



**TRI-COUNTY REGIONAL ENERGY NETWORK**

SAN LUIS OBISPO • SANTA BARBARA • VENTURA

**MULTIFAMILY PROGRAM  
MARKET RESEARCH & ANALYSIS**

Tasks A - F



*Prepared by Frontier Energy | September 2020*



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# TASK A: MULTIFAMILY MARKET CHARACTERIZATION

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## Overview

The Tri-County Regional Energy Network (3C-REN) serves the counties of Ventura, Santa Barbara, and San Luis Obispo, aiming to successfully expand and grow energy efficiency services and energy savings in the region. 3C-REN programs are designed to fill gaps in current Investor-Owned Utility (IOU) offerings for the territory.

Frontier Energy conducted research for this Multifamily Market Characterization report to assess the baseline potential and need for an energy efficiency program offering in 3C-REN territory.

The report focuses on three key areas:

1. The size, distribution, and characteristics of multifamily housing (defined as residential buildings with five or more units) and their energy efficiency potential.
2. Occupant demographics and energy burden.
3. Technology adoption considerations, participant decision-making processes, and marketing recommendations.

There are various existing programs in California serving residential customers, though many are not designed to reach multifamily customers. Looking at market data will be valuable for informing ongoing energy efficiency planning and program design.

In 3C-REN territory:

- Multifamily units comprise 17.5% of total housing stock and come in all sizes. 5.8% are in small (5-9 unit) buildings, 4.7% in mid-size (10-19 unit) buildings, and 7% in large (20+ unit) buildings.
- Multifamily units comprise between 25% - 41% of all rental housing. San Luis Obispo County sees a lower percentage of its rental housing in multifamily units at only 25%, while Santa Barbara and Ventura County have approximately 40% of their rental stock in multifamily units.
- Over half of these units were constructed prior to 1979, before modern energy code standards were established. This poses a significant opportunity for untapped savings potential.
- In each county, 90-93% of multifamily units are renter-occupied. This introduces the challenge of the split incentive barrier when considering incentivizing energy efficiency upgrades.
- The region faces income disparity. While 40% of tri-county households have annual incomes greater than \$100,000, 31% earn less than \$50,000, potentially making them eligible for income-based utility programs.
- Approximately 21% of renters (12.4% of all tri-county households) earn less than \$50,000 annually. However, even if a household does not technically meet the threshold for participation in low-income programs, they are likely rent-burdened; between 55-58% of all renters pay more than 30% of their income toward rent.
- Statewide energy burden for low-income multifamily households is significant. 5.5% of low-income customers statewide experience disconnections for nonpayment, compared to 2.9% of non-low-income customers. Half that were disconnected owed an average of \$315, and 6% never reconnected their service within a year.

Understanding the local multifamily building sector and demographics of customers can help grow efforts in the tri-county market. If barriers can be overcome, significant energy efficiency potential and benefits will be realized for both decision makers and occupants.

# Multifamily Building Attributes

## Distribution and Characteristics

### Number of Units

Multifamily housing (buildings with five or more housing units) in the Tri-County region provides 82,178 homes. The number of units of each housing category is shown below.

Single detached units (or single-family homes) comprise the greatest share (60%) of the tri-county housing stock. As a percentage of total housing, multifamily units make up 17.7% of the total housing stock in the region. Tables A-1 through A-5 show housing composition by units.

**Table A-1. Composition of Tri-county Housing Market**

Housing Type	# units - Santa Barbara Co.	# units - San Luis Obispo Co.	# units - Ventura Co.	Tri-County Total # units
Total Single Family	76,038	80,455	210,375	366,868
Total Multifamily	26,526	12,127	43,525	82,178
Mobile home	4,235	6,917	9,334	20,486
Boat, RV, van, etc.	48	232	178	458
<b>Total Housing Units</b>	<b>106,847</b>	<b>99,731</b>	<b>263,412</b>	<b>469,990</b>

**Table A-2. Single Family Composition of Tri-county Housing Market**

Housing Type	# units - Santa Barbara Co.	# units - San Luis Obispo Co.	# units - Ventura Co.	Tri-County Total # units
1 unit, detached	55,371	64,106	162,627	282,104
1 unit, attached	7,746	6,375	32,185	46,306
2 units	4,221	3,728	3,419	11,368
3 to 4 units	8,700	6,246	12,144	27,090
<b>Total Housing Units</b>	<b>76,038</b>	<b>80,455</b>	<b>210,375</b>	<b>366,868</b>

**Table A-3. Multifamily Composition of Tri-county Housing Market**

Housing Type	# units - Santa Barbara Co.	# units - San Luis Obispo Co.	# units - Ventura Co.	Tri-County Total # units
5 to 9 units	9,489	4,961	13,009	27,459
10 to 19 units	6,891	2,976	12,118	21,985
20 or more units	10,146	4,190	18,398	32,734
<b>Total Multifamily</b>	<b>26,526</b>	<b>12,127</b>	<b>43,525</b>	<b>82,178</b>

**Table A-4. Unit Type as a Percentage of Total Multifamily Housing Units**

Housing Type	# units - Santa Barbara Co.	# units - San Luis Obispo Co.	# units - Ventura Co.	Tri-County Total # units
5 to 9 units	2.02%	1.06%	2.77%	5.84%
10 to 19 units	1.47%	0.63%	2.58%	4.68%
20 or more units	2.16%	0.89%	3.91%	6.96%
<b>Total</b>	<b>5.64%</b>	<b>2.58%</b>	<b>9.26%</b>	<b>17.49%</b>

**Table A-5. Multifamily Housing as a Percentage of Total Housing Units**

Housing Type	# units - Santa Barbara Co.	# units - San Luis Obispo Co.	# units - Ventura Co.	Tri-County Total # units
5 to 9 units	11.55%	6.04%	15.83%	33.41%
10 to 19 units	8.39%	3.62%	14.75%	26.75%
20 or more units	12.35%	5.10%	22.39%	39.83%
<b>Total</b>	<b>32.28%</b>	<b>14.76%</b>	<b>52.96%</b>	

Source: US Census Bureau<sup>i</sup>

## Age and Location

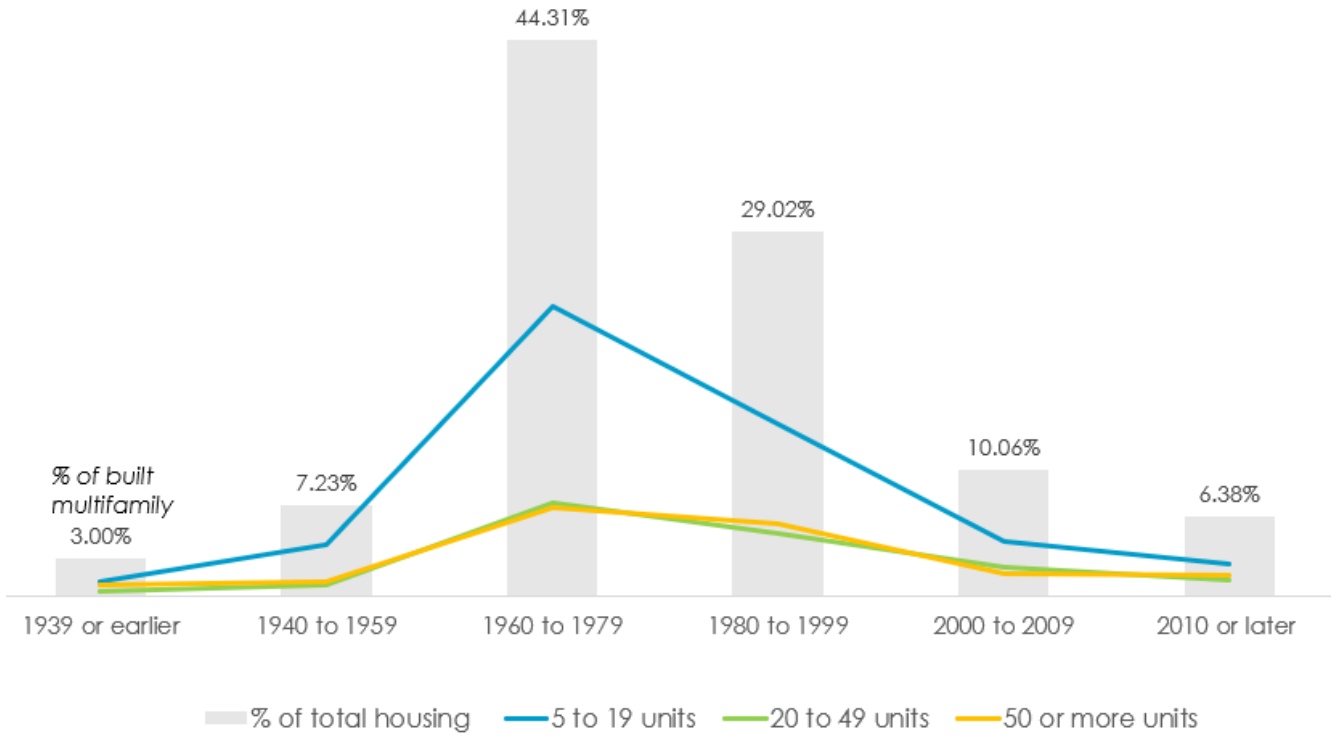
Multifamily housing in the tri-counties vary in age, as shown in Figure A-1. There was a significant uptick in multifamily housing construction in the 1960s, with a focus on midsize buildings (5 to 19 units). 83.6% of existing multifamily buildings were built between 1960 to 1999. Figure A-2 shows that growth over time occurred relatively consistently across all three counties. General construction of multifamily housing declined in the 2000s.

Construction date is important, as construction materials and building codes have improved over time. California has also worked to keep up with advancements, incorporating energy efficiency into new building stock or rehabilitations over time. The first energy-focused building codes were developed by the California Building Standards Commission in 1978, aptly called The Energy Efficiency Standards for Residential and Non-residential Buildings.<sup>iii</sup> The codes continue to help advance the state's energy policy, and the California Energy Commission updates them periodically to keep up with advancements. Codes are updated on a three-year cycle. The 2019 cycle was adopted by jurisdictions in 2019 and has gone into effect in 2020.

Newer multifamily buildings should, in theory, have a higher level of efficiency built in. Energy efficiency programs would likely have a lower impact on those buildings constructed within the past ten years. The tri-county building stock poses a potential opportunity, since 54.5% of its total existing multifamily units were constructed prior to 1979 and the development of energy code. Between 1980-1999, an additional 29% of total existing multifamily units were built, which could likely benefit from updated efficiency measures.

