy?	Program Similarities and Differences (p. 17) and MF Landscape Memo in the appendices
What are changes that the program may want to make?	8. What additional data could/should be collected to show the intended effects of the program (e.g., data collection from residents)?	See recommendations in the conclusions section (p. 23)
	9. What improvements could be made to the program to better serve multifamily residents and buildings? This includes determining what the program could do to better identify or support projects so that they go through the program.	This is briefly touched on in the Co-leveraging of Incentives section (p. 17)
	10. What improvement can be made to increase program cost effectiveness, TSB, and project conversion? (answered as budget allowed)	This was not included directly in this report, but the statistical analysis pointed to the amount of incentives being highly significant to project conversion. See Attrition Analysis Memo in the appendices

Appendix C. Implementation Team In-depth Interview Guide

This is the guide. Not all questions were asked of the implementers during the interviews.

Program Processes

- In your own words, how would you describe the objective(s) of the BayREN MF program?
- What do you think is valuable about the program?
- There seem to be four main program processes: market to targeted population; conduct an intake assessment; perform technical site assessments; and perform technical assistance (i.e., assist property owner/manager in all aspects of a project).
  - Are there other main processes that we should be aware of?
  - Do you do any marketing to and/or targeting of customers? If so, how?
  - Which of these are you most involved in?
  - When thinking about how the processes support the program objective(s), what do you think is working well and what could be improved?

Unique to BAMBE

- What do you see as unique to the BayREN MF program vs what you know of other MF programs (either in CA or elsewhere in the country). How do these areas inform any near or long term program strategies?
- Are there parts of how BAMBE is implemented or the value that you feel it provides that you think would be lost if it were a statewide program?

Barriers

- Customers indicate initial interest in the program, but as you work with customers, what are the barriers that seem to show up at different times of the process? That is, do customers seem to balk more when the construction starts? After the site visit?
- A review of the past couple of years of data seems to indicate that many projects may affect mainly the property owner as the chosen projects are ones where the owner is paying the bills. What benefits do you feel are accruing to residents (even in projects such as a common area hot water heater installation where you do not also install in-unit equipment)?
- Below is the number of MF renter households by county and two years of active vs inactive projects for the program (from Q1 2022 through Q1 2024).
  - Why do you feel so many projects are inactive (e.g., dropped out)?
  - What can you tell me about the difficulties reaching (and then implementing) the MF properties in various counties? Marin stands out to me as a county with projects that seem to want the program and then drop out for some reason

County	Sum of MF Renter HH	Active Projects by County	Inactive Projects by County
Santa Clara County	153,627	18	29
San Francisco County	144,754	11	7
Alameda County	142,020	30	38
San Mateo County	58,458	10	20
Contra Costa County	54,248	3	23
Sonoma County	24,433	8	11
Solano County	20,062	2	4
Marin County	17,752	3	20
Napa County	6,069	3	1
Total	621,423	88	153

- Marin County has a relatively large number of inactive projects (compared to their active projects). Any idea why? Tell me a little bit about the how you feel coordination is going between BAMBE and MCE. Could anything be improved?
- Past barriers based on a 2021 survey of BAMBE participants indicated that:
    - Some of them found it difficult to understand what they needed to do to participate (there was a point system in place at the time). Has the program changed this point system? If so, how? Do you find customers appear less puzzled about how to participate?
    - Repeat participation was difficult. Has this changed? If so, how?

Opportunities

- What do you find motivates the MF property owners/managers the most?
- The BAMBE program has shown success in reaching smaller, harder to reach properties. What are opportunities for this population in the future? Are you finding it more difficult to find or provide EE to these properties?
- How well received are the relatively new incentives for properties in certain zones (i.e., Housing Burden, Resilience to High Heat, and Health for this population)?
- Do you feel that BAMBE should increase incentives levels for any measures? If so, why? How about decreasing incentives? Do you feel that the program could reduce incentives and still "sell" the measures?
- Are there small activities or pilots that you feel would be beneficial for the program to implement?
- If the program were to try to implement some sort of resident protection (e.g., ensuring that the rent remain affordable after an upgrade), what do you think the response would be from potential customers?

Electrification

- As you know, fuel substitution is one of the large pushes for EE programs. How aware are MF owners/property managers of what fuel substitution is and how open do you find them to implementing any fuel substitution?
- How useful are the incentives for panel upgrades? Do you feel this helps move the property more towards electrification?
- In our 2021 survey, we heard that electrification incentives at the time were not high enough to move the market much. Do you feel this has changed? How has the new TECH program affected electrification? How do you think the new IRA funding will affect what customers install through BAMBE?

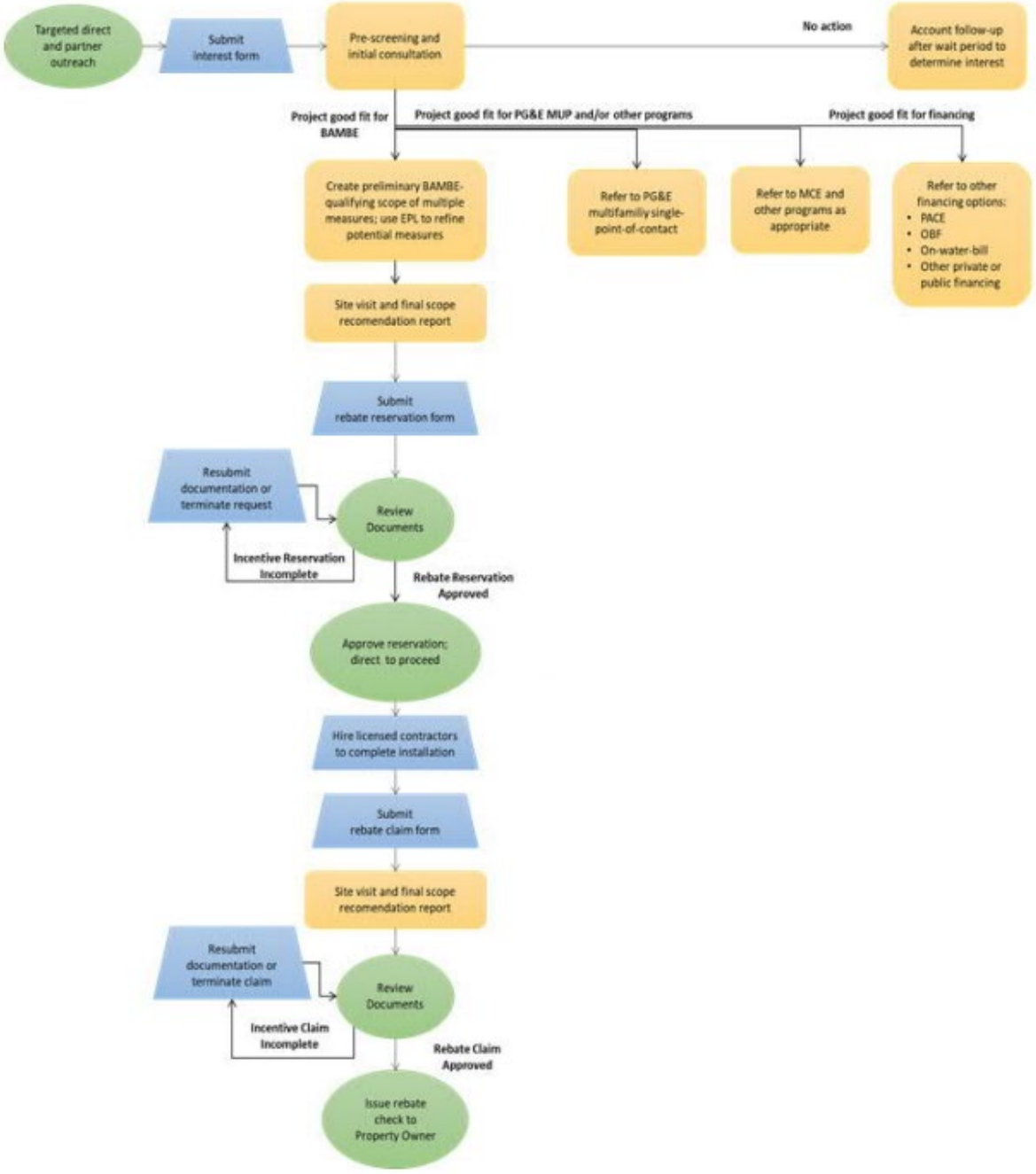
Costs (and Cost Effectiveness)

- The project data shows about four months between what is labeled as "Comprehensive TA" and "Site Visit", another two months between "Site Visit" and "Rebate Reservation Approved", and almost eight months between "Construction Started" and the "Rebate Claim Approved". Combined, this shows an extended timeline for a multifamily project within BAMBE to come to fruition.
    - Do these times seem typical for a MF project or is this longer because these are smaller properties?
    - How much do you think the program costs are increased because of this extended time?
- MF programs in the state have a range of benefit to cost (TRC) values from 0.14 to 1.66 and BAMBE is 0.18. What do you think occurs within these programs that affects their TRC values?
- Do you have any suggestions for how BAMBE's TRC could be increased?

Thank you for your time!

Appendix D.Multifamily Process Flow Chart

Note that his flow chart is old as the PG&E MUP program is no longer active in 2024. Kept for context around processes.



Source: BayREN Multifamily Residential Implementation Plan, PY2024-2027, October 9, 2023

Appendix E. Calculation of Special Adders

Redesigned 2023 Incentive Structure – Data & Priorities

v.10.23.2023

OVERVIEW

Effective January 1, 2023, the BAMBE program will implement a new incentive structure. Below is a summary of the 2023 incentives.

Base Rebate - All multifamily buildings that complete qualifying energy efficiency upgrades will receive a per unit base incentive

All projects that meet the Base Rebate requirements are also eligible to receive "adder" incentives:

Electrification Adder - Additional incentives are offered for gas-to-electric upgrades that result in reduced GHG emissions.

Health Burden Adder – Properties in specific "Health Burdened" geographic zones will receive additional incentives for in-unit upgrades that improve indoor air quality.

Resilience to High Heat Adder – Properties in specific "High Heat Burdened" geographic zones will receive additional incentives for in-unit upgrades that help residents be more resilient to extreme heat events.

Housing Burden Adder - Properties in specific "Housing Burdened" geographic zones will receive additional incentives for certain in-unit upgrades.

BACKGROUND

The BAMBE program was created to help overcome barriers to implementing energy efficiency retrofits in multifamily properties. Since its inception in 2013, the program has provided customers with a flat per unit rebate amount when the property owner makes upgrades designed to save a minimum threshold percent energy savings. The Base Rebate under the new 2023 incentive structure follows this same design.

In 2019, BAMBE introduced the "Clean Heating Pathway" to provide additional incentives for gas-to-electric upgrades. The new 2023 incentive structure will offer these same incentives to all multifamily properties in the BayREN territory through the "Electrification Adder".

In 2021, the CPUC created a new Equity Segment and the BAMBE program chose to be reclassified within that segment as an Equity program. As such, the BAMBE incentive structure will be revised beginning in 2023 to more directly center equity as the basis for how incentives are distributed within the BayREN territory.

For this program, centering equity means:

1. identifying which specific building upgrades offered through BAMBE can reduce burdens experienced inequitably throughout the region,

2. providing higher incentives for properties located in those overburdened regions when the scope of work includes upgrades that can reduce the impact of those burdens,

3. providing higher incentives for in-unit measures that improve comfort and safety for properties located in regions that have historically been "underserved" by energy efficiency programs.

METHODOLGY

For the past several years, the BAMBE program has met with stakeholders to gather input on the program and to learn how to better serve hard-to-reach communities. Stakeholder feedback has included, but is not limited to, conversations with property owners that participated in BAMBE, roundtable meetings with tenants and property owners of naturally occurring affordable housing, meetings with county staff to identify priorities and collaboration opportunities, review of local reports that identify housing needs and priorities based on community input, and discussions with affordable housing developers.

Building off this feedback, staff evaluated the following five central questions to direct the methodology used for establishing the new 2023 incentive structure:

a. In what ways can the building upgrades offered through BAMBE reduce burdens experienced throughout the region?
b. Of the burdens that the BAMBE program upgrades aim to address, what factors indicate an increased level of burden?
c. What data sources are available to identify the "overburdened" geographic zones?
d. At what level of granularity are relevant data available?
e. In cases in which multiple factors may be useful to determine eligibility, what is the relative importance of each input?

FINDINGS

After thorough analysis of stakeholder feedback and evaluation of available data, the BAMBE program identified the three burdens as measurable and relevant for meeting program objectives. Please read below for an explanation of each.