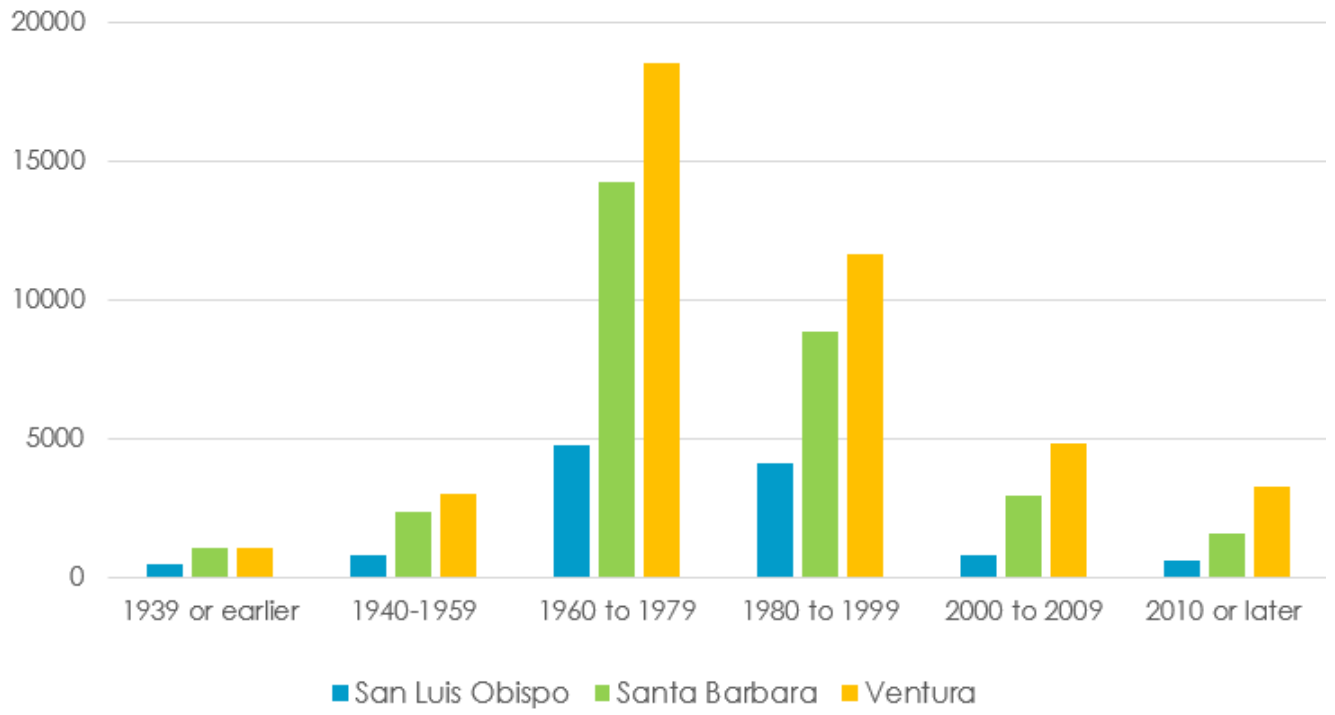


**Figure A-1. Tri-County Multifamily Building Stock by Year of Construction**



Source: US Census Bureau<sup>i</sup>

**Figure A-2. Multifamily Building Stock by County and Year of Construction**



Source: US Census Bureau<sup>i</sup>

## Equipment and Energy Efficiency

Energy in the tri-county region is served by three investor-owned utilities (IOUs), Southern California Edison, Pacific Gas and Electric, and Southern California Gas Company (SoCalGas), along with various municipal utilities and two community choice aggregators. The City of Lompoc (Santa Barbara County) appears to be the only municipality offering electric service. The IOUs have existing program offerings for multifamily properties, including rebates, income-qualified direct install programs, benchmarking, financing, and solar. These comprehensive programs continue to offer no-cost or rebated measures such as attic insulation, door and window repairs, caulking, weather stripping, power strips, efficient lighting, showerheads, low-flow toilets, and faucet aerators. As of March 2020, SoCalGas reported having served 46,917<sup>xi</sup> multifamily customers of its 21.8 million total consumers<sup>xii</sup>. The California Department of Community Services and Development also provides the Low-Income Weatherization Program (LIWP), a statewide program focusing on heating and cooling, water heating, and whole building upgrades.

## Occupant Demographics

### Rental Rates in Tri-County Multifamily Housing

Renters are the primary occupants of multifamily housing—just over 90% in each county—as shown in Table A-6. Of the three counties, San Luis Obispo shows the highest ownership percentage, where Santa Barbara shows the lowest.

High renter versus owner occupation is a key consideration for energy efficiency program barriers. This impacts decision making for improvements, scheduling and access to units, and marketing. It also creates the split incentive barrier, a phenomenon where improvements may not benefit the party investing in them, impairing investment decisions.<sup>viii</sup> Barriers are discussed further under Technology Adoption Considerations.

**Table A-6. Tenure of Occupied Multifamily Housing**

County	Tenure Status	1, detached or attached	2 to 4	5 to 19*	20 to 49*	50 or more*	Mobile home, boat, RV, van, etc.	% of total occupied MF housing*
San Luis Obispo	Owned	57,842	439	1,048	40	0	5,711	9.46%
	Rented	20,270	8,080	7,405	1,861	1,141	2,361	90.54%
Santa Barbara	Owned	67,662	1,488	1,104	645	279	5,426	6.55%
	Rented	26,814	12,908	16,793	4,618	7,507	980	93.45%
Ventura	Owned	155,683	1,528	1,662	577	1,139	9,191	8.00%
	Rented	48,668	12,717	20,983	9,691	8,193	1,764	92.00%
<b>TOTAL</b>		376,939	37,160	48,995	17,432	18,259	25,433	

Source: US Census Bureau<sup>i</sup>



Although there is a >90% likelihood that an occupied multifamily unit will be occupied by a renter, only 25 - 41% of all renters live in multifamily units. San Luis Obispo County sees a lower percentage of its rental housing in multifamily units at only 25%, while Santa Barbara and Ventura County have approximately 40% of their rental stock in multifamily units (41% and 38%, respectively). This is useful information when evaluating other data that is parsed by rental vs. ownership status, rather than multifamily vs. single-family status.

**Table A-7. Occupancy Status for Multifamily Households**

County	Tenure Status	1, detached or attached	2 to 4	5 to 19*	20 to 49*	50 or more*	Mobile home, boat, RV, van, etc.	% of total occupied units that are MF*
San Luis Obispo	Owned (61% of all households)	57,842	439	1,048	40	0	5,711	1.67%
	Rented (39%)	20,270	8,080	7,405	1,861	1,141	2,361	25.31%
Santa Barbara	Owned (52%)	67,662	1,488	1,104	645	279	5,426	2.64%
	Rented (48%)	26,814	12,908	16,793	4,618	7,507	980	41.53%
Ventura	Owned (62%)	155,683	1,528	1,662	577	1,139	9,191	1.98%
	Rented (38%)	48,668	12,717	20,983	9,691	8,193	1,764	38.09%
<b>TOTAL</b>		376,939	37,160	48,995	17,432	18,259	25,433	

Source: US Census Bureau<sup>i</sup>

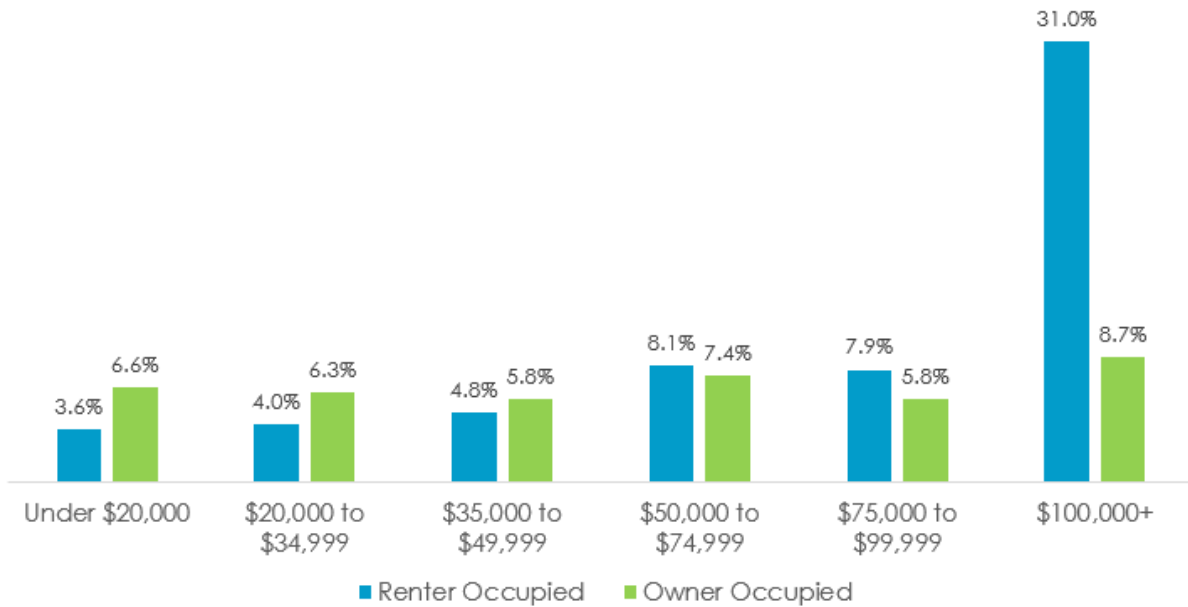
## Household Income & Rental Costs

Nationally, renters tend to have lower annual household incomes and wealth than those in detached single-family housing<sup>v</sup>, but the tri-counties appear to be an exception. As shown in Figure A-3, 39.7% of all households (31% + 8.7%) in the tri-counties have a household income greater than \$100,000, of which 80% are renters (31% of all households are renters with a household income greater than \$100,000). However, that does not mean there are no low-income households.

The California Alternative Rates for Energy (CARE) program offered by the IOUs delivers energy bill assistance to low-income customers, and its threshold for income-eligibility is a useful tool when assessing low-income population in the tri-counties. CARE tiers the income limits based on household size, but for a household of three, the limit is \$43,440 or less, and a household of four is \$52,400 or less. To align with available data more closely, we will use an upper limit of \$49,999 to approximate low-income status. With that definition, approximately 31% of all households are low-income, of which 40% are renters (12.4% of all households are renters with a household income less than \$49,999).

From a 2018 report on California housing challenges and opportunities, we were able to infer related details for the tri-county region.<sup>xvii</sup> In 2017, median rent for Ventura County was \$2,452 to \$4,342 per month. In San Luis Obispo County, the median rent was \$1,600 to \$2,452. No data was available for Santa Barbara County.

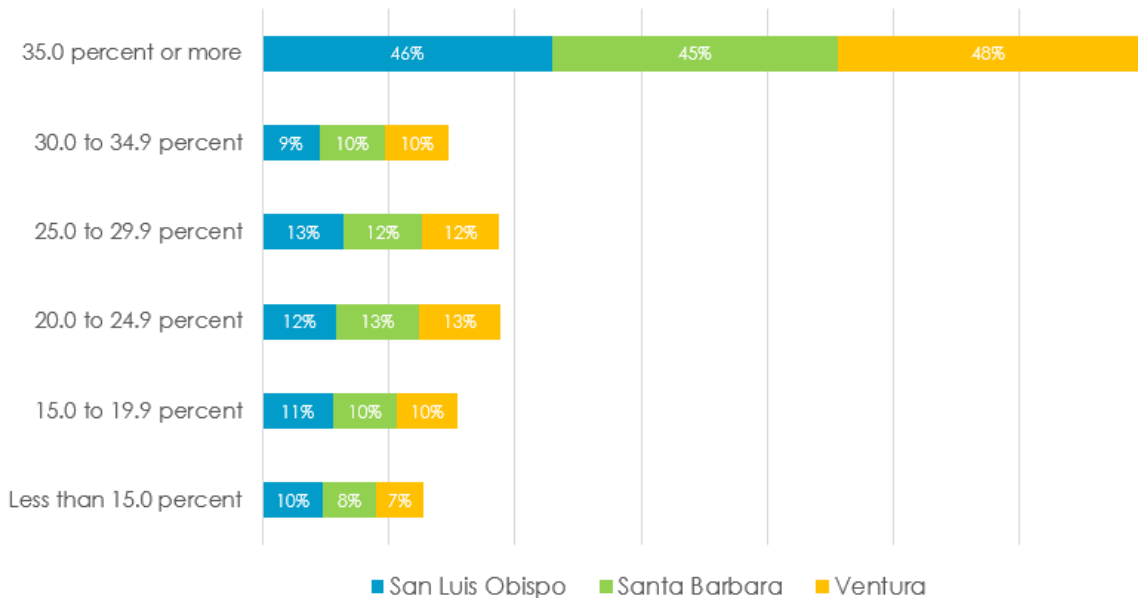
**Figure A-3. Renter vs. Owner Household Income in Tri-counties**



Source: US Census Bureau<sup>iv</sup>

However, in areas with high property values like the tri-counties, high income levels alone can create a false perception of disposable income. Instead, it can be more useful to examine the relative cost of housing in connection with income levels. Federal guidelines state those paying more than 30% of income on housing are cost-burdened<sup>vii</sup>. However, Figure A-4 shows that 55-58% of rental households in each county spend over 30% of their income on rent. As we can infer from Table A-7, if you live in a multifamily unit you are >90% a renter, meaning that more than half of multifamily households are cost-burdened due to rent.

**Figure A-4. Rent as a Percentage of Household Income**



Source: US Census Bureau<sup>iv</sup>



## Affordable Housing Shortage

It is important to note that housing challenges persist statewide. Unstable funding has stagnated affordable home development, preventing demand from being met. California needs 1.8 million more units by 2025 to address the shortfall. Despite this, annual production has only averaged 80,000 new homes. Lack of supply and rising costs have had the highest impact on low income households, and housing ownership has dropped to its lowest rate since the 1940s. <sup>xvii</sup>

In California, more than half of all renters pay more than 30% of income towards rent. Over 1.7 million pay more than 50%. <sup>xviii</sup> A California Housing Partnership study found that to afford the median rent cost of \$2,225, renters need a household income 3.6 times that of the current minimum wage (about \$42.79 per hour, or \$7,417 per month). To meet basic needs, a household of three would need to bring in \$77,750. <sup>xix</sup>

A few recommendations for addressing the housing crisis have been made in a State-funded assessment from 2018. This includes:

- Reforming policies to advance affordability, equity, and sustainability.
- Addressing the needs of vulnerable populations through inter-agency and cross-jurisdictional coordination and program offerings.
- Investing in development and rehabilitation, rental assistance, and community development.

## Energy Burden

Energy burden is the percentage of annual household income spent on energy bills. If the amount spent is high, this can impact a household's ability to balance costs of basic needs, forcing tough budget decisions. Energy burden is influenced by various drivers and is not simply influenced by high energy prices or low incomes. Other factors include income inequality, inefficient housing stock, and level of investment in energy efficiency. <sup>xx</sup>

As tri-county specific data is not available, nationwide and state-based data will provide useful benchmarks. An ACEEE study found that Southeastern and Midwest states saw the highest regional median energy burden of 4% and up. The median for the southwest region showed to be just above 3.5%. California's regional median came in nearly a percent lower, around 2.5%. Specific metro areas studied (Los Angeles, San Diego, and San Francisco) all saw median burdens between 1% to 4%.

There is no widely accepted value defining an unaffordable energy burden, though many researchers identify this to be between 6% to 11%. However, ACEEE recommends using the area's median to better infer high or unaffordable burden for a locality. <sup>xxi</sup>

The greater impact of energy burden on low income households residing in multifamily buildings, both nationwide and in California, should not be overlooked. Financial strains typically cause low income households to seek apartments with low rent. More affordable units are often in older, less efficient buildings with poor insulation and energy intensive HVAC systems and appliances. As a result, these households often pay more per square foot on energy.

Table A-8 reflects nationwide data from ACEEE, which found the median energy burden for a low-income multifamily household is nearly three times higher than that of a non-low-income multifamily household (5% and 1.5% respectively). Renters also tend to experience greater burden (4%) compared to owners (3.3%). Minority households, particularly African Americans and Latinos, were also seen to experience higher energy burdens than a median household in the same city.

**Table A-8. Median Income Energy Burden, Based on Nationwide Metro Areas**

	Household type	Median annual income	Median annual utility spending	Median energy burden
Income Type	Low-income	\$24,998	\$1,692	7.2%
	Non-low-income	\$90,000	\$2,112	2.3%
	Low-income multifamily	\$21,996	\$1,032	5.0%
	Non-low-income multifamily	\$71,982	\$1,104	1.5%
Building ownership	Renters	\$34,972	\$1,404	4.0%
	Owners	\$68,000	\$2,172	3.3%

Source: Reproduced from ACEEE Study<sup>xiii</sup>

In California specifically, 5.5% of low-income customers statewide experience disconnections for nonpayment, compared to 2.9% of non-low-income customers. Half that were disconnected owed an average of \$315, and 6% never reconnected their service within a year. <sup>xiii</sup>

A US Department of Energy study found that cost-effective efficiency improvements, such as insulation, lighting and appliances, in low-income households can reduce energy consumption by 13% to 31%. <sup>xviii</sup> Reducing energy burden is a long-established policy objective. In California, the IOUs typically meet this objective through bill assistance programs CARE and FERA, and through other programs specifically targeting low-income customers. Strategies to consider for a tri-county multifamily offering include:

- If low-income programs are offered, aligning eligibility criteria with CARE and FERA guidelines.
- Creating multiple pathways to participation, including low-income specific features.
- Leveraging existing utility resources to provide complementary services.
- Integrating a direct install component in addition to rebates.

## Technology Adoption Considerations

### Motivators and Barriers

#### Split Incentives

The split incentive is a market failure where the benefits of an investment pass to someone other than the party paying the cost. As the Occupant Demographics section demonstrates, a significant portion of residents in the tri-county region are renters. Thus, the challenge will be to align the interests of owners or landlords with energy efficiency improvements which tenants would benefit from, or appealing to tenants who do not want raised rent as a result of improved amenities.

A 2012 ACEEE study defines four main multifamily housing markets to consider when approaching the split incentive barrier.<sup>ix</sup> This includes:

- Investor-owned buildings, where owner decisions are market driven. Renters here usually resist paying higher rent for added benefits or services, and owners tend to be risk-averse towards increasing debt payments. Energy investments tend to go unnoticed by tenants, so

improvements that do occur tend to be low-cost or cosmetic improvements with immediate returns.

- Privately capitalized and publicly funded buildings, where residents are solely low-income or subsidized. These buildings are likely older, and more likely to have potential for greater energy efficiency. Though, since the Department of Housing and Urban Development (HUD) usually pays the utility allowance, the split incentive issue is a significant barrier.
- Publicly capitalized and privately owned buildings, developed partially with public subsidies where entire parts of the building are reserved for limited income tenants. This typically includes fixed-income or senior housing. Since many of the buildings were likely developed after the 1980s when the IRS Section 42/Low Income Housing Tax Credit (LIHTC) program came into existence, there may be fewer opportunities in these buildings.
- Publicly capitalized and publicly owned buildings, typically run by housing authorities. These facilities tend to focus on vulnerable residents, and are specifically built for the intended owner, who typically never intends to sell the building. These types of buildings may have upgrade opportunities, and owners may show more willingness to participate in programs with longer implementation periods and returns on investment.

The behavior of each market type will be important when considering how to address split incentives, and which strategies to implement.

To provide recommendations for addressing the split incentive issue, we drew heavily from ACEEE’s <sup>ix</sup> and Bird and Hernandez’s <sup>xv</sup> 2012 articles discussing policy options. These papers describe issues that still persist today around addressing energy efficiency for low income residents and tenants. Both offer similar strategies summarized in Table A-9.