Health Burden

Many BAMBE qualifying upgrades (such as building shell and HVAC improvements) can improve indoor air quality. Incentivizing these upgrades in areas with high outdoor air pollution is intended to improve resident health as research shows that residents in areas with high levels of exposure to particulate matter and other airborne toxins have higher rates of asthma and have more asthma-related ER visits than residents in areas with less airborne pollution[1].

[1] A. Madaniyazi, L., Xerxes, S. (2021) Outdoor air pollution and the onset and exacerbation of asthma. Chronic Dis Transl Med., 7(2): 100–106. doi: 10.1016/j.cdtm.2021.04.003
B. Environmental Defense Fund (2021, March 31) Air pollution's unequal impacts in the Bay Area. Available at: https://www.edf.org/airqualitymaps/oakland/health-disparities.
C. Green and Health Homes Initiative analysis of 2017 OSHPD Asthma-Related ED Visit data

Only outdoor air pollutants and asthma rates are used to identify the geographic areas that have higher rates of "health burden" for the BAMBE program. Other pollutants, such as Drinking Water Contaminants (which is part of the CalEnviroScreen "Pollution Burden" indicator[2]), are not included because the upgrades offered through BAMBE do not reduce these pollutant burdens.

Input Indicator	Relevance
Health Risk: • Asthma Rate	• High correlations between asthma rates and exposure to inhalable particulate matter and other airborne toxins • BAMBE building upgrades can potentially reduce asthma triggers from outdoor air pollution
Pollution Risk: • Diesel PM • Toxic Releases from Facilities • Traffic Impacts	• High indicator levels denote increased risk for triggering asthma attacks • High indicator levels, in combination with high asthma rates, suggests potential for exposure to corresponding pollutants (rather than other factors) contributing to increased asthma rates • Presence of high indicator levels suggests that reducing exposure to outdoor air through BAMBE participation can benefit tenant health

Index Calculation

Health Index =

$$\frac{\text{Asthma Rate \%} + \text{Diesel PM \%} + \text{Toxic Releases from Facilities \%} + \text{Traffic Impacts \%}}{4}$$

Calculation Rationale

CalEnviroScreen 4.0 (CES) includes Diesel PM, Toxic Releases from Facilities, and Traffic Impacts as "Exposure Indicators" in its Pollution Burden index and includes asthma rate in the Population Characteristics Score. While CES considers asthma rate in a different category from the other three inputs, the composite CES 4.0 score weights all four of these indicators equally. CES is a well-researched framework and the use of these four indicators in CES is similar to their use in defining the BAMBE "health burdened" geographic zone. Moreover, we did not identify any considerations that would suggest that one of these indicators is considerably more relevant than the others to BAMBE's impacts and objectives. Therefore, the BAMBE health index evenly weights the value of the four input indicators.

Absolute measurement values of each of the indicators use differing units and are not comparable. Therefore, the Health Index uses percentile values for each indicator.

High Heat Burden

Many BAMBE-approved energy efficiency improvements can help residents be more resilient to extreme heat events. For example, measures such as building shell improvements and efficient cooling equipment can support occupant comfort and safety.

[2]https://experience.arcgis.com/experience/ed5953d89038431dbf4f22ab9abfe40d/page/Indicators/?views=Pollution-Burden

Air temperatures experienced in different census tracts across the Bay Area vary significantly. Air temperatures depend on elevation, proximity to the ocean, and weather patterns, but are also affected by the local environment, which may contribute to local heat islands. Rates of impervious surface contribute significantly to the existence of heat islands and can magnify the impacts of high heat days.

The following two input indicators are used to identify the geographic zones most impacted by high temperatures.[3]

Input Indicator	Relevance
Risk factor • High Heat Days (HHD)	• Distinguishes the regions in the Bay Area for which extreme high temperatures are most prevalent and prioritizes those with the highest risk • HHD definition based on threshold temperature for increased heat related health emergencies
Aggravating factors • Percent impervious surface	• Individually, low percentages influence occurrences of heat island effect

Index Calculation:

Step 1: If HHD % <= 25, Heat Burden Index = 0

Step 2: If HHD % > 25, Heat Burden Index =

$$\frac{2 * \text{HDD\%} + \text{Impervious Surface\%}}{3}$$

Calculation Rationale:

Research on heat islands and heat island mitigation has found that the high levels of impervious surfaces within a region aggravate the effects of hot weather on the area, by contributing to the occurrence of urban heat islands[4]. However, the impact of Impervious Surfaces (solely from an urban heat perspective) on the local environment is only relevant if there are hot days. Therefore, the index gives greater importance to temperature and less weight to impervious surfaces. It also eliminates from consideration those areas with the lowest frequencies of high heat days.

HHD values are derived from the National Climate Assessment's LOCA dataset forecasts for annual average number of days with temperatures over 90 degrees from 2016 – 2045. The forward-looking timeframe recognizes that climate change will unevenly affect sub-regions within the Bay Area and

[3] Rationale for not including tree canopy data in heat burden index: The team found that including tree canopy data weighted the index toward rural areas that may have large open fields (agricultural lands, or other open spaces). Since the intent of including this data point was to help identify areas where there was increased risk of heat island effects and the team was not aware of data connecting agricultural areas and natural open spaces to heat islands, the tree canopy input was removed from the index.

[4] Vujovic, S. et. Al. 2021. Urban Heat Island: Causes, Consequences, and Mitigation Measures with Emphasis on Reflective and Permeable Pavements. Advances in Civil Engineering. 2 (2) 459-484. https://doi.org/10.3390/civileng2020026

approximately aligns with the average expected useful life of building improvements that may be included in a BAMBE project.

Impervious Surface values are aggregated from 30-meter pixel data from the Multi-Resolution Land Characteristics Consortium's National Land Cover Database. The value for each pixel is the percentage of area in that pixel that is covered by impervious surfaces.

Absolute measurement values of each of the indicators use differing units and are not comparable. Therefore, the Health Index uses percentile values for each indicator.

Housing Burden

It is well-documented that energy efficiency programs have historically underserved low-to-moderate income multifamily residents[5]. The BAMBE program aimed to address this issue in 2020 by prioritizing the following property types in its pipeline:

- Properties with less than 100 units
- Deed-restricted or naturally-occurring affordable property
- Property has a resident ownership structure such as an HOA or co-op
- Property is located within a disadvantaged community (determined by the AB 1550 Low-Income Communities map[6])

Now as an Equity program, BAMBE will not only prioritize funds for these property types, but will also provide additional incentive dollars to properties that are located in geographic zones defined as "Housing burdened" when the project's scope of work includes in-unit upgrades that do not increase utility bills. This incentive is focused on improving the quality of the unit for the resident. Consequently, because electrification can lead to higher utility bills, only in-unit energy efficiency upgrades qualify for this incentive. BAMBE offers a separate "Electrification" adder to incentivize gas-to-electric upgrades.

There is no data source for the Bay Area that identifies rents for all multifamily properties and it is infeasible for the BAMBE program to verify incomes of all residents in a building. Consequently, "Housing Burden" is defined by data available through CalEnviroScreen 4.0 (CES), the American Community Survey (ACS), and the U.S. Department of Housing and Urban Development (HUD). The Federal Poverty Level (FPL), or multiples thereof, is not used because this data does not take into account regional housing costs. Below is more information about the data sources that are used to identify the geographic zones with low-to-moderate income multifamily residents that experience a housing burden.

Input Indicator	Relevance
Renter Housing Burden	• Data focuses on housing burden experienced by tenants, rather than by homeowners. • Reflects impact of high housing costs relative to income, as experienced by households across a wide range of income levels

[5] Fournier, ED, et al. 2020. On energy sufficiency and the need for new policies to combat growing inequities in the residential energy sector. Elem Sci Anth, 8: 24. DOI: https://doi.org/10.1525/elementa.419

[6] https://ww3.arb.ca.gov/cc/capandtrade/auctionproceeds/lowincomemapfull.htm

	• Aligns with HUD definition of housing affordability
Low-Income Extreme Housing Burden	• Highlights areas that have high concentrations of households with income that is less than 80 percent of area median • By only including extreme housing burden, focuses on low-income households most affected by housing burden.

Index Calculation

Housing Burden Index =

$$\frac{\text{Renter Housing Burden} + \text{Low} - \text{Income Extreme Housing Burden \%}}{2}$$

If the median income in a tract is 80 percent of the county median income and no Low-Income Extreme Housing Burden value is available for the tract, the index is calculated based solely on the Renter Housing Burden value. If the median income for the tract exceeds 80 percent of the county median income and no Low-Income Extreme Housing Burden is available for the tract, the Housing Burden Index value for the tract is zero.

Calculation Rationale

The two primary input indicators each offer housing burden information, but neither indicator fully identifies low-to-moderate income multifamily residents who experience a housing burden.

The "Renter Housing Burden" data focuses only on tenant households, but equally values the rates of housing burden among low-income, moderate income, and affluent households. It also does not distinguish between the impacts of modest housing burden (ex. 31% of income paid for housing costs) and extreme housing burden (ex. 60% of income paid for housing costs).

The "Low-Income Extreme Housing Burden" data focuses on impacts on households with low incomes but includes data for both renters and homeowners. This indicator highlights the most extreme instances of housing burden on households with low-incomes but excludes households with unaffordable housing costs below 50 percent of their incomes and also excludes moderate income households, for whom market rate housing costs are unaffordable.

Therefore, the index equally weights percentile values for the two indicators.

Because the "Renter Housing Burden" indicator measures burden across all income levels, in the absence of a value for the "Low-Income Extreme Housing Burden" indicator, the index uses tract median income (ACS) in comparison to county median income (HUD) to exclude tracts with moderate and high median incomes.

Appendix F.BAMBE Rebates

There are three components to BAMBE rebates – a base rebate, special rebates, and a multiplier.

$500/unit Base Rebate: The base rebate requires installation of 2+ energy efficiency upgrades that save 10% or more of the building's energy. For project-scopes including in-unit envelope measures (exterior wall insulation or windows), the savings threshold is reduced to 5%. (Table 15)

Varied Special Rebates: BAMBE provides additional rebates based on whether the project includes an electrification measure or if the building is within a burdened zone. The rebate is a per-unit rebate. (Table 16 to Table 19)

2X Multiplier: BAMBE seeks to incentivize building owners to install measures that benefit residents by providing a total rebate multiplier if either of two specific measures are included in the project. If either measure is part of the project, the total rebate value is doubled. (Table 20)

Table 15. BAMBE Measures Eligible for Base Rebates

Measure Location	End Use	Measure Name
Common Area	Appliance	Central washing machines
	Building Envelope	Cool roof
		Crawlspace insulation
		Floor insulation
		Roof insulation
		Wall insulation
		Window film
		Windows
	DHW	Central Heat Pump Water Heater
		Central Heat Pump Water Heater (FuelSub)
		DHW boiler control
		DHW recirculation controls
		Domestic hot water heater/boiler
		Drain water heat recovery
		Laundry/Common Area HP Water Heater
		Laundry/Common Area HP Water Heater (FuelSub)
		Time and/or temperature controls (DHW recirculation pump)
		Variable speed recirculation pump
	HVAC	Central Heat Pump HVAC
		Central Heat Pump HVAC (FuelSub)
		Chiller plant, cooling tower
		Cold water booster pump
		Common Area Heat Pump HVAC
		Common Area Heat Pump HVAC (FuelSub)
		Direct drive exhaust fan
		Pipe insulation
		Steam trap replacement
		Variable speed hydronic heat circulator
	Lighting	Common area bulbs
		Common area, garage, exterior lighting fixtures/controls
	Other	Central vending machines
		Common Area Electrical Upgrades (Heat Pump Readiness)
		Common Area Electrical Upgrades w/ Transformer Upgrade (Heat Pump Readiness)
		Crossover repairs (<75% units or common area)
		Crossover repairs (>75% units)
		Imbalance repairs

Measure Location	End Use	Measure Name
		Landscaping
		Operational measures (w/data release to affected meter)
	Pool	Heat Pump Pool Heater
		Pool Covers
		Pool heater
		Variable speed pool pump
In-unit	Appliance	Dishwashers
		In-Unit Electric Cooking
		In-Unit Laundry Dryer
		In-unit washing machines
		Refrigerators
		In-Unit Laundry Dryer
	DHW	Auto-diverting tub spout
		Bathroom faucet aerators
		In-Unit Heat Pump Water Heater
		Kitchen faucet aerators
		Low flow showerheads
		Pipe insulation for DHW
		ThermaXX Insulation Jackets
		Thermostatic shower valve
	HVAC	Air vent replacement
		Duct Insulation
		Duct sealing
		In-Unit Heat Pump HVAC
		Min-split heat pump
		Natural gas furnace
		Natural gas wall furnace
		Package terminal heat pump
		Thermostat
		Thermostatic radiator valves (TRVs)
	Lighting	In-unit bulbs only
		In-unit hard-wired lighting fixtures
	Other	CAS repairs
		In-Unit Electrical Upgrades (Heat Pump Readiness)E
		Toilets