**Table A-9. Overview of Responses to the Split Incentive Issue**

Item	Description	Benefits	Concerns
<b>General program design efficiencies</b>	Participants should be highly targeted. Cost-effective measures with fast returns to be used as a lead-in for decision makers, taking the opportunity to educate and upsell as appropriate. Forms and process should be streamlined.	Eases participation process	Program design may be complicated if integrating concierge services
<b>Energy efficiency lease</b>	A mutual commitment to conservation by the landlord and tenant. Tenants will experience benefits invested in by the landlord.	Higher rent can be offset by reduced utility expense More amenities for the tenant Potential for more satisfied tenants and better retention	Need mutual commitment from parties on cost and living space changes
<b>Energy efficiency financing</b>	Externally funded loan.	Improvements can be completed under a single financing product More affordable monthly payments make investment	Benefits remain with property Loan transfer complicates resale



		easier on landlord, and prevents tenants from incurring higher rent increase	Potential liability for owner
<b>On bill financing</b>	Improvements are paid for through utility bills.	Improvements can be done under a single financing product No lien issues Can be paid in installments	Usually for owners, not tenants
<b>Low income energy standards</b>	Mandating higher efficiency standards for low income housing.	High potential for scalability	Disincentivizes low income housing offering
<b>Niche offerings or programs</b>	Concierge services that can provide comprehensive energy education and assistance.	Likely to have high success for efficiency improvements and behavioral changes More accessible to low income and disadvantaged participants	Too costly to effectively scale

Source: Policy options for the split incentive <sup>xv</sup>

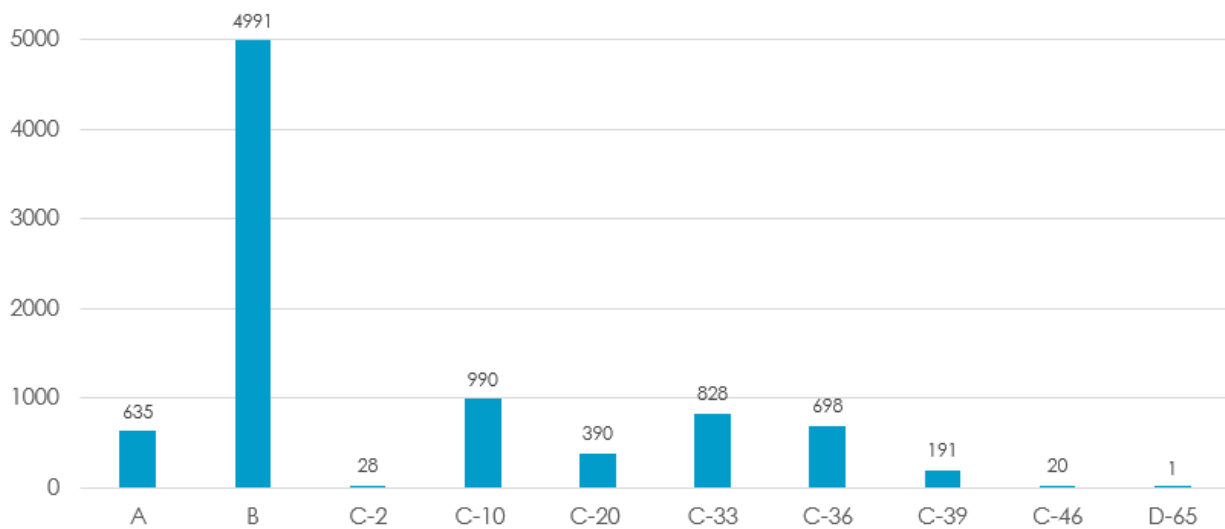
## Skilled Contractor Availability

**Table A-10. Common Energy Efficiency Program Participant License Types**

License	Title
<b>A</b>	General Engineering Contractor
<b>B</b>	General Building Contractor
<b>C-2</b>	Insulation and Acoustic Contractor
<b>C-10</b>	Electrical Contractor
<b>C-20</b>	Warm-Air Heating, Ventilating, and Air-Conditioning Contractor
<b>C-33</b>	Painting and Decorating Contractor
<b>C-36</b>	Plumbing Contractor
<b>C-39</b>	Roofing Contractor
<b>C-46</b>	Solar Contractor
<b>C-61; D-65</b>	Limited Specialty; Weatherization and Energy Conservation Contractor

Source: CSLB<sup>x</sup>

**Figure A-5. Composition of Tri-County Contractor Base with Selected Licenses**



Source: CSLB<sup>x</sup>

Table A-10 shows ten common license types held by contractor companies participating in existing energy efficiency programs. According to the California Contractors State License Board (CSLB), the tri-county region has 9,161 active contractor entities with one or more of these licenses.

Figure A-5 shows the composition of the tri-county contractor base with these selected licenses. Just over half of contractors hold a B license (General Building Contractor), in addition to other licenses, who can perform basic measure upgrades. When considering HVAC and water heating upgrades, there are 390 and 698 licensed entities respectively who can perform this work. Only one contractor holds the specialty D-65 license for Weatherization and Energy Conservation work.

## Marketing and Outreach Recommendations

The multifamily sector differs from the single-family sector in its opportunities and decision makers. Effective marketing and outreach will be heavily dependent on directly targeting those who make decisions for the unit or building, and entities whose built-in audience or clients can be leveraged for promotion.

ACEEE and Better Buildings recommend the following best practices:

- Building a broad trade ally network who can point potential participants back to the program.
- Partnering with multifamily financing entities, including local housing authorities, development agencies, nonprofits, and green certification programs. Other industry players to focus on include affordable housing developers, real estate management companies and public housing entities, and tenant advocacy groups. Contractors and upgrade services are also key partners, who can mention the program when a decision maker calls them in for work.
- Local apartment and property manager associations make good program allies and have close contact to decision makers or may be the decision makers themselves.
- If units are rented, outreach should focus on reaching the decision maker more than tenants.

- Messaging should be focused on benefits specific to the decision maker, whether it is the owner, property manager, tenant, etc. Highlighted benefits can include direct savings to utility bills, reduced maintenance costs, decreased tenant turnover, “low hanging fruit” measures that can provide immediate impact or return, increased property value, improved comfort, and multiple upgrades can be completed at once when units are vacant.

**Table A-11. Program Stakeholder Entities and Marketing Methods**

Entity	Outreach and Engagement Methods	Entity Examples
<b>Industry Organizations and Associations</b>	Introductory meeting and materials Direct referral Presentations Industry publications E-blasts Web advertisement	BOMA NAA-National Local Government Economic Development departments NPH Housing CA CAA local chapters AOA of CA CA Association of Community Managers
<b>City Departments</b>	Introductory meeting and materials Direct referral Newsletters Workshops Web advertisement	Cities within the Tri-counties (housing, permitting, etc.)
<b>Building Professionals, Decision Makers, and Target Participants</b>	Introductory meeting and materials Training orientation Client distribution E-blasts Web advertisement	Owners/developers Investors Raters Property service providers Property management
<b>Direct Contact with Owners</b>	Direct mail; direct email Phone calls In-person meetings and materials	Building decision makers, shown below
<b>Contractors</b>	Direct mail; direct email Phone calls In-person meetings and materials	Targeted contractors can be found on CSLB



# Appendix A

## Additional Reference Tables

**Table AA-1. Composition of San Luis Obispo County Housing Market by City**

County	Geographic Area Name	1-unit, detached	1-unit, attached	2 units	3 or 4 units	5 to 9 units	10 to 19 units	20 or more units	Mobile home	Boat, RV, van, etc.
San Luis Obispo	Arroyo Grande	5,257	710	246	157	168	220	444	468	15
	Atascadero	8,752	448	336	744	795	170	375	409	0
	Avila Beach	604	147	14	136	35	36	48	54	0
	Cambria	3,827	90	76	44	0	12	25	122	0
	Cayucos	2,050	123	115	36	35	28	9	65	0
	Creston	7	0	0	0	0	0	0	0	0
	Grover Beach	3,122	574	359	821	315	187	186	184	0
	Los Osos	5,283	210	259	176	67	71	143	610	10
	Morro Bay	4,209	315	322	227	243	152	141	516	121
	Nipomo	4,461	198	71	248	133	90	61	726	0
	Oceano	1,690	237	148	178	308	48	15	657	0
	Pismo Beach	3,188	704	216	437	165	191	92	813	0
	San Luis Obispo	9,454	1,681	1,042	1,678	1,728	1,302	2,191	1,411	63
	San Miguel	767	29	0	27	37	0	0	11	0
	San Simeon	10	38	99	40	46	96	0	18	0
	Santa Margarita	432	0	0	0	0	0	0	93	0
	Shandon	443	19	0	0	0	0	0	10	0
	Templeton	2,150	77	12	110	95	24	128	430	0
	Paso Robles	8,400	775	413	1,187	791	349	332	320	23
		<b>64,106</b>	<b>6,375</b>	<b>3,728</b>	<b>6,246</b>	<b>4,961</b>	<b>2,976</b>	<b>4,190</b>	<b>6,917</b>	<b>232</b>

**Table AA-2. Composition of Santa Barbara County Housing Market by City**

County	Geographic Area Name	1-unit, detached	1-unit, attached	2 units	3 or 4 units	5 to 9 units	10 to 19 units	20 or more units	Mobile home	Boat, RV, van, etc.
Santa Barbara	Buellton	1,394	99	10	5	84	0	82	286	0
	Carpinteria	2,241	680	101	683	488	338	768	724	0
	Goleta	5,509	964	102	1,040	1,003	907	1,683	628	0
	Guadalupe	1,473	125	142	218	42	51	38	0	0
	Lompoc	7,222	1,416	373	1,765	1,549	419	692	678	13
	Santa Barbara	18,749	2,825	2,668	3,118	3,457	3,182	5,136	304	18
	Santa Maria	17,173	1,481	825	1,756	2,557	1,862	1,599	1,528	17
	Solvang	1,610	156	0	115	309	132	148	87	0
		<b>55,371</b>	<b>7,746</b>	<b>4,221</b>	<b>8,700</b>	<b>9,489</b>	<b>6,891</b>	<b>10,146</b>	<b>4,235</b>	<b>48</b>

**Table AA-3. Composition of Ventura County Housing Market by City**

County	Geographic Area Name	1-unit, detached	1-unit, attached	2 units	3 or 4 units	5 to 9 units	10 to 19 units	20 or more units	Mobile home	Boat, RV, van, etc.
Ventura	Camarillo	14,962	5,197	184	579	708	1,227	1,761	975	8
	Fillmore	3,370	162	178	239	239	42	103	260	0
	Moorpark	8,473	1,618	58	218	415	426	387	201	0
	Oak Park CDP	3,344	1,018	70	205	455	48	346	0	0
	Oak View CDP	1,461	112	40	11	0	0	0	18	0
	Ojai	2,202	530	151	121	185	100	125	0	0
	Oxnard	30,711	5,444	637	3,444	3,486	3,946	4,516	2,872	92
	Piru CDP	483	12	28	37	5	4	10	14	9
	Port Hueneme	2,491	2,418	70	606	534	416	1,184	35	0
	San Buenaventura (Ventura)	24,178	4,388	1,034	2,736	2,729	2,335	3,962	2,039	62
	Santa Paula	5,577	714	450	703	522	218	338	852	0
	Simi Valley	31,509	3,703	162	1,672	1,568	1,456	2,301	894	7
	Thousand Oaks	31,402	6,258	328	1,505	2,033	1,887	3,330	1,006	0
	Westlake Village	2,464	611	29	68	130	13	35	168	0
		<b>162,627</b>	<b>32,185</b>	<b>3,419</b>	<b>12,144</b>	<b>13,009</b>	<b>12,118</b>	<b>18,398</b>	<b>9,334</b>	<b>178</b>

Source: US Census Bureau<sup>1</sup>

Note that Newbury Park (Ventura County) data is included under Thousand Oaks city, as it was counted as a township. Somis (Ventura County) and Harmony (San Luis Obispo County) are considered unincorporated communities, and data is not available through the US Census.

Newer 2019 datasets are also available from the California Department of Financing Housing Agency, though 2018 Census data was utilized since it provides greater detail on characteristics and occupant demographics.

**Table AA-4. San Luis Obispo County Cities with Over 5,000 Multifamily Units Built Before 2014**

County	Geographic Area Name	Built 2014 or later	Built 2010 to 2013	Built 2000 to 2009	Built 1990 to 1999	Built 1980 to 1989	Built 1970 to 1979	Built 1960 to 1969	Built 1950 to 1959	Built 1940 to 1949	Built 1939 or earlier	Sum
San Luis Obispo	Arroyo Grande	62	183	1,239	635	1,622	1,460	974	843	444	223	7,685
	Atascadero	123	245	1,945	1,557	2,272	3,067	1,298	861	312	349	12,029
	Los Osos CDP	22	0	231	342	1,780	3,006	691	476	121	160	6,829
	Morro Bay	100	8	749	720	619	1,315	1,178	893	338	326	6,246
	Nipomo CDP	0	170	1,673	1,029	1,242	925	628	145	13	163	5,988
	Pismo Beach	106	80	882	570	1,553	702	530	615	465	303	5,806
	San Luis Obispo	274	363	1,682	2,182	3,583	4,598	2,959	2,001	815	2,093	20,550

**Table AA-5. Santa Barbara County Cities with Over 5,000 Multifamily Units Built Before 2014**

County	Geographic Area Name	Built 2014 or later	Built 2010 to 2013	Built 2000 to 2009	Built 1990 to 1999	Built 1980 to 1989	Built 1970 to 1979	Built 1960 to 1969	Built 1950 to 1959	Built 1940 to 1949	Built 1939 or earlier	Sum
Santa Barbara	Carpinteria	15	190	267	240	977	2,230	827	651	302	324	6,023
	El Paso de Robles (Paso Robles)	302	200	2,980	1,816	2,788	1,955	1,024	680	414	431	12,590
	Goleta	323	250	1,149	779	956	2,713	4,308	1,044	139	175	11,836
	Lompoc	95	277	616	1,154	2,748	2,572	3,672	2,084	341	568	14,127
	Santa Barbara	147	639	1,904	2,042	4,141	6,070	6,790	6,811	3,116	7,797	39,457
	Santa Maria	500	369	4,586	4,065	4,922	5,039	4,932	2,806	717	862	28,798

**Table AA-6. Ventura County Cities with Over 5,000 Multifamily Units Built Before 2014**


County	Geographic Area Name	Built 2014 or later	Built 2010 to 2013	Built 2000 to 2009	Built 1990 to 1999	Built 1980 to 1989	Built 1970 to 1979	Built 1960 to 1969	Built 1950 to 1959	Built 1940 to 1949	Built 1939 or earlier	Sum
Ventura	Camarillo	382	252	3,190	3,768	5,207	7,176	4,145	1,080	235	166	25,601
	Moorpark	292	40	1,878	1,522	5,559	1,325	323	584	189	84	11,796
	Oak Park CDP	0	0	246	1,507	2,425	1,065	136	40	38	29	5,486
	Oxnard	447	1,712	7,131	5,775	6,669	12,493	10,845	7,141	1,959	976	55,148
	San Buenaventura (Ventura)	351	382	3,351	3,236	5,710	8,664	9,997	6,586	1,712	3,474	43,463
	Santa Paula	22	90	354	561	1,104	1,615	2,077	1,465	723	1,363	9,374
	Simi Valley	86	299	5,326	5,253	9,186	8,457	12,366	1,739	243	317	43,272
	Thousand Oaks	108	471	4,941	5,229	9,527	15,887	9,353	1,694	373	166	47,749

Source: US Census Bureau<sup>1</sup>



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TRI-COUNTY REGIONAL ENERGY NETWORK  
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## TASK B: EXISTING PROGRAM EXAMPLES

*Prepared by Frontier Energy | September 2020*

### Overview

This document provides an overview of selected existing multifamily programs and a look ahead to the future of multifamily programs, along with insights from research and interviews with program administrators, implementers, and other program partners. Sources and helpful links are provided in the appendix.


### BayREN Bay Area Multifamily Building Enhancements

#### Program Summary

<b>Program Name</b>	Bay Area Multifamily Building Enhancements (BAMBE)
<b>Program Administrator</b>	StopWaste acts as the PA on behalf of BayREN
<b>Implementer</b>	AEA (non-profit third party)
<b>Measures</b>	HVAC, water heating, fuel-switching, lighting, and appliances, building sealing and insulation, windows, etc. Also includes “Clean Heating Pathway” with electrification measures for deep decarbonization.
<b>Energy Savings Claims Approach</b>	Custom
<b>Incentives</b>	Flat \$750 incentive per unit

The BAMBE program launched in 2013 to fill a gap between IOU single-measure and whole-building multifamily programs. Projects must deliver 15% savings and include three core measures, two of which must deliver in-unit benefits. Currently, in order to help BayREN fulfill its mission of supporting underserved sectors, BayREN has determined that properties over 100 units and market rate are not eligible to apply until July unless they are in an underrepresented county, participating in Clean Heating pathway, or include 50% or more measures accruing benefits to tenants.

The program relies on outreach to counties and cities to advertise offerings. Interested parties complete an initial screening. If property is not a fit for BAMBE they are referred to another program. If a good fit for BAMBE, the property receives end-to-end technical assistance including modeling, site visit, and a survey report with specifications and measures. After project approval to proceed, property owner has



up to six months to complete the work (exceptions may apply upon written request and approval). Rebate is paid after final onsite inspection and programmatic quality control (QC) review.

## Key Takeaways

- **Program keys to success:**
  - Simplicity and internal clarity on the program logic model.
  - Focus on customer experience to mitigate barriers: BAMBE provides the technical assistant as a single point of contact and resource for the property owner as well as other project stakeholders such as general contractors or installers.
  - Program design should harmonize with local government planned policies/requirements.
  - Include community stakeholder groups in program ideation and program design phase.
  - Find balance between offering an attractive program and pushing the market forward.
  - REN values inform program priorities, such as tenant-benefit measures and projects in underserved areas.
  - Having letters and emails from personal contacts at counties and cities has been very successful for program outreach to property owners and shows that local governments are looking out for the best interests of property owners/tenants.
  - Modeled approach allows flexibility with incentivizing different measures and unique opportunities at some properties. However, this requires additional details for reporting and coordination with CPUC custom review team.
- **Program evolution:**
  - BayREN began with a closed rater program, then switched to allow a rater pathway through their collaboration with the Multifamily Upgrade Program (MUP), then closed the rater pathway.
    - PA perspective: The closed rater model means they have a direct relationship with property owner and more visibility into the project pipeline for improved planning and budgeting. In their view, the open rater model produced project scopes that didn't align with program goals for more comprehensive projects and required higher administrative QC burden and timelines for programmatic approvals. When the rater pathway closed, projects working with partners were still able to participate in the program through the standard pathway.
    - Rater perspective: The change from closed to open and then back to closed was viewed negatively by a rater who had participated in the program. For them, the changing program rules resulted in stranded projects, and the lack of transparency at the program level made it difficult to manage expectations for their customers.
  - In the past BAMBE saw a higher drop-out rate among smaller projects, due to per-unit costs and economies of scale. To address this issue, the program is now specifically targeting properties with 100 units or less, giving them priority access to apply to the program earlier in the year before larger projects are accepted. Additionally, the Clean Heating Pathway, with its per electrification measure adders, has been positively adopted by smaller properties.



# Central Coast Community Energy (3CE) Multi-Unit Dwelling Electrification Grant Program

## Program Summary

Program Name	Multi-Unit Dwelling (MUD) Electrification Grant Program
Program Administrator	Central Coast Community Energy (3CE) <sup>1</sup>
Implementer	In-house
Measures	All-electric new construction including but not limited to water heating, space heating, and cooking appliances.
Energy Savings Claims Approach	Structured review process in-house
Incentives	\$2,500 per affordable housing unit; \$1,750 per market-rate housing unit. Up to \$240,000 for each housing development.

The MUD Electrification Grant Program launched in May 2020 and is designed to accelerate construction of all-electric multi-unit housing (meaning two units or more in a single development). At program launch, 70% of funds were allocated for affordable housing, and 30% of funds for market rate. The program was fully subscribed within hours of opening. To participate, developers apply online and submit the required documentation. If approved, funds are reserved for up to 3.5 years and disbursed upon project completion. Applications are waitlisted if received after the program is fully subscribed.

## Key Takeaways

- **Program keys to success:**
  - Simplicity allows for in-house implementation using Salesforce.
  - Program does not require efficiency rating thresholds; the main goal is incentivizing new construction without natural gas infrastructure or measures, not necessarily having the most energy efficient electric equipment.
  - Outreach and roundtables with developers and contractors provided helpful input for program ideation, and 3CE floated program design documents to those groups for feedback.
  - Use local jurisdictions' (counties) definition of low-income/affordable housing threshold. This comes from their general plan housing element.
- **Program evolution:**
  - 3CE's ideas for future program years include the following:
    - Larger budget with set-aside for underserved counties.
    - Expand program to include single-family homes.
    - Create a clearinghouse to aggregate all programs and opportunities available to stack.

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<sup>1</sup> Monterey Bay Community Power changed their name to Central Coast Community Energy (3CE) in September 2020.



# SoCalREN Multifamily Subprogram

## Program Summary

Program Name	Multifamily Subprogram
Program Administrator	Southern California Regional Energy Network (SoCalREN)
Implementer	ICF (third party)
Measures	Lighting, water heating, HVAC, insulation, windows, pool pumps, water efficiency, cool roofs, elevators, etc.
Energy Savings Claims Approach	Custom
Incentives	Tiered, up to \$1,200 per unit. Capped at 50% of project cost for non-DAC or 75% for DAC.

The SoCalREN Multifamily program is designed to encourage full-building, integrated upgrades in multifamily developments with a minimum of five connected units. Projects must include at least three measures and produce 10% improvement in energy efficiency to quality. In 2019 the program had a goal of 50% of projects delivered in DAC territories. The program provides technical assistance consulting and an energy audit to identify cost-effective measures. From the date of funds reservation, property owners have 12 months to complete their project.