Table 16. BAMBE Measures Eligible for an Electrification Rebate

Measure Location	End Use	Measure Name	Additional Rebate
Common Area	DHW	Central Heat Pump Water Heater	$1,000 / apartment served
		Laundry/Common Area HP Water Heater	$1,000 / equipment
	HVAC	Central Heat Pump HVAC	$1,000 / apartment served
		Common Area Heat Pump HVAC	$1,000 / equipment
	Other	Common Area Electrical Upgrades	$5,000 / property
		Common Area Electrical Upgrades w/ Transformer Upgrade	$5,000 / property
	Pool	Heat Pump Pool Heater	$1,500 / pool (or spa)
In-unit	Appliance	In-Unit Electric Cooking	$750 / apartment
		In-Unit Laundry Dryer	$250 / apartment
	DHW	In-Unit Heat Pump Water Heater	$1,500 / apartment
	HVAC	In-Unit Heat Pump HVAC	$1,500 / apartment
		Mini-split heat pump	$1,500 / apartment

Measure Location	End Use	Measure Name	Additional Rebate
		Package terminal heat pump	$1,500 / apartment
	Other	In-Unit Electrical Upgrades	$1,000 / apartment

Table 17. BAMBE Measures Eligible for an additional $500/apartment rebates if in a Health Burdened Zone

Measure Location	Measure End Use	Measure
Common Area	Building Envelope	Windows
In-unit (all must be electrification efforts)	Appliance	In-Unit Laundry Dryer
		In-Unit Electric Cooking
	DHW	In-Unit Heat Pump Water Heater
	HVAC	In-Unit Heat Pump HVAC

Table 18. BAMBE Measures Eligible for an additional $500/apartment rebate if in a Heat Burdened Zone

Measure Location	Measure End Use	Measure
Common Area	Building Envelope	Roof insulation
		Cool roof
		Crawlspace insulation
		Floor insulation
		Wall insulation
		Windows
In-unit	HVAC	In-Unit Heat Pump HVAC

Table 19. BAMBE Measures Eligible for an additional $500/apartment rebate if in a Housing Burdened Zone*

Measure Location	Measure End Use	Measure
In-unit	Appliance	Dishwashers
		In-unit washing machines
		Refrigerators
	HVAC	Duct Insulation
		Duct sealing
		Thermostat
	Lighting	In-unit hard-wired lighting fixtures
	Other	Toilets

**Housing-related additional rebate is only available to properties built before 2010 with less than 50 apartments OR all deed-restricted affordable properties located in the housing burden zone.*

Table 20. BAMBE Measures Eligible for a rebate 2X multiplier if in a Housing Burdened Zone*

Measure Location	Measure End Use	Measure
Common Area	Building Envelope	Wall Insulation
		Windows

**Housing-related multiplier only available to properties built before 2010 with less than 50 apartments OR all deed-restricted affordable properties located in the housing burden zone.*

As noted above, the BAMBE rebate structure has many components. Below are two examples to help understand how the rebates/multipliers would be applied.

Example 1:

The building has 10 apartments and is in a housing and health burdened zone.

The building owner chooses to install the following measures that are estimated to save 8% of the annual consumption. (Because this project includes wall insulation, the savings requirement is lowered to 5%)

Rebate	Qualifying Measures	Rebate Calculation	Rebate Total
Base Rebate		10 units x $500	$5,000
Electrification Rebate	Central Heat Pump Water Heater	10 units x $1,000	$10,000
	Common Area Electrical Upgrades w/ Transformer Upgrade	1 equipment x $5,000	$5,000
	In-Unit Heat Pump	10 units x $1,500	$15,000
Health Burden Rebate Adder	In-Unit Heat Pump HVAC	10 units x $500	$5,000
		Sub-total	$40,000
Housing Burden Rebate Multiplier	Wall Insulation	2 x $40,000	$80,000
		Total	$80,000

Example 2:

The building has 10 apartments and is in a heat burdened zone.

The building owner chooses to install the following measures that are estimated to save 12% of the annual consumption. (Because neither wall insulation nor windows are going to be installed, the project must meet the 10% savings requirement.)

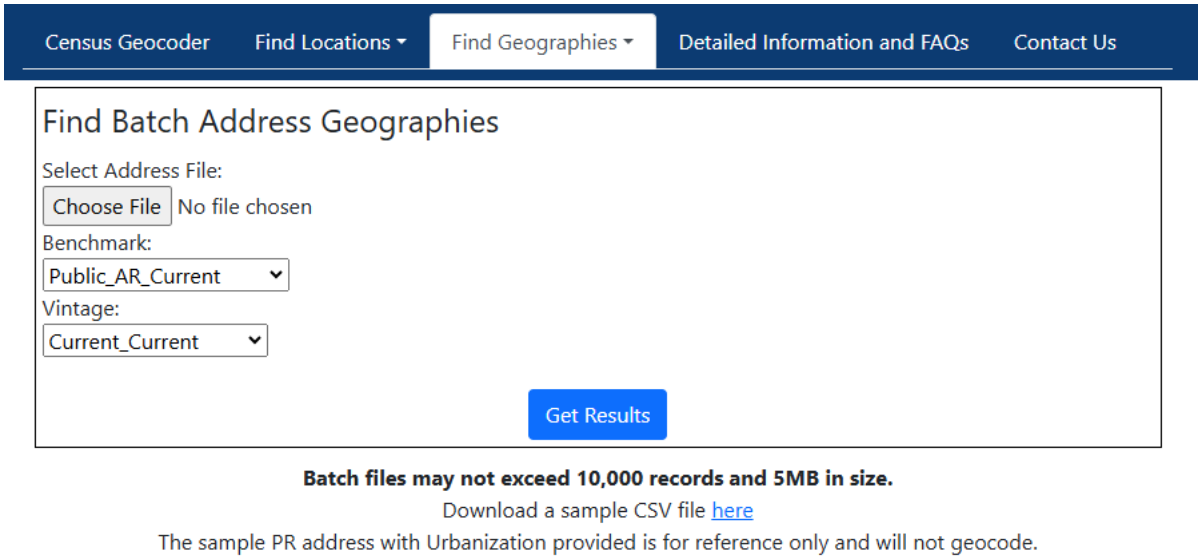
Rebate	Qualifying Measures	Rebate Calculation	Rebate Total
Base Rebate		10 units x $500	$5,000
Electrification Rebate	Central Heat Pump Water Heater	10 units x $1,000	$10,000
	Common Area Electrical Upgrades w/ Transformer Upgrade	1 equipment x $5,000	$5,000
	In-Unit Heat Pump	10 units x $1,500	$15,000
Heat Burden Adder	In-Unit Heat Pump HVAC	10 units x $500	$5,000
		Total	$40,000

Appendix G. Determining Census Tract and Mapping to DAC/Underserved

This appendix describes how to determine and map a project to DAC or underserved census tracts using Excel.

Determining Project Census Tract: This website (https://geocoding.geo.census.gov/geocoder/geographies/addressbatch?form) is an easy to use (and free) site maintained by the federal government to obtain census tract information based on addresses. It matches addresses to census tracts about 98% of the time.

The graphic below shows the landing page of the website link. A Census Geocoder Users Guide is here (https://www.census.gov/programs-surveys/geography/technical-documentation/complete-technical-documentation/census-geocoder.html).



The site can determine census tracts for multiple addresses through uploading a CSV file. A sample CSV file that shows what data to provide is available on the site.

Results are provided with state, county and tract code in separate columns. Because DAC and other census data (to determine underserved) are 10 character numbers, these three columns must be concatenated and then multiplied by 1 to create a number (not text).

Mapping to DAC/Underserved DAC and underserved census tracts are obtained from two different locations

- DAC census tracts are included in an Excel sheet located here: https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40 (the Excel file is under "Data and Additional Materials"
- Statewide median income came from this site https://www.deptofnumbers.com/income/california/#:~:text=According%20to%20the%20Census%20ACS,household%20income%20is%20%2415%2C190%20higher and them was multiplied by 80% to determine an underserved median income.
- This report used census data to determine the median income by census tract. Specifically, the 5 year American Community Survey table B19013 from this site https://data.census.gov/table?q=median+income&g=040XX00US06$1400000 . This data has a geography variable that must be reduced in site to match the 10 character tract value. This can be reduced by using the Excel function that keeps only the 10 characters on the right of the geography variable and then multiplies that by 1 to create a number. Each census tract was set to underserved or not by comparing the census tract value to 80% of the statewide median income.

Mapping the DAC and underserved census tracts to the census tracts of the projects can occur by a vlookup function in Excel.

Appendix H. Attrition Analysis Memo

MEMORANDUM

To: Ben Cooper and Maria Hart, StopWaste

From: Jean Shelton and Ethan Barquest, Verdant Associates
Mary Sutter, Grounded Research

Date: September 3, 2024

Re: BayREN Multifamily (BAMBE) Logistic Regression Attrition Memo - Final

Grounded Research and Verdant are submitting the BayREN Multifamily Logit Attrition Memo as a continuation of analysis associated with research conducted on BayREN's Multifamily (BAMBE) program. This memo presents findings from a logistic regression analysis to assess attrition trends in multifamily projects and identify the influence of project characteristics on whether a project is active or inactive (attrite).

Findings

1. The *Incentive Per Unit* is the most significant predictor of whether a project would be inactive, where the larger the incentive per unit, the less likely a project would become inactive. This characteristic is also correlated with BAMBE high-priority zones (including being located in health burden zone, housing burden zone, and a high heat zone), with *Incentive Per Unit* most strongly correlated to the property being located in a housing burden zone.
2. Being located in a *Low Income Census Tract* has a statistically significant influence on the likelihood a project is inactive. The estimated coefficient for *Low Income Census Tract* implies that projects in these tracts are 2.5 times more likely to be inactive than those located outside low-income tracts. However, this influence is much smaller than the estimated influence of a *Property Located in a Housing Burden Zone* (homes located in a housing burden zone are 5.7 times less likely to be inactive). The fact that being in a low-income census tract increases the likelihood of being inactive while being in a housing burden zone decrease the likelihood of program inactivity could imply that the program is meeting more of the needs of housing burden customers while providing less support for those with low incomes.
3. Other project features do not appear to be strong or reliable predictors of attrition. The analysis of other project features, however, was substantially impacted by the missing project data associated with measures installed (or suggested for inactive projects) and project costs (and potential costs). More complete data could add to the understanding of the features influencing project attrition.

Data Sources

Grounded Research provided Verdant with information on 353 BAMBE projects from the first quarter of 2022 through the first quarter of 2024[1]. Project information included project status, location, incentive amount, the number of units located in the building, and whether the project was located in a disadvantaged community (DAC), low income census tract, health burden zone, high heat zone and/or housing burden zone. Additionally, the project data contained information on measures rebated, whether the project was in a deed restricted building, building vintage, and total project cost, however, these data fields were too incomplete to be used for the analysis.

Grounded Research had binned each of the 353 projects by Project Status Group into Active, Inactive, In Progress, and Other Status (see Table 1). Many of the 353 projects are currently In Progress (93) and can either be completed

[1] BayREN originally sent the program tracking data to Grounded Research. Grounded Research added additional variables, such as low-income census tract, to the data before providing the data to Verdant.

(become active) or become Inactive. Given their ambiguous state (as it pertains to this analysis), these projects were removed from the analysis. In total there were 87 defined as active and 153 as inactive.