## Key Takeaways

- **Program keys to success:**
  - Direct outreach to property owners helps reach multiple properties across a property manager's portfolio, rather than working one property at a time.
  - Direct partnership with contractors is key to identifying retrofit opportunities and measures that appeal to property owners.
- **Program evolution:**
  - For PY 2019, SoCalREN shifted from an open rater model to closed rater, to focus on contractor trade allies rather than raters. Prior to April 2019 they had offered a \$5,000 rater incentive (previously \$25,000 in 2018). The rater incentive was eliminated in 2019.
  - Shifting from open to closed rater reduced the project pipeline from more than a year on average to less than two months, while reducing program costs and increasing TRC, according to SoCalREN's 2019 Annual Report. In the previous open rater model, raters' energy assessments were not connecting to contractor-driven projects.
  - SoCalREN's future plans and goals in their 2019 report included the following:
    - Increased focus on smaller DAC contractors and DAC/HTR property owners.
    - Use data analytics to inform targeted marketing and outreach to specific regions and building types.
    - Pilot a streamlined solution for smaller properties (< 50 units), to overcome barriers to participation and reduce the cost to deliver the program to these customers.
    - Launch a multifamily financing offering to help overcome participation barriers.



# PG&E Energy Savings Assistance Common Area Measures Program

## Program Summary


<b>Program Name</b>	<b>Energy Savings Assistance Common Area Measures Program (ESA CAM)</b>
<b>Program Administrator</b>	Pacific Gas & Electric (PG&E)
<b>Implementer</b>	TRC (third party)
<b>Measures</b>	Common area measures and central systems including water heating, lighting, heating/cooling, building envelope, appliances, and plug loads
<b>Energy Savings Claims Approach</b>	ENERGY STAR Portfolio Manager to benchmark energy usage before, during, and after project implementation to ensure reasonable energy savings are achieved
<b>Incentives</b>	Covers 100% of costs of qualifying energy upgrades to common areas and central systems

Commission Decision 16-11-022 expanded the statewide ESA program to include energy retrofits to common areas and central systems at deed-restricted multifamily buildings through the ESA CAM initiative. Property owners must certify that 65% of tenant households meet ESA income guidelines (200% of federal poverty level) to qualify for ESA CAM. PG&E's ESA CAM program began in 2018 and serves deed-restricted properties with five or more attached units, either low or high rise. To qualify, properties must also participate in the ESA in-unit offering. The PG&E ESA CAM program covers the full cost of qualifying upgrades to community and laundry rooms, outdoor recreation areas, parking lots, and central heating and cooling systems.

The program implementer (TRC) performs tasks including but not limited to outreach; energy audit and utility benchmarking; comprehensive technical assistance to property owners and contractors from application to project completion; and coordination with other applicable programs. Program funding is first-come, first-served. The current 2018-2020 program cycle is fully subscribed and interested projects are being waitlisted for the 2021 program cycle.

## Key Takeaways

- **Program keys to success:**
  - PG&E participated in Multifamily Working Group meetings and ad-hoc sessions to gain insights from multifamily stakeholders and share the initial program design plans.
  - ESA CAM leverages PG&E's Single Point of Contact (SPOC) initiative for multifamily property owners, managers, and other industry professionals to identify funding opportunities. TRC serves as the program implementer for ESA CAM and PG&E Multifamily SPOC.
  - PG&E's program relies on an open contractor network, allowing owners to select contractors of their choice. This results in lead sourcing, eliminates participation barriers, and allows owners to leverage existing relationships.
  - PG&E found success integrating and collaborating activities with other organizations, such as the Tax Credit Allocation Committee (TCAC) and California Community Services Department Low Income Weatherization Program (CSD LIWP). This has allowed the



team to develop relationships with staff and potential property owner participants, break down barriers, and streamline participation for the multifamily customer. However, it is critical to consider timing when working with TCAC. Project delays may occur if measures are not accounted for prior to re-syndication eligibility.

- In an interview, a rater identified ESA CAM as a successful example of the closed rater/open contractor program model.
- **Program evolution:**
  - Future program recommendations may be informed by ongoing analysis of non-deed restricted or “naturally occurring affordable housing” (NOAHs), which recognizes that demand for affordable housing outpaces supply. Low-income residents aren’t always able to find deed-restricted housing and instead opt for non-subsidized housing at or below market rate.

## The Future of Multifamily Programs

Beginning with Decision (D.) D.17-12-009<sup>2</sup> and then reinforced in D.19-06-022 the CPUC ordered the Energy Savings Assistance Program (ESA) and other programs serving multifamily customers to treat at the property level, including common areas upgrades, and not just in-unit measures. This focus on treating the whole building commonly results in significantly higher energy efficiency savings. Additionally, several forces are combining to push future program design to increasingly treat multifamily buildings comprehensively. These include:

- CPUC’s direction that an increasingly greater percent of IOUs’ energy efficiency portfolio be outsourced to third parties. At least 40 percent by December 31, 2020 and at least 60 percent by December 31, 2022;<sup>3</sup>
- Multifamily Working Group efforts and direction to work with market rate and affordable owners of multifamily buildings to provide holistic energy efficiency solutions to multifamily buildings;
- The erosion of cost-effective measures available as deemed measures due to code improvements; and
- The Potential and Goals Studies eliminating much of the savings on low hanging fruit energy efficient measures – those that are relatively simple and require little investment.

Combined, these factors will result in advancing future multifamily program designs to integrated in-unit and common area offerings and solutions.

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<sup>2</sup> D.17-12-009 was a response to Petitions for Modification of Decision 16-11-022.

<sup>3</sup> CPUC D.18-01-004 Ordering paragraph 1.



# Appendix A: Sources & Helpful Links

## BayREN Bay Area Multifamily Building Enhancements

- Program Website: <https://bayareamultifamily.org/>
- Clean Heating Pathway: <https://www.bayren.org/clean-heating>

## Monterey Bay Community Power Multi-Unit Dwelling Electrification Grant Program

- Program Website: <https://www.mbcommunitypower.org/mud-electrification-program/>
- Program Design and Implementation Guide Multi-Unit Dwelling Electrification Grant Program. 5/26/2020. Accessed August 2020. <https://www.mbcommunitypower.org/wp-content/uploads/2020/05/MUD-Electrification-Grant-Program-Design-Guide-final-1.pdf>
- MUD Electrification Grant Program FAQs. Updated 5/25/2020. Accessed August 2020. <https://www.mbcommunitypower.org/wp-content/uploads/2020/05/MUD-Electrification-Grant-FAQs-1.pdf>

## SoCalREN Multifamily Subprogram

- Program Website: <https://socalren.com/multifamily>
- Southern California Regional Energy Network Implementation Plan – SoCalREN Multifamily Subprogram. First filing date: 08/31/2018, Revision filing date: 5/16/2019. [https://socalren.com/sites/default/files/SCR\\_RES\\_A1\\_IP.pdf](https://socalren.com/sites/default/files/SCR_RES_A1_IP.pdf)
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- Multifamily Working Group Final Report: <https://pda.energydataweb.com/#!/documents/2318/view>



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## TASK C: POTENTIAL ELECTRIFICATION TECHNOLOGIES

*Prepared by Frontier Energy | September 2020*

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### Overview

This report summarizes three electrification measures for consideration for inclusion in 3C-REN's future multifamily program. The measures were identified by reviewing existing workpapers and considering the implications in 3C-REN service area.


Critically, the current Cost-effectiveness Tool (CET) calculator primarily considers the kWh and therms savings, without fully considering the net energy benefits and lifecycle emission reductions from fuel substitution. As a result, electrification measures can result in claiming negative kWh, creating the appearance of a net energy increase instead of savings. This reduces the measure Total Resource Cost (TRC) dramatically. CPUC is aware of the issue and is working on updating the CET, which is expected to include considerations for lifecycle emissions savings, but a firm timeline is not yet available.

### Central Measures

Currently, there are no approved workpapers for central multifamily electrification/fuel substitution measures.<sup>1</sup> Therefore, in order to claim electrification savings in central locations, the program must pursue a custom savings claims process, which opens the program up to both greater variety of measures, and greater risk of savings claims uncertainties and potential timeline delays. Pursuing the custom review process also requires the program administrator to fully substantiate their savings claims using energy modeling, complying the Custom Review Handbook, and requires what some program participants may feel is extensive documentation collection. Although the data collection and energy modeling can be costly, it can result in maximizing the energy savings claims on a per-project basis, assuming the CPUC approves of the project.

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<sup>1</sup> SCE developed and submitted a Central HPWH workpaper in June 2020, with anticipated approval in Jan. 2021.



Although the details may vary from program to program, generally the process involves:

- Before the customer submits full application: PA collects information on the project, including a site visit, net-to-gross survey data, energy modeling on the potential savings. An Energy Survey Report is recommended to show preponderance of evidence and program influence.
- Customer submits full application, but before beginning work: PA submits projects and full project documentation to the CPUC on the 1st and 3rd Monday of each month. CPUC has 10 Business Days (BD) to decide whether they want to review the project. If the CPUC selects the project for review, the CPUC has 30 BD to review, request additional clarification, and either approve the project/approve the project with modifications or reject the project. However once CPUC requests additional information from the PA, the 30 BD clock stops until the PA responds, so the entire process can take anywhere from 4-8 weeks. If approved, the PA can then work with the customer on executing the project.
- After the customer has completed the project: PA submits notice of completed savings claim. CPUC can later select projects to verify if savings claimed are accurate, and will again request full project documentation and review. Savings claims may be modified based on CPUC review.

Common central electrification measures include shared electric dryers, heat pump water heaters, and mini-split space heating and cooling for hallways and common areas.

## In-Unit Ductless HVAC Heat Pump

**Full Measure Name:** SWHC044-01 Ductless HVAC (Mini-split Heat Pump) Fuel Substitution

**Measure Description:** Mini-split heat pumps are all electric ductless heating and cooling systems that control the temperature in individual or multiple rooms.

**Measure Eligibility:** The existing base case is defined as a system with both a natural gas gravity wall furnace and an electric window air conditioner unit. The existing furnace equipment must be removed and disposed of rather than refurbished and sold. Existing gas line(s) serving removed gas equipment must be capped off.

**Savings Reference Information:** Deemed, based on existing workpapers.

**Savings Potential:** There are four tiers of deemed measure IDs based on the efficiency of the installed equipment. However, within 3C-REN's service area, the greater variation in emissions savings is determined by the climate zone, rather than the efficiency. For simplicity, just Tier 1 measure savings (with the measure ID SWHC044A) are presented below.

**Table C-1. In-Unit Ductless HVAC Heat Pump**

EnergyImpactID	Climate Zone	kWh <sup>i</sup>	Therms <sup>ii</sup>	Energy Savings, MMBTU <sup>iii</sup>	Emissions Savings, Metric tCO <sub>2</sub> <sup>iv</sup>
SWHC044A	CZ04	-260.92	123.04	171.75	9.11
SWHC044A	CZ05	-334.37	134.61	185.51	9.85
SWHC044A	CZ06	-196.88	103.16	145.08	7.70
SWHC044A	CZ09	-227.78	135.61	192.24	10.20
SWHC044A	CZ13	-304.13	155.10	217.37	11.55

The majority of 3C-REN’s service area falls in Climate Zone 5, demonstrating significant lifecycle emissions savings opportunity.

**Additional measure considerations:**

- Currently, this measure is only applicable for systems with an existing heating & cooling load. If the unit doesn’t have an AC unit, the program cannot use this workpaper. Many buildings may not have an existing window AC unit, thus making this available to only a small segment of the population.
- There will be a revised workpaper with a base case without the AC (from a furnace to a ductless heat pump, no existing AC), expected late 2020. This will enable a project to claim the savings on the heating load, even if adding a cooling load. However, this is not currently available.
- This upgrade is expensive, as it requires gas pipeline work, very likely will require additional electric wiring, and often requires electrical panel upgrades.

## In-Unit Heat Pump Water Heater

**Measure Name:** SWWH025-01 Residential Heat Pump Water Heater-Fuel Substitution

**Measure Description:** Heat pump water heaters use a direct expansion heat pump to transfer heat to stored water, bringing it to temperature for the end user. Heat pump water heaters achieve higher efficiency compared to electric-resistance or natural gas water heaters and are typically equipped with supplemental electric-resistance elements for periods of high demand.

**Measure Eligibility:** The base case equipment for this fuel substitution workpaper are Federal code compliant natural gas domestic hot water heaters. Both storage and instantaneous (tankless) natural gas water heaters are being considered for the base case. For storage water heaters, the base case may be a storage water heater that is solely natural gas fueled, or a storage water heater that is primarily natural gas fueled with a secondary electric heat exchanger at the top of the tank.

**Savings Reference Information:** Deemed, based on existing workpapers.

**Savings Potential:** In reviewing the deemed savings, there are only minor variations in savings by climate zone. Savings can vary based on the size and efficiency of both the existing and replacement water

heater. However, the greatest variation in savings is determined by the type of existing equipment being replaced, and whether the existing equipment is fueled by just natural gas, or natural gas and electricity.

For simplicity, the below table highlights an existing case in climate zone 5 (the most common in 3C-REN service area), with an existing and replacement water heater of an average size of 50 gallons, and medium draw or efficiency level from available data. This means there are essentially three main measures cases/variables to compare, making it simpler to review potential emissions savings.

**Table C-2. In-Unit Heat Pump Water Heater**

Existing	Replaced With	kWh	Therms	Energy Savings, MMBTU	Emissions Savings, Metric tCO2
Tankless Natural Gas Water Heater, <i>Med Draw, UEF=0.81; original fuel natural gas + electricity</i>	Heat Pump Water Heater, >45 to ≤55 Gal, UEF=3.09	-1,360.0	138.0	90.347	4.795
Storage Natural Gas Water Heater, <i>50 Gal, UEF=0.63; original fuel natural gas</i>	Heat Pump Water Heater, >45 to ≤55 Gal, UEF=3.09	-1,360.0	178.0	130.347	6.918
Storage Natural Gas Water Heater, <i>50 Gal, UEF=0.63; original fuel natural gas + electricity</i>	Replaced with: Heat Pump Water Heater, >45 to ≤55 Gal, UEF=3.31	-1,280.0	178.0	133.150	7.066

There are greater emissions savings opportunities when upgrading to a heat pump water heater from an existing storage water heater, rather than from a tankless. However, even tankless natural gas water heaters can offer significant emissions savings when upgraded, and they are more likely to have the necessary electrical infrastructure in place to make the upgrade.

**Additional measure considerations:**

- Heat pump water heaters are not yet widely installed, and many contractors are not familiar with the technology. Consider pairing this measure with a workforce, education and training effort to generate additional contractor availability and comfort with installing the technology.
- Water heaters are primarily replaced on an emergency basis with equipment most-readily available, rather than with equipment carefully selected for its unique features. Again, pairing this measure with a workforce training initiative so that contractors can help guide customers in selecting efficient technology can support adoption.
- Significantly, many existing water heaters do not currently have electric service at their location. Although the measure workpapers acknowledge that some water heaters already have both gas and electric fuel, that is not the norm. Additional electrical work, including wiring and in some situations potentially panel upgrades, may be required to upgrade to a heat pump model. This can significantly impact cost, creating a barrier to what might otherwise be a standard installation with a more traditional water heating model.



## In-Unit Heat Pump Clothes Dryer

**Measure Name:** SWAP014-01 Heat Pump Clothes Dryer, Residential, Fuel Substitution

**Measure Description:** A clothes dryer uses electricity to power an electric motor that rotates a drum to create a tumble action. Traditional clothes dryers draw heated air through the drum to evaporate the moisture in the clothing. Heat pump clothes dryers recirculate the exhaust air back to the dryer after the moisture is removed by a refrigeration-dehumidification system. No heating element is needed. The warm and damp exhaust air of the dryer enters the evaporation coil where it cools down below the dew point, and sensible and latent heat are extracted. The heat is transferred to the condenser coil and reabsorbed by the air in a closed cycle.

**Measure Eligibility:** The base case is defined as a natural gas clothes dryer with a CEF of 3.30. Natural gas clothes dryers are cabinet-like appliances designed to dry fabrics in a tumble-type drum with forced air circulation. The heat source is gas and the drum and blower(s) are driven by an electric motor(s). Gas clothes dryers must be vented.

**Savings Reference Information:** Deemed, based on existing work papers.

**Savings Potential:** There are only minor variations in savings by climate zone. Savings can vary based on the electric voltage of the system, whether the unit is vented or ventless, unit size. Voltage creates only minor variations in savings. For simplicity, the below data references a unit in Climate Zone 5 and highlights the differences in savings between a standard and a compact unit, and a vented or ventless unit.

**Table C-3. In-Unit Heat Pump Clothes Dryer**

Measure Description	Vent Status	kWh	Therms	Energy Savings, MMBTU	Emissions savings, Metric tCO2
Compact Size Heat Pump Clothes Dryer, 240 Volt	Ventless	-69.8659	12.48045	12.09906	0.642101
Compact Size Heat Pump Clothes Dryer, 240 Volt	Vented	-61.6132	12.64438	12.63566	0.670579
Standard Size Heat Pump Clothes Dryer, Any Volt	Ventless	-273.526	12.61872	3.877058	0.205757
Standard Size Heat Pump Clothes Dryer, Any Volt	Vented	-270.842	12.67203	4.051567	0.215018

Vented units offer slightly more savings than ventless units. However, the greater variation is that compact clothes heat pump clothes dryers offer greater savings opportunities than standard size. This is likely because the existing base case assumes up to a standard size dryer. Additionally, when compared to other measures reviewed in this paper, the lifecycle emissions savings are relatively small at less than 1 metric ton.



**Additional measure considerations:**

- Existing natural gas clothes dryers are nearly always located within units alongside electric clothes washing machines, so electrical wiring may be readily available. However, the existing wiring may not be able to handle the additional load. This may mean that upgrading may require additional electrical work, which can significantly impact cost and create a barrier.
- In some multifamily buildings, clothes washing and drying equipment are shared facilities located in communal areas. However, the workpaper is only available for clothes dryers installed in-unit.

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<sup>i</sup> Per-unit, measure savings over standard, whole-building, kWh, per fuel substitution workpaper

<sup>ii</sup> Per-unit, measure savings over standard, whole-building, Therms, per fuel substitution workpaper

<sup>iii</sup> Lifecycle Primary Energy Savings (MMBTU at generation source), per fuel substitution workpaper

<sup>iv</sup> Lifecycle emissions savings, Metric tCO<sub>2</sub>, per fuel substitution workpaper



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## TASK D: IMPLEMENTER APPROACHES

*Prepared by Frontier Energy | September 2020*

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### Overview

This document presents implementer and quality assurance/quality control (QA/QC) approaches and potential benefits and cautions for each.

### Program Implementer Approaches

As 3C-REN can administer energy efficiency programs outside the traditional investor-owned utility paradigm, there is flexibility in approaches for the multifamily offering. This poses a unique opportunity for 3C-REN as the Program Administrator (PA) to leverage one or multiple implementer types for localized expertise, market penetration, knowledge, and connections. Below, four options are described and contrasted at a high level.

- **Traditional Third Party:** These can be private or not-for-profit companies offering specialized expertise and a full suite of implementation services to complement 3C-REN in-house resources. Third party services can include program design, administration, marketing, education and outreach, quality assurance and control, desktop reviews, site inspections, savings measurement and verification, rebate and incentive fulfillment, and reporting. A third party can incorporate elements of pay-for-performance contracts, and subcontract tasks to additional program partners.
- **Not-For-Profit: Community Benefit Organizations (CBOs)** and other not-for-profit organizations typically use a fee-for-service structure or contracts to supplement funding, which can typically be used at any time for any service. Services and expertise tend to be specialized and localized, and these organizations tend to have deeper connections with local or state resources.
- **Energy Service Companies (ESCO):** ESCOs arrange project financing focused on energy use and cost reduction, and act as project developers for a range of measures. ESCOs assume the technical and performance risks associated with energy-efficiency improvements, and they use performance-based contracting methodology to ensure savings. Compensation is based on pay-for-performance, being directly linked to the actual energy savings.

- Hybrid: This approach could include a community-oriented partner providing technical assistance (like a CBO or non-profit) and separate entity providing program design, regulatory and reporting support (like a private or non-profit company). The Bay Area Multifamily Building Enhancements program (BAMBE) uses this type of hybrid structure.