Table 1: Count of Projects Included in the Analysis by Disposition

Project Status Group	Project Status	Count	Disposition for Analysis
Active	In Construction	15	Active
	Paid	19	Active
	Rebate Reservation Approved	23	Active
	Rebate Reservation Requested	2	Active
	Report Sent	28	Active
Inactive	Project Inactive	153	Not Active
In Progress	Comprehensive TA	61	Removed
	Site Visit Complete	31	Removed
	Site Visit Scheduled	1	Removed
Other Status	Potential Future Project	19	Removed
	Project Ineligible	7	Removed
	Referred Out of Program	6	Removed
	Rebate Reservation Requested	1	Removed
	Referred Out of Program	1	Removed
Total		353	Active 87/Inactive 153

After defining the projects status and removing In Progress and Other projects that did not pertain to the analysis, Verdant reviewed the projects and their associated data. If projects were missing data for variables of interest (e.g., location, eligible for certain type of incentive), they were removed from the dataset to allow for modeling on a complete dataset. In total, 235 of the original 240 projects were included in the analysis dataset. We created an *Inactive Flag* that defined projects as inactive (1) and active (0). The *Inactive Flag* represents the dependent variable in the analysis, the independent variables (e.g., incentive per unit, number of units, low income census zone, and others) explain the likelihood of a project being active or inactive.

Summary of Results

Prior to conducting the logistic regression modeling, Verdant developed a correlation matrix of variables likely to be included in the logistic regression analysis of attrition. The correlation matrix provides the magnitude and direction of the correlation between each variable, where the further the statistic is from zero, the stronger the correlation. A correlation coefficient of 1 or -1 represents perfect correlation between two variables. The matrices provide two main insights. The first insight identifies what characteristics are correlated with the *Inactive Flag,* which helps identify project characteristics important to the analysis. Secondly, it helps to identify multicollinearity among independent variables, which can cause issues in regression-based analysis if two independent variables are too highly correlated. Figure 1 presents the correlation matrix for project characteristics explored in this analysis.

Figure 1: Correlation Matrix (n=235)

	Inactive (Definition 2)	Low Income Census Tract	DAC	Number of Units at the Property	Less than 15 Units at the Property	Incentive Per Unit	Total Incentive Amount	Property Located in a Health Burden Zone	Property Located in a High Heat Zone	Property Located in a Housing Burden Zone	San Fran.	East Bay	South Bay	North Bay
Inactive (Definition 2)	1.00													
Low Income Census Tract	0.07	1.00												
Disadvantaged Community	0.11	0.26	1.00											
Number of Units at the Property	0.10	0.00	-0.08	1.00										
Less than 15 Units at the Property	-0.04	-0.04	0.12	-0.34	1.00									
Incentive Per Unit	-0.58	-0.01	-0.04	-0.12	0.19	1.00								
Total Incentive Amount	-0.12	-0.03	-0.06	0.85	-0.38	0.14	1.00							
Property Located in a Health Burden Zone	-0.17	0.19	0.34	-0.12	0.16	0.29	-0.04	1.00						
Property Located in a High Heat Zone	-0.18	0.07	-0.04	-0.02	0.08	0.21	0.08	0.20	1.00					
Property Located in a Housing Burden Zone	-0.37	0.20	0.11	-0.12	0.19	0.45	-0.01	0.46	0.28	1.00				
San Francisco	-0.15	-0.06	-0.03	-0.02	-0.15	0.01	-0.01	-0.05	-0.12	-0.08	1.00			
East Bay	0.04	0.19	0.12	0.00	0.07	0.03	-0.04	0.37	-0.12	0.06	-0.23	1.00		
South Bay	0.00	-0.20	-0.03	0.07	0.03	0.07	0.11	-0.22	0.11	0.01	-0.20	-0.54	1.00	
North Bay	-0.06	0.04	-0.09	-0.06	-0.03	-0.13	-0.07	-0.15	0.08	-0.03	-0.15	-0.41	-0.36	1.00

Correlation coefficient values of 1 or -1 represents perfect correlation between the variable and the project being inactive. The closer to 1 or -1, the stronger the correlation.

Through the correlation matrices, there were two main variables identified that have a strong correlation with the *Inactive Flag*. These included negative correlations with *Incentives Per Unit* and *Property Located in a Housing Burden Zone*. The relationship between *Incentives Per Unit* and *the Inactive Flag* indicates that there is a strong negative correlation between a project becoming inactive and increases in the incentive per unit. The larger the incentive per unit, the less likely a project will be inactive. The BAMBE incentive structure also explains some of the relationship *Incentives Per Unit and Located in a Housing Burden Zone* (0.45 correlation coefficient) and the relationship between *Located in a Housing Burden Zone* and the *Inactive Flag* (-0.38 correlation coefficient). The BayREN web site states that "housing cost burdened properties" built before 2010 with less than 50 units or deed-restricted affordable properties are provided an incentive multiplier of 1.5 to 2 times the standard incentive amounts.[2] These incentive multipliers were made available after January 1st, 2023. However, 80% (189) of the projects included in the analysis had their rebate reservation submitted or became inactive after January 1st, 2023. Therefore, most projects located in a housing burden zone were eligible to receive substantially higher incentives than other participants. The other geographic incentive multipliers (*Located in a Health Burden Zone* and *Located in a High Heat Zone*) are also negatively correlated with the *Inactive Flag,* but to a lesser degree.

There were also several combinations of variables identified that would introduce multicollinearity into the model if they were included together. Multicollinearity concerns arose for the relationships between *Incentives Per Unit* and *Property Located in a Housing Burden Zone*, *Property Located in a Housing Burden Zone* and *Property Located in a Health Burden Zone*, and *Total Incentive Amount* and *Number of Units at the Property*. Given the collinearity of these variables, they cannot be included in the same model specification.[3] However, Verdant assessed multiple logit model specifications, adding and replacing variables that were colinear with other independent variables.[4] Ultimately, the model specification chosen is described in Equation 1 below.

Equation 1: Logistic Regression Model Specification

$$Inactive_i = \beta_0 + \beta_1 IncentivePerUnit_i + \beta_2 NumberOfUnits_i + \beta_3 LowIncomeCensusTract_i + \beta_4 HighHeatZone_i + \beta_5 SF + \beta_6 South\_Bay + \beta_7 East\_Bay$$

[2] https://www.bayren.org/multifamily-property-owners/building-improvements

[3] In regression analysis, multicollinearity occurs when an independent variable is correlated with the dependent variable and another independent variable. Multicollinearity creates instability in parameter estimates which results in a coefficient that has the incorrect magnitude or direction of influence in explaining the relationship between the independent and dependent variable. It also erodes the statistical significance of coefficient estimates.

[4] Verdant also explored the timing of when the current incentive structure took effect. However, this was found to be statistically insignificant and excluded from the analysis.

Coefficient	Description
$Inactive_i$	A flag indicating whether a project is active (0) or inactive (1)
β_0	The intercept of the model
The coefficient for the independent variable that represents the change in the log odds of the event for…	
$\beta_1 IncentivePerUnit_i$	…the incentive per unit ($) of a project (a continuous variable).
$\beta_2 NumberOfUnits_i$	…the number of units at the property of a given project (a continuous variable)
$\beta_3 LowIncomeCensusTract_i$	…whether a project is in a low income census tract (1) or not (0) (a binary variable)
$\beta_4 HighHeatZone_i$	…whether a project is in a high heat zone (1) or not (0) (a binary variable)
$\beta_5 SF$	…whether a project is San Francisco County (1) or not (0) (a binary variable)
$\beta_6 South\_Bay$	…whether a project is in a San Mateo or Santa Clara County (1) or not (0) (a binary variable)
$\beta_7 North\_Bay$	…whether a project is in a Napa, Marin, or Solano County (1) or not (0) (a binary variable)

Table 2 present the logistic regression model results. Before discussing the results, it is worth discussing the interpretation of logistic regression coefficients. In linear regression the coefficients describe the effect of a one unit change in an independent variable on the dependent variable (i.e., a linear relationship). However, in binary logistic[5] regression, the coefficient represents the change in the predicted log odds[6] of an event associated with a one unit change in the independent variable.[7] The exponent of the coefficient represents the odd ratio (marginal effect), or the probability of an event (being inactive) over a non-event (being active). An odds ratio of 1 means that the probability of an event is 50/50. For non-binary independent variables, the odds ratio represents the change in probability of an event (being inactive) for a one unit change of independent variable. In Table 2, we present the odds ratios for binary independent variables, however, the odd ratios for continuous variables, such as *Incentive Per Unit*, are excluded because the odds ratio is dynamic for continuous variables and changes as the independent variable increases or decreases.

Table 2: Logit Model Result

Coefficients:	Estimate	Std. Error	z-value	Pr(>|z|)	Odds Ratio
$\boldsymbol{Intercept}$	**3.4540**	**0.5818**	**5.9370**	**0.000**	31.62665
$\boldsymbol{\beta_1 IncentivePerUnit}$	**-0.0024**	**0.0005**	**-4.8960**	**0.000**	--
$\beta_2 NumberOfUnits$	0.0002	0.0014	0.1700	0.865	--
$\boldsymbol{\beta_3 LowIncomeCensusTract}$	**0.9083**	**0.5403**	**1.6810**	**0.093**	**2.480**
$\beta_4 HighHeatZone$	-0.8385	0.5718	-1.4670	0.143	0.432
$\beta_5 SF$	-0.8848	0.7096	-1.2470	0.212	0.413
$\beta_6 South\_Bay$	-0.0566	0.5021	-0.1130	0.910	0.944
$\beta_7 North\_Bay$	-0.3891	0.5089	-0.7650	0.444	0.677

Note: Bolded estimates are statically significant with 90% confidence or greater.

Incentives per unit and the intercept are the most statistically significant coefficient estimates. The log odds of a project being inactive decrease by 0.0024 for every one dollar increase in the incentive per housing unit. However, the odds ratio for continuous variables are dynamic and depend on two relative values (and is not a linear relationship). In other words, the change in likelihood of a project becoming inactive is relative to two *Incentive Per*

[5] Binary logistic regression is a type of regression where the dependent variable is a binary outcome (1 or 0). In this analysis the two possible outcomes are Inactive (1) or Active (0).

[6] Log odds is the logarithm of the odds ratio, where the odds ratio is the probability of an event divided by the probability of a non-event. Mathematically log odds is expressed as $Logit(p) = log(\frac{p}{1-p})$ where p is the probability of an event.

[7] Similar to coefficients estimated using linear regression, if a logit model coefficient is negative, the independent variable is associated with a decrease in the likelihood of an event and a positive coefficient implies that an increase in the independent variable is associated with an increase in the likelihood of the event.

Unit values. Mathematically, the relationship of the change in odds is represented by Equation 2, where β_1 is the coefficient related to *Incentive Per Unit* from the logit model and $IncentivePerUnit_x$ and $IncentivePerUnit_y$ represent the comparative incentive per unit dollar values.

Equation 2: Change in Odds Equation

$$Change\ in\ Odds = exp(\beta_1 * IncentivePerUnit_x)/exp(\beta_1 * IncentivePerUnit_y)$$

Illustrative examples of this interpretation are as follows:

- Increasing the incentive from $750 per unit to $1,000 per unit decreases a project's likelihood of being inactive decreasing by 1.8 times.
- Using the median incentive per unit values of active and inactive projects comparing the change in odds of an incentive of $750 per unit (inactive median incentive) to $2,500 per unit (active median incentive) results in a project being 66.7 times less likely to be an inactive (all else held equal).

While the interpretation of these continuous variable odds ratios is more complex, *Incentive Per Unit* is the most statistically significant variable, indicating that it has the most significant relationship with the *Inactive Flag*. This finding is also consistent with the correlation matrix. Given that binary independent variables are more easily interpreted in logistic regression, it is worth noting that when *Incentive Per unit* is replaced with *Property Located in a Housing Burden Zone,* this variable also has a statistically significant estimated coefficient with z-values less than 0.001 and a coefficient estimate of -1.7509. This coefficient estimate is associated with an odds ratio that indicates that a project in a *Housing Burden Zone* 5.7 times less likely to be an inactive project all else equal.

In addition to the intercept and *Incentive Per Unit*, the estimated coefficient for being in a low income census tract was statistically significant. The coefficient estimate of 0.908 translates to a project being 2.5 times more likely to become inactive if it's located in a low income census tract.

Attachment 1: Missing Data

As mentioned previously, the analysis was limited to variables in the dataset that contained complete or near complete data for each project. Table 3 below includes variables that were not explored in this analysis and the percent of projects that contained populated values. It should be noted that some of this information is only collected at various stages of program participation and others were merged onto the BAMBE data from outside data sources. Regardless, these values represent additional areas that could provide additional insights into BAMBE program attrition.

Table 3: Incomplete Data Fields

Variable	Percent of Projects Populated
Total Project Cost ($)	10%
TSB	17%
Included Measures Description	26%
Year Built	60%
Deed-Restricted Affordable Housing	72%
Any Subsidized or Section 8 Tenants	70%
Rental or owner-occupied	82%
Tenant Paid Utilities	27%
Owner Paid Utilities	27%
Existing Cooling System	23%
Existing Cooling System Location	26%
Existing DHW System	32%
Existing DHW System Location	34%
Existing Heating System	34%
Existing Heating System Location	32%

Appendix I. MF Landscape Memo

MEMORANDUM

To: Ben Cooper and Maria Hart, StopWaste

From: Mary Sutter and Jenn Mitchell-Jackson

Date: 9/23/24

Re: Literature Review of Multifamily Ratepayer Energy Efficiency Programs in California – Final

GROUNDED
RESEARCH AND CONSULTING

This memo describes our findings from a literature review of 12 multifamily (MF) energy efficiency programs in California that were active in 2024.[1] This information is to help the program staff understand how their program may differ from other MF programs in California so they can use this knowledge to make potentially relevant changes to their own program.

Summary of Strengths and Opportunities

When looking across the 12 MF programs, BayREN's BAMBE program appears to offer several strengths and one unique element not offered by other MF programs in CA.

- BAMBE is focused on equity populations. BayREN's program has historically served a higher percentage of underresourced tenant units than other programs (i.e., HTR, DAC, or considered local difficult to serve), although not all programs have reported this data. In addition, BayREN's program is one of two programs that serve smaller properties.
- BAMBE relies on local knowledge to support outreach for the BAMBE program. Specifically, BayREN uses the counties (which represent the BayREN communities) to conduct outreach.
- BAMBE provides a comprehensive offering – offering a full spectrum of efficiency measures. The program also has a focus on electrification.
- In addition to these strengths, the one unique element of the BayREN program is the adder incentives that focus on increasing health, reducing heat burden, and reducing housing costs – all with potential non-energy benefits that would accrue to tenants.

When looking across the 12 MF programs, there appear to also be a few opportunities to learn from other programs.

- BayREN may want to emphasize energy savings a bit more when discussing your objectives for this equity segment program. The focus on equity and energy savings does not always depend on the segment (i.e., energy savings do not just occur within the resource acquisition segment of programs).
- BayREN may want to review the incentives from other programs to see if they should make changes.
- The Northern and Southern Low Income Programs have a unique component of tenant protection.

There may also be some areas to watch (or potential threats for the future if the CPUC considers a Statewide MF program[2]). There are only two programs in Northern California that are targeted at retrofits for properties that are

[1] The programs are: 1) BayREN MF, BAYREN02, 2) MCE MF, MCE01, 3) MCE MF SEM, MCE01c, 4) SoCalGas MF Whole Building, SCC3705, 5) SoCalGas MF Energy Alliance, SCG3889, 6) SoCalREN MF, SCR-RES-A1, 7) SoCalREN HTR MF DI, SCR-RES-A6, 8) SDG&E MF, SDGE4002, 9) Tri-County REN MF, TCR-Res-002, 10) PG&E Statewide Res New Construction, PGE_SW_NC_Res_electric, 11) ESA Northern MF Whole Building, PGE_NMFWB, and 12) Southern MF Whole Building, SDGE-ESA_SW_South_MFWB

[2] Note that they are not currently considering a Statewide MF program, but it was discussed as an option in the Draft Decision (D.23-06-055). It was removed in the final. We also note that this is an internal document and we would likely remove this "areas to watch" language in any externally facing report.

not eligible for the low-income programs (BayREN and MCE) so BayREN's program is critical (and not redundant in Northern California); however, BayREN's program also has many similarities to other MF programs. For example, almost all indicate that they target DAC and HTR. Resource Acquisition (RA) programs are as likely to target HTR or DAC as equity segment programs, but future analysis will be needed to determine if these programs serve the HTR and DAC as expected. Additionally, while BayREN does not have to be cost-effective, it is in the bottom three in terms of the 2024 Total Resource Cost (TRC) cost-effectiveness value[3] (among the 10 non-low income programs) with 2024 program costs that are higher than 2023 and 2024 Total System Benefits (TSB) that is lower than 2023.

Introduction

Our memo is based on analysis of implementation plans (IPs) for 12 MF programs that had been filed by program administrators (PAs) and were active in 2024.[4] Additionally, we reviewed the 2020-2023 annual report for the six (6) PAs with active programs in 2024. We also drew on information in the common metrics spreadsheets for 2020-2023. (See Attachment 1 for a list of programs included in this analysis.) This analysis has limitations introduced by IPs that have varying levels of information and our assumption that what is written in the IPs is occurring. Also, in some cases we found incomplete data.

Within California, ~2.8 million households rent a multifamily dwelling unit (i.e., within a building with 5 or more units). This is 21% of all California households.[5] At 23%, BayREN has a slightly higher percentage of MF renters across their nine counties (i.e., ~620,000 households rent a MF unit vs 2.78 million total households). Among these ~620,000 households, over half (61%) are low income households (i.e., 80% or less of the county specific area median income, AMI) and an additional 17% of MF renters are moderate income households (i.e., between 80% and 120% of county specific AMI).

Characteristics of California MF Programs

Overarching Information

In 2024, the 12 MF programs in our analysis have been in the field from less than one to ten years (see Attachment 1: PA filed MF Programs). They also cover different areas across the state.

- Four of the twelve programs are in Northern California (one BayREN, two from MCE, and one PG&E[6])
- Seven are in Southern California (two each for SoCalREN and SoCalGas, one each for SDG&E and Tri-County REN, and one that SDG&E oversees for the entire Southern California region)
- One is a statewide new construction program that includes a retrofit component (overseen by PG&E)

As shown in Table 1, among these 12 programs:

- Three are in the equity segment
- Six are in the resource acquisition (RA) segment
- One is a market support segment program (focused on new construction)

[3] The TRC is a ratio where the program's monetary benefits are divided by the costs. A value equal to or over 1.0 means that the program's benefits are equal to or greater than the costs – it is "cost effective". The BayREN 2024 TRC is 0.18. See Table 1 for the TRC values of the programs in this analysis.

[4] As part of their 2024-2027 business plans, the PAs had filed for 19 MF programs, but only 10 of these were active in 2024. See Attachment 1 for list of all 19 programs and their status as of the date of this memo.

[5] Data from the B25032 Census table. Excludes Del Norte, Modoc, and Siskiyou counties as they are not covered by any PA. These three counties have only ~31,000 total households and of those, ~1,900 are MF renters.

[6] This is the Northern Multifamily Whole Building Program (Low-Income) Program managed by PG&E. There were no active PG&E MF programs at the time of this memo although PG&E does have a website presence for a Single Point of Contact (SPOC) that references BayREN's program and the Statewide New Construction program that are included in this memo.

- Two are low-income programs[7]

Excluding the two low-income programs, the other ten multifamily programs:

- Have 2024 budgets that are close to double what was spent by the programs in 2023
    - The 2024 budget for these ten programs totals $46.52 million (19% of the all-PA residential budget).
- Expect to obtain $43 million of TSB (15% of the all-PA portfolio residential TSB)
- Had actual TRC values ranging from 0.02 – 1.80 in 2023 and forecast TRC values from 0.14-1.66 in 2024

Excluding the two low-income programs, BayREN's BAMBE program:

- Has the highest budget for MF programs in the equity segment
- Is in the top three programs for 2023 expenditures and 2024 budgets
- Was the third highest TSB in 2023 with a forecast that is the fifth highest
- Has a TRC that is in the bottom three programs in both 2023 and 2024

When comparing the actual values in 2023 to the forecast values in 2024, the programs show a mix of changes. Two programs have more funds, but lower TSB and TRC (BayREN and SoCalREN), one program has lower values for all (SDGE), and the other programs show mainly increases in 2024. (Table 1)

[7] The low-income programs (the Energy Savings Assistance [ESA] Northern Multifamily Whole Building Program and ESA Southern Multifamily Program) are paid for by ratepayers but is included within a different regulatory swim lane. We include them in this analysis because they appear to target the same population as BAMBE and offer similar technologies.

Table 1. Program Expenditures or Budgets and TSB, TRC

			2023			2024			2024 Compared to 2023		
PA	**Program ID**	**Program Name**	**Expenditures** *(millions)*	**TSB** *(millions)*	**TRC**	**Budget** *(millions)*	**TSB** *(millions)*	**TRC**	**Funds**	**TSB**	**TRC**
Equity Programs											
BAY	BAYREN02	Multi Family	$5.22	$1.99	0.19	$8.18	$1.61	0.18	↑	↓	↓
TCR	TCR-Res-002	Multifamily	$1.47	$0.27	0.20	$3.62	$0.58	0.14	↑	↑	↓
SCG	SCG3705	RES-Multifamily Whole Building Program (Equity)	$0.27	$0.56	0.61	$3.09	$4.04	1.16	↑	↑	↑
Resource Acquisition Programs											
SCR	SCR-RES-A1	Multifamily Program	$6.70	$8.69	0.71	$8.25	$5.17	0.45	↑	↓	↓
SDGE	SDGE4002	Multi Family Program (AKA Residential Zero Net Energy Transformation, RZNET)	$5.12	$9.25	1.80	$4.82	$5.55	1.15	↓	↓	↓
SCR	SCR-RES-A5	Small HTR Multifamily Direct Install	--	--	--	$2.39	$1.08	0.45	NA	NA	NA
SCG	SCG3889	RES-Multifamily Energy Alliance Program (Resource Acquisition)	$0.19	$0.29	0.21	$2.14	$1.88	0.83	↑	↑	↑
MCE	MCE01	Multifamily Energy Savings	$0.56	$0.04	0.09	$0.76	$0.33	0.46	↑	↑	↑
MCE	MCE01c	Multifamily Strategic Energy Management	$0.20	$0.16	0.59	$0.42	$0.66	1.55	↑	↑	↑
Market Support Program											
PG&E (statewide lead)	SW_NC_Res_ electric	California Energy-Smart Homes All Electric Residential Program	$7.10	$0.02	0.02	$12.85	$21.91	1.63	↑	↑	↑
Low Income (ESA) Programs											
PG&E	PGE_NMFWB	ESA Northern Multifamily Whole Building Program (public facing name is the Multifamily Energy Savings Program)	$8.01	NA	NA	Unknown	NA	NA	NA	NA	NA
SDG&E (as lead)	ESA_SW_South_ MFWB	Southern Multifamily Whole Building Program (public facing name is the Multifamily Energy Savings Program)	$2.45	NA	NA	$42.14	NA	NA	NA	NA	NA
		Totals (excluding ESA programs)	$26.83	$21.27	--	$46.52	$42.81	--			

Past Participation

BayREN has historically served a higher percentage of underresourced tenant units than other programs (i.e., HTR, DAC, or considered local difficult to serve), although not all programs have reported this data. BayREN consistently provides installations to tenants that are considered local difficult to serve (LDTS). [8] BayREN has been offering a multifamily program since 2014 and has been tracking the number of units they serve, although the focus on (and tracking of) LDTS began in 2020. In the past four years (2020-2023), the BayREN program has provided energy efficiency upgrades to about 10,400 units and 89% of those (~9,300 units) are what has been tracked as local difficult to serve (annually, the percentage of LDTS ranges from 83% to 100%).

We have spotty information on tenant units served within other programs, so cannot fully describe the historic uptake within MF buildings across all programs in this analysis. However, as shown in Table 2, we know that in 2023, four PA programs served a little over 12,000 tenant units and that ~60% of those units were considered HTR, DAC, or LDTS.[9] In 2023, 92% of BayREN tenant units (~2,200 out of ~2,400 units) were LDTS.)

Table 2. # of Tenant Units Served by Year and % that are Underresourced

PA	Program ID	# of Tenant Units Served				Total (for available data)	% of HTR/ DAC / LDTS Served				Total (for available data)
		2023	2023	2021	2020		2023	2023	2021	2020	
Equity Programs											
BayREN	BAYREN02	2,417	1,755	2,302	3,945	10,419	92%	100%	87%	83%	89%
TCR	TCR-Res-02	219	Unknown	Just starting	NA	219	67%	NA	NA	NA	67%
Resource Acquisition Programs											
SoCalGas	SCG3889	4,961	1,268	1,807	9,004	17,040	48%	52%	90%	9%	32%
SoCalREN	SCR-RES-A1	4,491	16,623	12,812	Unknown	33,926	60%	50%	51%	Unknown	52%
Subtotal		*12,088*	*19,646*	*16,921*	*12,949*	*61,604*	*62%*	*55%*	*60%*	*31%*	*53%*
MCE	*MCE01*	*653*	*784*	*Unknown*	*422*	*1,859*	*Unknown*				
Total		12,741	20,430	---	13,371	63,463	---				

Source: Annual Reports or Common Metrics

Targeted Populations

RA programs are as likely to target HTR or DAC as equity segment programs, but future analysis will be needed to determine if these programs serve the HTR and DAC as expected. Many of the resource acquisition programs began prior to the segmentation of programs into equity, market support, and resource acquisition; however, at the time they began, there was a push to include DAC and HTR in any program so these multifamily programs target DAC and HTR – even though not equity focused. As such, there is little to no difference in the targeted population between the current MF programs in our analysis. The equity programs focus on small, HTR, DAC, or independently owned units as are the RA programs and the one market support program. The low-income programs target income qualified, but not necessarily small, HTR, or DAC. Additionally, one RA program focuses on deed restricted MF buildings.

[8] Local difficult to serve (LDTS) is a BayREN value metric and is defined as Bay Area populations considered underserved by the Bay Area local government members. For the BayREN MF program, LDTS were defined in 2020 as tenants within buildings that have less than 100 units, a deed-restricted or naturally occurring affordable property (i.e., using the LIWP definition and demonstrates low-income eligibility without a regulatory agreement), has an ownership structure such as a HOA or co-op or is located in a DAC. As shown in Table 3, the program is currently targeting similar buildings. (BayREN is in currently adjusting the LDTS value metric based on the new equity indicators.)

[9] The four programs were BayREN, SoCalGas, SoCalREN, and TCR. MCE served 653 units in 2023 but did not provide the number in HTR or DAC, so they are not included in the total.

BayREN is one of two programs that serve smaller properties. As shown in Table 3, BayREN is one of two programs (the other is the SoCalREN MF HTR program that is just beginning) that focus on serving small properties. While BayREN targets properties with less than 50 units, over the past two years, they are serving an average of 15 units per project among the projects active in the program. (Table 3)

Table 3. MF Program Targeted Populations by Program Segment

	Targeting				
Program Name	**Small (<50 units)**	**HTR**	**DAC**	**Independently owned**	**Other**
Equity Segment Programs					
BayREN	✓		✓	✓	HOA or co-op; within a Bay Area Healthy Homes Initiative Pathway area
SoCalGas Whole Building		✓	✓		
TCR MF		✓			
Resource Acquisition Segment Programs					
MCE MF					Deed restricted
MCE SEM					Any MF
SoCalGas MF Alliance		✓	✓		
SDG&E Reznet		✓	✓		
SoCalREN MF		✓		✓	
SoCalREN HTR MF	✓		✓		Includes manufactured home
Market Support Segment Programs					
California Energy-Smart Homes All Electric Residential Program		✓	✓		This is a new construction program that includes a MF component
Low Income Energy Savings Assistance (ESA) Programs					
Multifamily Energy Savings Program – Northern					Income-qualifying properties and residents. For deed-restricted properties, must house at least 65% of residential with incomes at or below 250% of Federal Poverty Guidelines (FPG); for non-deed restricted properties, this is 80% below 250% of FPG. Residents may qualify even if the property does not.
Multifamily Energy Savings Program – Southern					Same a MFES Northern

Source: Program Implementation Plans on CEDARS; information from relevant websites

Program Objectives

The focus on equity and energy savings does not always depend on the segment. Among the three equity programs, the two non-BayREN programs seem to have more of an energy saving focus (when looking at their implementation plans). In addition, a couple of the resource acquisition programs have a clear focus (i.e., program objective) related to equity. As shown in the table below, in total:

- Four (4) of the 12 programs describe only equity related objectives (e.g., support vulnerable communities).
- Three (3) of the 12 have objectives related only to energy savings (e.g., achieve low cost/no cost energy savings).
- Three (3) others describe both equity and energy savings objectives.
- One of the remaining two programs describes decarbonization while the second is an "other" objective (increasing awareness of programs being offered and including a limited set of measures). (Table 5)

Table 4. Program Objectives

Program Name	Categorization of Program Objective(s) by Grounded Research	Program objective(s) from implementation plans or 2023 Joint Cooperation Memo
Equity		
BayREN	Equity	Reach MF communities that are often underserved by traditional programs. Bay Area multifamily property owners requiring a higher level of program assistance, populations, and ownership types in which it has been harder to obtain savings, and owners pursuing gas-to-electric upgrades.
SoCalGas Whole Building	Energy Savings	Energy savings
TCR MF	Equity and Energy Savings	1) Increase the number of multifamily properties that have access to affordable energy upgrades and the benefits associated with making those upgrades, including reduced energy use, bill savings, and increased health, comfort, and safety for multifamily tenants. 2): Increase the number of multifamily properties that take advantage of other programs through cross promotion efforts. 3): Establish a long-term relationship with property owners through knowledgeable Technical Assistants (TAs) who can help owners achieve deeper energy savings over time as they are able to implement them.
Resource Acquisition		
MCE MF	Energy Savings	Support vulnerable communities, particularly those who have been underserved
MCE SEM	Energy Savings	Achieve low cost / no cost energy savings which are sustained by making cultural changes and adopting best practices.
SoCalGas MF Alliance Program	Other	Broad outreach and customer screening for all SoCalGas MF offerings to increase general awareness of programs being offered. Provide a limited set of measures for customers who do not qualify for ESA common area measures or not yet ready to participate in other MF programs
SDG&E RZNET	Energy Savings	Put participants on a path to zero net energy
SoCalREN MF	Equity and Energy Savings	Deliver comprehensive energy savings projects. Achieve high participation in HTR or DAC. Drive SoCalREN portfolio cost-effectiveness. Develop, enhance, and expand the EE service provider market serving SoCalREN MF properties.

Program Name	Categorization of Program Objective(s) by Grounded Research	Program objective(s) from implementation plans or 2023 Joint Cooperation Memo
SoCalREN HTR MF	Equity and Energy Savings	Improve the efficiency of multifamily buildings through simple retrofits, performed by program pre-qualified contractors at no cost to the property owner or tenants, which will benefit both tenants and owners by reducing their energy and water utility bills. Raise the knowledge and awareness of tenants and owners about energy saving behaviors and practices so that they can make better choices and manage their utility costs to ensure persistence of savings from the program measures. Provide valuable energy services to underserved hard-to-reach customers, and those located in Disadvantaged Communities. Help reduce strain on California's energy grid, while also helping California meet long-term greenhouse gas (GHG) reduction goals. Provide opportunities for training and employment of Disadvantaged Workers who could work for the direct installation contractors who will be performing the EE measure installations.
Market Support		
California Energy-Smart Homes All Electric Residential Program	Decarbonization	Main objective is to influence the decision and ease the transition to adopt all-electric new construction practices and to drive deeper adoption of proven all-electric measures not yet widely implemented in the market. Includes alterations to existing MF low-rise projects where all gas appliances and equipment are converted to electric (Space and water HPs, electric or induction cooling, electric or HP clothes dryer, and infrastructure upgrades)
Low Income		
Low Income Energy Savings Assistance (ESA) Programs Northern Multifamily Whole Building Program (public facing name is the Multifamily Energy Savings Program)	Equity	Improve comfort, save money, and conserve energy. Seeks to qualify all residents at the property-level to avoid individual resident enrollment.
ESA Programs Southern Multifamily Whole Building Program (public facing name is the Multifamily Energy Savings Program)	Equity	Improve comfort, save money, and conserve energy. Seeks to qualify all residents at the property-level to avoid individual resident enrollment.

Program Outreach

BayREN and others bring in local knowledge to support outreach. BayREN uses county staff to enable tailoring of messages specific to the known issues for that county. However, other programs use Community Based Organizations (CBOs) and Regional Partners which would also bring in local knowledge. Several programs rely on contractors or informal partners to spread the word about the program. While not every implementation plan mentions online marketing, it is likely that all rely on the internet for some form of program promotion (e.g., all have website and would like use email at a minimum).

The large majority of programs also mention some form of mining utility/usage data and other data to target buildings. BayREN's use of counties for their marketing is unique, although most programs also have some form of partner organizations. While these may not be paid partnerships, they are leveraging the experience and established relationships of those already working in the communities. (Table 5)

Table 5. Program Outreach

Program Name	Type of outreach (details) from implementation plan	Online marketing (email, digital ads/social media, webinars)	Data mining	Contractors	Partners (e.g., CCA, CBOs, MF Orgs, Counties)	Other
Equity						
BayREN	County specific and done by individual **counties**	✓			✓	Direct Mailers
SoCalGas Whole Building	Implementer will primarily use **data from SoCalGas** to target specific customers, as well as attending industry trade shows, conferences, hosting events such as webinars, mailing, and emailing. They will also coordinate with ESA MF Whole Building program and leverage appropriate programs within municipal utilities and water districts (that overlap with SoCalGas). SoCalGas **account executives** will also perform targeted customer outreach. Additionally, the program will work with potential contractors to onboard and train the contractor and then use the **contractor(s)** for outreach.	✓	✓	✓		Trade shows/ conferences Account Execs
TCR MF	The multifamily program will employ marketing and outreach that leverages existing relationships and forming **partnerships** with utilities, community choice aggregators (CCAs), municipalities, community-based organizations, and residents and position them as advocates of the program. The program will utilize **building ownership data** to target outreach to owners as well as wider outreach campaigns to target tenants and other players who may motivate building owners/managers to enroll.	(likely)	✓		✓	Tenant campaigns
Resource Acquisition						
MCE MF	Leverage existing organizational structures and communication channels including customer contacts, industry associations, local government member agencies, and service providers and property management associations. Also **leverage relationships** by implementer with affordable housing orgs, MF developers, and property owners and managers.	✓			✓ (MF orgs)	

Program Name	Type of outreach (details) from implementation plan	Online marketing (email, digital ads/social media, webinars)	Data mining	Contractors	Partners (e.g., CCA, CBOs, MF Orgs, Counties)	Other
MCE SEM	**Data driven analysis** of savings potential and past participation paired with qualitative information on the prospective participant's decision making process and market pressures. **Direct outreach** to this targeted set of property managers.	✓	✓			
SoCalGas MF Alliance Program	Engagement with local contractors, equipment vendors, key industry associations including apartment management organizations, and other types of **trade allies and service providers** in the multifamily community to support industry-wide knowledge and understanding of SoCalGas multifamily offerings through outreach activities such as webinars, direct mail, email Customer outreach and education to multifamily property owners, managers, and property management companies to help them access the appropriate SoCalGas multifamily program for their property/properties For HTR and or DAC, **utilize data analytics** to identify prospective customers by screening levels of customer data such as demographic information, CalEnviroScreen data, load characteristics, and building types and overlaying utility specific information and independent databases. Assemble community-based advisor teams to provide messaging that is appropriate and **in language**, as needed. Contractor **community advisors** will coordinate with technical staff/partners and trade allies to support project identification, development, financing, and follow up. Establish **strategic partnerships** aligned within unique customer segments to develop new, targeted integrated marketing and outreach plans outlining multiple delivery channels that target multifamily customers based on their unique needs.	✓	✓	✓	✓ (MF orgs)	Equipment vendors Mentioned in-language
SDG&E RZNET	The SB 535 mapping tool found on the OEHHA CalEnviroScreen website is used to identify the disadvantaged communities for program outreach and education. A program outreach utilizes an iPad to **geofence** the disadvantaged communities and targets MF and MH communities face to face, by phone, or email to set-up a meeting to share the program in person or via webinar. The intent is to meet the property manager or owner of the property at the beginning of the sales cycle so that the property begins with zero net energy in mind. Multifamily (MF) and Manufactured Housing (MH) marketing lists are created to prepare for strategic outreach efforts that include the distribution of flyers, and door hangers by program **energy**	✓	✓			Energy specialists

Program Name	Type of outreach (details) from implementation plan	Online marketing (email, digital ads/social media, webinars)	Data mining	Contractors	Partners (e.g., CCA, CBOs, MF Orgs, Counties)	Other
	specialists. Disadvantaged communities (DAC) are identified for DAC outreach intensification.					
SoCalREN MF	Generating awareness of and interest in the SoCalREN Multifamily program requires a variety of complementary efforts – from digital advertising tactics and marketing collateral to direct contractor outreach and one-on-one conversations with property managers who contact the program. Both the **Program team** and participating **Contractors** act as the Program's primary sales force, using the various Program offerings to sell cost-effective retrofit services to multifamily properties. Engagement channels include program website, industry associate advertising, industry associate events, direct mail and email, social media, market and event collateral, **residential community coordinator.**	✓		✓	(MF orgs)	Regional Community Coordinator
SoCalREN HTR MF	SoCalREN will identify targeted customers using a combination of **utility billing information**, census data, real estate databases and other data sources. Primary characteristics that will inform target customers include zip code, number of rental units, ownership and year built. The list of target customers will be provided to the DI contractors, who will do outbound calling to screen and qualify properties and to arrange a site evaluation and sales appointment.	(likely)		✓		
Market Support						
California Energy-Smart Homes All Electric Residential Program	Targeted phone and email; email and social media marketing; leverage past participant and **trusted network relationships**; host trainings and webinars to industry stakeholders, potential participants and residents; develop and distribute tailored campaign materials; develop research-based targeted messaging and collateral; leverage relationships with HTR and DAC networks; lunch and learns, webinars, and trainings to **CBOs** and other organizations serving HTR and DAC.	✓			✓	Past participants, Lunch and Learns
Low Income						
Low Income Energy Savings Assistance (ESA) Programs	Leverage existing relationships such as ESA in-unit **contractors**, PG&E ESA Common Area ; Measure program contacts and waitlist, and PG&E Single-Point of Contact (SPOC). ; • Conduct a **review of market data** to inform targeting and the best channels to utilize to reach ; the target audiences ; • Ensure robust program coordination through the SPOC service (e.g., financing, IDSM, and ; water savings opportunities) ; • Qualify leads received from the Multifamily Central Portal (MCP)	✓	✓	✓		Past participants

Program Name	Type of outreach (details) from implementation plan	Online marketing (email, digital ads/social media, webinars)	Data mining	Contractors	Partners (e.g., CCA, CBOs, MF Orgs, Counties)	Other
Northern Multifamily Whole Building Program						
ESA Programs Southern Multifamily Whole Building Program	Use a prioritized **lead list** of multifamily properties to focus outreach efforts on properties with high energy users and those with Customers in one or more CPUC-defined segments. Customers will also be able to learn about and apply for the Program individually.	(likely)	✓			Prioritized lead list

Measures and Incentives

BayREN offers a full spectrum of efficiency measures. As noted in Table 6 and Table 7, BayREN is one of two programs (the other is the TCR program) that offer incentives for seven different end uses as well as offering incentives to support changes in panels for electrification efforts.[10] Both BayREN and TCR are implemented by the same contractor, so it is not surprising that they provide the same offerings. The low-income programs offer incentives for six end uses and the next nearest two programs offer incentives for five end uses (MCE's MF and the Statewide New Construction programs).

All programs include domestic hot water (DHW) measures (e.g., heat pump water heaters, faucet aerators, etc.). However, SoCalGas is the only program that provides incentives for gas storage or tankless water heaters. Four programs provide incentives for pools. All other end uses are provided in seven or eight programs. For the HVAC end use, SoCalGas is the only program with incentives for furnaces and boiler controls while all other programs incentivize heat pumps. Both SoCalGas and MCE provide incentives for Smart Thermostats. (Table 6)

[10] The end uses include measures within DWH, cleaning, HVAC, lighting, building envelope, cooling, and pools.

Table 6. End Uses by MF Programs
(programs in gold font are equity segment programs, blue font is a market support program, all others are resource acquisition)

End Use	Total with potential measures installed*	BayREN	MCE MF	MCE SEM *	SoCalGas Whole Building *	SoCalGas MF Alliance	TCR MF	SDG&E Reznet *	SoCalREN MF *	SoCalREN HTR MF	Statewide RNC and Alterations	ESA - North and South MFES *(two programs)*
Total end uses offered by program (# of "other" in parentheses)		*7 (2)*	*5 (2)*	*NA*	*NA*	*4 (1)*	*7 (2)*	*NA*	*NA*	*2 (1)*	*4 (1)*	*6 (7)*
DWH	12	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓✓
Cleaning *(e.g., dishwasher, clothes washer)*	11	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓✓
HVAC	11	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓✓
Lighting	9	✓		✓	✓		✓	✓	✓	✓		✓✓
Building Envelope	9	✓	✓	✓	✓		✓	✓	✓			✓✓
Cooking	9	✓	✓	✓	✓	✓	✓	✓	✓		✓	
Pool	8	✓		✓	✓		✓	✓	✓			✓✓
Other (see below)	8	✓	✓			✓	✓			✓	✓	✓✓
Other Details												
Electric Panel (or wiring) Upgrade	--	✓	✓				✓				✓	✓✓
Advanced Power Strip	--									✓		✓✓
Air purifier	--											✓✓
Energy Star Refrigerator	--	✓	✓				✓					✓✓
EV Charging plug	--											✓✓

End Use	Total with potential measures installed*	BayREN	MCE MF	MCE SEM *	SoCalGas Whole Building *	SoCalGas MF Alliance	TCR MF	SDG&E Reznet *	SoCalREN MF *	SoCalREN HTR MF	Statewide RNC and Alterations	ESA - North and South MFES *(two programs)*
Smoke and Carbon Monoxide Alarms	--											✓✓
Minor home repairs												✓✓
Gas fireplace insert						✓						

**Indicates that the program has a whole building incentive or pay for performance and so could include the end use. Also shown as a gray checkmark*
Source: Program Implementation Plans on CEDARS for most programs, website information for New Construction and the two ESA programs

BayREN and four other programs focus on electrification. BayREN includes incentives to support electrification for four end uses as well as panel upgrades and pool water heaters. Four additional programs offer special incentives for electrification of DHW and three others offer special incentives for HVAC, cleaning, or cooking measures. Two more programs (a REN and CCA) offer incentives for panel or wiring upgrades. (Table 7)

Table 7. Programs with electrification incentives
(programs in gold font are equity segment programs, blue font is a market support program, all others are resource acquisition)

End Use	BayREN	Total other programs with incentives for electrification	MCE MF	MCE SEM	SoCalGas Whole Building	SoCalGas MF Alliance	TCR MF	SDG&E Reznet	SoCalREN MF	SoCalREN HTR MF	Statewide RNC	ESA - North and South MFES
DWH	✓	4	✓				✓	✓			✓	
HVAC	✓	3	✓				✓				✓	
Cleaning	✓	3	✓				✓				✓	
Cooking	✓	3	✓				✓				✓	
Other (panel or wiring upgrades)	✓	2	✓				✓					
Other (pool HPWH)	✓	1					✓					

Source: Program Implementation Plans on CEDARS

We include the specific amounts of incentives by end use, location, and program in Attachment 3. However, there are six incentives that BayREN may want to be aware of so that BayREN can consider adjusting BayREN incentives. The BayREN incentives are sometimes higher than other PAs and sometimes lower. (Table 8)

Table 8. Incentives for BayREN to be aware

Measure	Location	Incentive Unit	BayREN	Difference from BayREN	Other PAs
Laundry dryer	In-unit	Per measure	$250	↑	MCE - $640
Electric Induction Range	In-unit	Per measure	$750	↑ and ↓	MCE - $1,500 TCR - $350
HPWH	Central	Per tenant unit served	$1,000	↑ and ↓	MCE - $1,200 TCR - $800 Statewide Res New Construction (RNC) - $500
HPWH	In-unit	Per measure	$1,500	↑ and ↓	MCE - $2,000 TCR - $1,000 ESA - free
HP (space heating)	In-unit	Per measure	$1,500	↓	TCR - $1,000
Electric Panel Upgrade	In-unit	Per tenant unit	$1,000	↑ and ↓	MCE - $800 TCR - $2,000 Statewide RNC - $600

BayREN's BAMBE incentive adders are unique. BAMBE is the only program including special incentive "adders" for specific geographic areas based on customer burdens. The measures may be similar to other programs, but the BayREN program determines census tracts where homes are burdened by high heat (resilience to high heat and being comfortable), indoor air quality issues (health burden), or high housing costs (housing burden and high utility bills) and packages the measures to address each type of burden.[11] The program provides an additional incentive of up to $500 per apartment if specific measures are installed as shown below.[12]

- Resilience to High Heat Incentive must include one or more of these measures:
    - Windows; insulation; in-unit heat pumps (Mini-split heat pumps, MSHPs/Packaged terminal heat pumps, PTHPs)
- Health Burden Incentive must include one or more of these measures:
    - Windows; insulation; in-unit heat pump electrification (MSHPs/PTHPs); residential HPWH electrification; induction cooktop electrification
- Housing Burden Incentive must include one or more of these measures:
    - Refrigerator, dishwashers, in-unit washing machines, lighting, in-unit duct sealing, in-unit duct insulation and/or smart thermostat

The Northern and Southern Low Income Programs have a unique component of tenant protection. These two ESA programs have written tenant protections directly into the program requirements. As a condition of property-level enrollment – which qualifies the property for all resident units and eligible common areas to be upgraded, non-deed restricted properties, and deed-restricted properties with less than 10 years remaining on their deed restriction are required to sign a Tenant Protection Agreement that extends specific rent restrictions to at least 50% of the property's residents/units for a period of 10 years. Specifically, the property must maintain at least 50% of the property's resident units at or below CARE income guidelines for a period of 10 years and protect residents from significant rent increases or eviction as a direct result of the upgrades. We are unsure how the ESA programs plan to monitor whether the tenant protections are kept over time. Depending on the number of projects that meet the specific program requirements, if they actively follow up with each project with these protections, it could be costly.

[11] The program contracted with Slipstream to use multiple data sources to create indices for each of the three incentive areas. For example, the index for the housing burden area included information from the American Community Survey (ACS), California EnviroScreen 4.0, and Department of Housing and Urban Development (HUD). Each census tract includes an index value for each of the three incentive adder areas.

[12] These adders are aligned with the definition of equity segment programs outlined in D.21-05-031 where it was written that equity segment programs "may provide increased comfort and safety, improved indoor air quality and more affordable utility bills" (D.21-05-031 at 14-15). These adders also align with the recent focus on non-energy benefits.

Attachment 1: PA filed MF Programs

This attachment lists the 19 programs we considered for our analysis and why we did not include seven (7) of them.

Table 9. Program Included and Excluded from this Analysis

#	PA*	Program ID*	Program Name*	Program segment*	Start Year*	End Year*	Reason not included in this analysis
Programs included in this analysis							
1	BAY	BAYREN02	Multi Family	equity	2014	Ongoing	---
2	MCE	MCE01	Multifamily Energy Savings	RA	2016	Ongoing	---
3	MCE	MCE01c	Multifamily Strategic Energy Management	RA	2022	Ongoing	---
4	SCG	SCG3705	RES-Multifamily Whole Building Program (Equity)	equity	2023	Ongoing	---
5	SCG	SCG3889	RES-Multifamily Energy Alliance Program (Resource Acquisition)	RA	2021	Ongoing	---
6	SCR	SCR-RES-A1	Multifamily Program	RA	2016	Ongoing	---
7	SCR	SCR-RES-A5	Small HTR Multifamily Direct Install	RA	2024	Ongoing	---
8	SDGE	SDGE4002	Multi Family Program (AKA Residential Zero Net Energy Transformation, RZNET)	RA	2019	Ongoing	---
9	TCR	TCR-Res-002	Multifamily	equity	2022	Ongoing	---
10	PG&E (statewide lead)	SW_NC_Res_electric	California Energy-Smart Homes All Electric Residential Program	market support	2024	Ongoing	---
11	PG&E	PGE_NMFWB	ESA Northern Multifamily Whole Building Program (public facing name is the Multifamily Energy Savings Program)	serves equity segment, but overseen by low-income board	2023	Ongoing	---
12	SDG&E (as lead)	ESA_SW_South_MFWB	Southern Multifamily Whole Building Program (public facing name is the Multifamily Energy Savings Program)		2023	Ongoing	---
Programs **not** included in this analysis							
13	PGE	PGE21007	California New Homes Multifamily	MS	2016	2026	Unsure what year this ended, but not in 2023 or 2024 budget filing
14	SCE	SCE_3P_2020RCI_004	Comprehensive Multifamily Program	RA	2020	2023	This is a known solicitation. Assume new IP will be available in Q2 or Q3 2024
15	SCG	SCG3888	RES-Multifamily Space and Water Heating Controls	RA	2021		All zero expenditures and savings in 2023. Minimal

#	PA*	Program ID*	Program Name*	Program segment*	Start Year*	End Year*	Reason not included in this analysis
Programs included in this analysis							
							expenditures ($30K in 2022 and no savings). Indicated not in 2024 budget filing
16	SCG	SCG3936	RES-Multifamily Energy Alliance Program (Equity)	equity	2024		Unsure what SCG is doing here. Using 3705 IP for lit review since that is what CEDARS indicates in the current active IP version and the IP is identical to this program ID IP
17	SCG	SCG3938	RES-Multifamily Whole Building Program (Resource Acquisition)	RA	2024		Unsure what SCG is doing here. Using 3889 IP for lit review since that is what CEDARS indicates in the current active IP version and the IP identical to this program IP
18	SDGE	SDGE4177	Residential Multi Family Equity Program	equity	2024		Listed in one place in CEDARS, but when going to 2024 budget & Application filings, listed as not in the filing and had no IP. Assume not moving forward
19	BAY	BAYREN02_IDSM	MULTIFAMILY IDSM	equity	2024		Program not yet begun.

**Data from CEDARS*

Additionally, two large programs will provide funding for multifamily buildings in the future, but we do not include them in this memo because little information about program design or implementation is publicly available.

- The California Energy Commission (CEC) Equity Building Decarbonization Direct Install program will include multifamily buildings. The CEC estimated a population of 5.3 million underresourced communities in the Northern Region (that includes BayREN) and will make $158 million in state funds available for this program.[13]
- The Inflation Reduction Act Home Electrification and Appliance Rebates (HEEHRA) program will be open to owners of eligible low or moderate income multifamily buildings. While we know the level of retrofit incentives available in general (e.g., up to $400,000 per building), we could not find the amount of funds that will be available for multifamily buildings in California.

[13] This site, https://www.energy.ca.gov/event/funding-workshop/2024-05/pre-application-workshop-gfo-23-404-equitable-building, includes the pre-application workshop for this program

Attachment 2: Incentives by End Use

This attachment includes the detailed information for incentives by end use. The tables below are separated by end use and only include the programs with incentives. The incentives shown in this attachment are based on the implementation plans we reviewed or the website information. They are accurate to the extent that we could discern a value.

We have done some simplification for ease of reading:

- Incentives with an **asterisk (*)** are measures with an electrification incentive (i.e., the incentive comes into play if the fuel of the item moves from gas to electricity).
- We label the ESA-North and South MFES simply as ESA in these tables. The **ESA programs** have special incentives that are the same for any end use. We simply indicate a "Y" in the column if present. ESA has two ways to obtain incentives. These are
  - Limited Whole building path - 100% of in-unit and common area projects costs paid for Deed-Restricted properties. For non-deed-restricted in-unit measures are free and has incentives for 50% of common area project costs.
  - Whole building path - 100% in-unit, common area, and whole building projects paid costs for Deed-Restricted properties. For non-deed-restricted in-unit measures are free and has incentives for 50% of common area and whole-building project costs
- **Statewide RNC** also has special incentives for electrification. Instead of stating this each time, we put a "Y" in the appropriate measure.
  - A "Y" means that there are up to $2,200 in incentives for whole building electrification alterations (i.e., there is no gas within a home)
  - Where noted, we include incentives specific to a measure.
- **BayREN** includes incentives for some measures that are part of the base incentive of $500 / dwelling unit (for non-electrification measures) or are part of a specific incentive based on geographic location (i.e., the zone). Rather than write this out for each measure, we include a single letter in the BayREN column.
  - A "B" means that this measure is included as within the base incentive. Base incentives are shown first in the tables below
  - A "Z" means that this measure is included in the geographically based zone. Incentives for Z items are shown in the second table below.

The tables are in alphabetical orders as shown below.

- Base Incentives
- Special Incentives
- Building Envelope
- Cleaning
- Cooking
- DWH
- HVAC
- Lighting
- Other
- Pool

Base Incentives

Incentive	BayREN	TCR
Base incentive for: DHW, HVAC, Lighting, Building Envelope, Pool Pumps, Other	$500 per tenant unit for non-electrification measures	Up to $1,000 per tenant unit

Special Incentives

Incentive	Property is located in a burdened zone (based on census tract) and includes one or more of these eligible measures	BayREN
Health Burden Incentive	Windows; insulation; in-unit heat pump electrification (Mini-split heat pump- MSHPs/packaged terminal heat pump - PTHPs); residential HPWH electrification; induction cooktop electrification	$500 per impacted tenant unit
Housing Burden Incentive	Refrigerator, dishwashers, in-unit washing machines, lighting, in-unit duct sealing, in-unit duct insulation and/or smart thermostat	Up to $500 per apt. and 1.5x total rebate OR 2x total rebate if includes wall insulation and/or window upgrades
Resilience to High Heat Incentive	Windows; insulation; in-unit heat pumps (MSHPs/PTHPs)	$500 per impacted tenant unit

Building Envelope

Measure	Location	BayREN	MCE MF	TCR MF	ESA
Air Sealing				Y, but unknown amount	Y
Insulation	Roof or crawl-space - In unit	B, Z	$1.20 per square foot	Y, but unknown amount	Y
Insulation	Wall In-unit	B, Z	$1.60 per square foot	Y, but unknown amount	Y
Windows		$500 per impacted unit, Z		Y, but unknown amount	

Cleaning

Measure	Location	BayREN	MCE MF	TCR MF	SoCalGas MF Alliance	ESA	SW RNC
Dishwasher	In-unit	Z		Y, but unknown amount			
Laundry Dryer	In-unit	$250 per item*	$640 per item*	Y, but unknown amount			$250 per item*
Laundry Washer	Common Area				$670 up to this value for vended machines	Y	
Laundry Washer	In-Unit	Z		$250 per item*		Y (free to residents)	

Cooking

Measure	Location	BayREN	MCE MF	TCR MF	SoCalGas MF Alliance	SW RNC
Gas Oven	In-unit				$100 free standing; $300 wall oven	
Electric Induction	Common Area	$750 per item	$800 per item*			
Electric Induction	In-unit	$750 per item*, Z	$1,500 per item*	$350 per item *		Y*
Electric Standard	In-unit	$750 per item*				

DWH

Measure	Location	BayREN	MCE MF	TCR MF	SoCalGas MF Alliance	SoCalREN HTR MF	ESA	SW RNC
Boiler Control	Common Area						Y	
Demand / VSD Recirculation Control	Common Area		$750				Y	
HPWH	Central	$1,000 per tenant unit served (up to 100 units)*	$1,200 per tenant unit served*	$800 per tenant unit served*			Y	$500 per unit plus $5,000 per project/developer for full MEP design and documentation
HPWH	Common Area		$2,500 per system*				Y	
HPWH	Common Area Laundry	$1,000 per item*	$200 per item	$1,000 per item			Y	
HPWH	in-unit	$1,500 per item*, Z	$2,000 per unit served*	$1,000 per item*			Y – Free to residents	
Low Flow Aerators	Common Area						Y	
Low Flow Aerators	In-Unit		$10			Y – Free to residents	Y – Free to residents	
Low Flow Showerheads	Common Area						Y	
Low Flow Showerheads	In-Unit		$20			Y – Free to residents	Y – Free to residents	
Pipe insulation	In-Unit or Common Area						Y	

Measure	Location	BayREN	MCE MF	TCR MF	SoCalGas MF Alliance	SoCalREN HTR MF	ESA	SW RNC
Storage (gas)	Common Area				$6 per mBtu (up to this value)		Y	
Storage (gas)	Common Area				$5 per mBtu (up to this value)		Y	
Tankless Water Heater (gas)	Common Area						Y	
Tankless Water Heater (gas)	In-unit				$80 per household		Y	
Thermostatic tub spouts and shower valves	In-unit						Y – Free to residents	
VSD Pump	Common Area						Y	
Boiler Control	Common Area						Y	

HVAC

Measure	Location	BayREN	MCE MF	TCR MF	SoCalGas MF Alliance	ESA	SW RNC
Boiler (Space heating)	Common Area				$5 per mBtu (up to this value)	Y	
Boiler Control	Common Area				$700-$1,400 (max values based on # of tenant units in building)	Y	
Duct sealing / replacement	In-unit	Z	$ 400			Y	
Ducted mini split	In-unit	Z	$ 4,000 *			Y	
Ductless mini split	Common Area		$ 4,800 *			Y	
Ductless mini split	In-unit	Z	$ 6,000 +$1,000 per additional head*			Y	
Efficient fan controller	Common Area / In-unit					Y	
Furnace	Common Area					Y	
Furnace	In-unit					Y – Free to residents	

Measure	Location	BayREN	MCE MF	TCR MF	SoCalGas MF Alliance	ESA	SW RNC
HP	serves multiple units		$ 3,000 per tenant unit served*			Y	
HP	Central	$ 1,000 per tenant unit served*		$800 per tenant unit*		Y	
HP	Common Area	$ 1,000 per item*		$1,000 per item		Y	
HP	In-unit	$ 1,500 per item*,Z		$1,000 per item*		Y	Y
HP (ducted, for electrification)	Common Area		$ 3,600*			Y	
HP (ducted, not for electrification)	Common Area		$ 2,500			Y	
HP RTU	Common Area		$ 2,400*			Y	
Inverter Driven PTHP	In-unit		$ 2,000*			Y	
PTHP	In-unit	Z	$ 1,200			Y	
PTHP (for electrification)	Common Area		$ 2,000*			Y	
PTHP (Not for electrification)	Common Area		$ 500			Y	
Room AC	In-unit					Y – Free to residents	
Smart Thermostat	Common Area					Y	
Smart Thermostat	In-unit	Z	$ 140			Y – Free to residents	Y

Lighting

Measure	Location	BayREN	TCR MF	SoCalREN HTR MF	ESA
Occupancy Sensors	Common Area				Y
LEDs	Common Area	B			Y
LEDs	Exterior	B			Y
LEDs	Interior	B			Y
LEDs	In-unit	B	Y, but unknown amount	Y – Free to tenants	Y – Free to tenants

Other

Measure	Location	BayREN	MCE MF	MCE SEM	SoCalGas Whole Building	SoCalGas MF Alliance	TCR MF	SDG&E Reznet	SoCalREN MF	SoCalREN HTR MF	ESA	SW RNC
Advanced Power Strip	In-unit									Y – Free to tenants	Y	
Air purifier	In-unit										Y	
Electric Panel Upgrade	Central/Common Area	$5,000 per property*					$5,000 per property					
Electric Panel Upgrade	Common Area		$ 1,200*									
Electric Panel Upgrade		$1,000 per tenant unit*	$ 800*				$2,000 per tenant unit					$600 per tenant unit served*
Energy Star Refrigerator	In-unit		$ 520				Y, but unknown amount				Y	
Energy Star Refrigerator	Common Area										Y	
Gas fireplace insert	In-unit					$300 or $500 depending on Tier						
Initial milestone	Participant			$ 2,000 per participant								
Minor home repairs	In-unit										Y	
New conduit to HP; replace disconnect at meter bank; upsize feeder cable	In-unit		$500 per upgrade*									
New conduit to HP; replace disconnect at	Common Area		$400 per upgrade*									

Measure	Location	BayREN	MCE MF	MCE SEM	SoCalGas Whole Building	SoCalGas MF Alliance	TCR MF	SDG&E Reznet	SoCalREN MF	SoCalREN HTR MF	ESA	SW RNC
meter bank; upsize feeder cable; drywall repair and painting												
NMEC based savings	Building							$ 0.68 per kWh saved				
NMEC based savings	Building							$1,295 per kW saved				
NMEC based savings	Building							$ 5.50 per therm saved				
Pay for performance	Participant			Y – payment based on savings								
Smoke and Carbon Dioxide Alarm	In-unit										Y	
Subsequent milestones	Participant			$ 1,000 per participant (4 possible payments)								
Whole Building	Participant								$ 0.33 per kWh (not DAC)		Y	$2,200 per tenant unit*
Whole Building	Participant								$ 0.57 per kWh (DAC)		Y	
Whole Building	Participant								$3.50 per therm (not DAC)		Y	

Measure	Location	BayREN	MCE MF	MCE SEM	SoCalGas Whole Building	SoCalGas MF Alliance	TCR MF	SDG&E Reznet	SoCalREN MF	SoCalREN HTR MF	ESA	SW RNC
Whole Building	Participant								$6.00 per therm (DAC)		Y	
Whole Building - 5% savings	Participant				$300 per tenant unit							
Whole Building - 10% savings	Participant				$425 per tenant unit							
Whole Building - 15% savings	Participant				$570 per tenant unit							
Whole Building - 20% savings	Participant				$630 per tenant unit							
Whole Building - 25% savings	Participant				$750 per tenant unit							
Segregated Circuits	Common Area											Y
240V plugs for EV charging	Common Area											Y

Pool

Measure	Location	BayREN	TRC MF	ESA
Heater				Y
HPWH	Common Area	$1,500 per item*	$1,500 per item*	
Pool pump	B	Y (included in base unit incentive)		Y