**Table D-1. Implementer Approaches**

Implementer Type	Potential Benefits	Cautions
<b>Traditional Third Party / Private</b>	<ul style="list-style-type: none"> <li>• Offers administrative and technical expertise and experience for specific customer and program types</li> <li>• May have connections to other beneficial market actors</li> <li>• More flexibility in staffing to take on skill or knowledge-specific tasks</li> </ul>	<ul style="list-style-type: none"> <li>• Can be costly, depending on skills and resources needed</li> <li>• May lack “social capital” needed to connect with underserved communities</li> </ul>
<b>Not-For-Profit</b>	<ul style="list-style-type: none"> <li>• Community-oriented and mission-driven, offering specific expertise and thought leadership on locality</li> <li>• May have the social capital needed to serve as trusted messengers to underserved communities</li> <li>• May bring experience leveraging various funding sources</li> <li>• May have deeper federal, state, and local connections that can layer benefits to program participants</li> </ul>	<ul style="list-style-type: none"> <li>• May have less internal resource flexibility for hiring or taking on additional tasks</li> <li>• Close support may be required from PA throughout program cycle</li> </ul>
<b>Energy Service Companies (ESCO)</b>	<ul style="list-style-type: none"> <li>• Performance contracting ties compensation to savings to ensure program delivers on goals</li> <li>• Brings project development perspective</li> <li>• Assumes the technical and performance risks that come with projects</li> </ul>	<ul style="list-style-type: none"> <li>• Performance-based contracting methodology may skew efforts away from hard-to-reach and underserved audiences</li> </ul>
<b>Hybrid Approach</b>	<ul style="list-style-type: none"> <li>• Each entity can focus on strengths with specific program and customer types</li> <li>• Provides the opportunity for crossover in market connections and mission</li> <li>• Resources could be more flexible with multiple entities contributing</li> </ul>	<ul style="list-style-type: none"> <li>• Implementers may run into scope limitations for certain tasks</li> <li>• Need clear communication to prevent information silos between entities</li> </ul>



## Quality Assurance/Quality Control (QA/QC) Approaches

Quality assurance and quality control (QA/QC) is a critical component to establish checks and balances for entities completing and reviewing program work. QA/QC helps ensure that ratepayer funds are being judiciously utilized, and that quality work is performed and verified. It also informs continuous program improvement by indicating whether program partners are fully understanding and adhering to the PA's guidelines and expectations.

Establishing thorough QA/QC processes also help prepare the PA to respond to CPUC evaluation questions by ensuring that the program collects appropriate documentation. As an example, a CPUC data request for a multifamily program evaluation could ask for data about the units and properties served; referrals to other programs; and details on outreach materials, events, and targeted customers.

Energy efficiency program QA/QC falls into three general categories:

- **Desktop QA/QC:** Review of project documentation, including models. Costs and measurements are verified to align with program requirements. Reviews can be conducted at pre-project approval and post-project completion. Depending on program parameters and measure mix, desktop QA/QC may require specific technical or engineering expertise as well as proficiency with modeling software.
- **Onsite Verification:** Conduct pre- and post-project onsite verification and post-installation inspections at project sites. Pre- and post-project verification may be performed by an implementer or a third-party rater, auditor, or technician. Post-installation inspections can be conducted for a percentage of sites, depending on program resources. Inspection sampling can be based on various things: random sample, contractor performance record, measure mix, project size or contribution to program savings goal, etc. Note that virtual inspection and self-inspection procedures have been developed and deployed for QA/QC in recent months due to COVID-19.
- **Oversight and Final Approvals:** Serve as the final checkpoint before a project proceeds to installation or to payment. Though desktop review and onsite verification are often contracted to implementers or third parties, the oversight and final approval role is sometimes played by PA in-house staff. This role can also ensure QA/QC informs continuous program improvement.

Three approaches are detailed below that could best complement the multifamily program offering.

- **In-House Review:** A member of the program administrator team completes the QA/QC process. This provides the program administrator with a hands-on understanding of project processing, and the highest level of oversight to be sure that projects are completed and reported accurately. However, it can be time-intensive and may detract from the program administration staff's bigger-picture tasks.
  - *Example: In the PG&E California Multifamily New Homes (CMFNH) Program, the property owner contracts with a certified third-party rater who provides pre- and post-verification on site. CMFNH program staff conduct desk reviews and re-inspect a percentage of project sites post-installation.*
- **Prime Implementer:** The prime implementer conducts QA/QC under the same contract. This allows the implementer to be a one-stop shop for the program. Process and procedures must be clearly defined custom to the program.

- Hire Second Implementer: This additional organization would act as a subcontractor or operate under a separate contract. This entity should specialize in QA/QC and may bring existing processes and procedures for desktop review, onsite or virtual inspections. Depending on program design, this entity may review the work of installation contractors as well as the prime implementer and/or outside raters.
  - *Example: In the BAMBE program, the prime implementer provides technical assistance and field verification. Their modeling and project specifications are checked via pre-installation desk review by a second implementer. Following installation, the prime implementer conducts onsite verification of installed measures, and the second implementer completes a post-project desk review prior to sending to the PA for final approval and payment.*

**Table D-2. Quality Assurance/Quality Control Approaches**

Approach Type	Potential Benefits	Cautions
<b>In-House Review</b>	<ul style="list-style-type: none"> <li>• Provides highest level of oversight to approved projects</li> </ul>	<ul style="list-style-type: none"> <li>• Desktop review can be time consuming and requires specific technical/engineering expertise</li> <li>• Onsite inspections require travel to sites and coordination with property management, owners, and residents</li> </ul>
<b>Prime Implementer</b>	<ul style="list-style-type: none"> <li>• Allows prime implementer to be a one-stop shop for program needs</li> <li>• Can allow for direct delivery of assistance offered at no additional cost to participants</li> </ul>	<ul style="list-style-type: none"> <li>• Loses “checks and balances” aspect of work review</li> </ul>
<b>Hire Second Implementer</b>	<ul style="list-style-type: none"> <li>• An additional organization can help ensure adequate resources are available to complete the work</li> <li>• Can provide a greater level of technical assistance and expertise to the PA and program participants</li> </ul>	<ul style="list-style-type: none"> <li>• Additional contract required for program management</li> <li>• Silos can occur when having multiple parties doing separate work; each would need clear tasks and communication procedures</li> </ul>

## Sources

In preparing this document, the Frontier Energy Team reviewed and considered various sources of information including other program administrators’ multifamily program plans and manuals; multifamily program evaluation and market assessment reports; energy efficiency industry publications; as well as our team’s own experience with multifamily programs and quality assurance best practices. Interviews with other multifamily program teams also informed this document.



## TRI-COUNTY REGIONAL ENERGY NETWORK

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# TASK E: EVALUATION, MEASUREMENT & VERIFICATION APPROACHES

*Prepared by Frontier Energy | September 2020*

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## Overview


This document outlines three approaches for evaluation, measurement, and verification (EM&V) for a potential multifamily program and describes some of the opportunities and challenges of each approach to claiming savings. It is helpful to understand the relationship between PA-led EM&V and CPUC-led EM&V. Both CPUC and PA led EM&V is informed by program logic models and EM&V approaches define the type outcomes and outputs and their respective data and savings claims. The goal of both EM&V efforts is to maximize transparency, inform portfolio planning and in most cases a PA's data collection informs CPUC evaluations.

*PA EM&V* is procured, managed, and contracted by the PA. EM&V methods are selected for energy efficiency programs to determine how the program will *measure* energy savings and other outcomes and *verify* that the outcomes are accurate. PA evaluations may study process, program design, and market assessment. “Managing these studies assists PAs in selecting and managing a portfolio of programs to meet the CPUC’s objectives as well as provide them with access to information on a real-time basis to improve program delivery.”<sup>1</sup> Program-specific EM&V approaches define how each program will collect data to verify that its savings claims are accurate. PA-led EM&V may also inform program target setting, value metrics, and highlight opportunities for improved data and measurement collection. In addition, program EM&V may help inform the PA on an implementer’s performance towards established program goals and targets, CPUC metrics and indicators, and PA determined value metrics.

*CPUC EM&V* is managed and directed by Energy Division. CPUC’s evaluation of PA portfolio and programs is a critical component of CPUC-funded energy efficiency programs, as it ensures that ratepayer dollars are spent prudently. EM&V as directed by the CPUC will not be covered in depth in this document as it is directed by CPUC Energy Division staff in collaboration with PAs. The purpose of the CPUC EM&V is to ensure the “development of energy efficiency programs that deliver reliable energy savings for California’s ratepayers depends on well-designed policies and methods of portfolio

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<sup>1</sup> Energy Efficiency Policy Manual, version 6, April 2020, p.38.



performance evaluation, measurement and verification (EM&V). Rigorous and strategically focused EM&V practices are required to gauge the performance of IOUs, RENs, CCAs, and Implementers, verify energy savings, improve the design and success of future energy efficiency programs and enhance the reliability of forecasted savings for resource planning purposes.”<sup>2</sup> CPUC ordered EM&V is structured such that evaluation can:

- 1) inform the program selection process,
- 2) provide early feedback to program implementers,
- 3) produce impact evaluations at the end of the funding period, and
- 4) feed the planning process for future program cycles.<sup>3</sup>

For a discussion of the CPUC-led and PA-led EM&V see section “VII. Evaluation, Measurement and Verification” of the [Energy Efficiency Policy Manual](#).

Portfolio-wide and program-type<sup>4</sup> EM&V efforts are designed to provide early feedback to PAs and implementers prior to program completion, support future impact evaluations, and inform the planning process for future program cycles.

## Types of Evaluations and Studies<sup>5</sup>

According to the *Energy Efficiency Program Impact Evaluation Guide*, Evaluations can document program performance, operations, changes in energy efficiency markets, and cost-effectiveness. There are three broad categories of efficiency program evaluations:

- *Impact evaluations*: assessments that determine and document the direct and indirect benefits of an energy efficiency program. Impact evaluation involves real-time and/or retrospective assessments of the performance and implementation of an efficiency program or portfolio of programs. Program benefits, or impacts, can include energy and demand savings and nonenergy benefits [NEB] (sometimes called co-benefits, with examples being avoided emissions, health benefits, job creation and local economic development, energy security, transmission and distribution benefits, and water savings). Impact evaluations also support cost-effectiveness analyses aimed at identifying relative program costs and benefits of energy efficiency as compared to other energy resources, including both demand- and supply-side options.
- *Process evaluations*: formative, systematic assessments of an energy efficiency program. They document program operations and identify and recommend improvements that are likely to increase the program’s efficiency or effectiveness for acquiring energy efficiency resources, preferably while maintaining high levels of participant satisfaction.
- *Market evaluations*: assessments of structure or functioning of a market, the behavior of market participants, and/or market changes that result from one or more program efforts. Market

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<sup>2</sup> Ibid.

<sup>3</sup> Ibid.

<sup>4</sup> An example of a program-type evaluation is one that would look multifamily programs implemented by all PAs receiving energy efficiency funding.

<sup>5</sup> The “Types of Evaluations and Studies” section is a direct excerpt from [Energy Efficiency Program Impact Evaluation Guide](#), December 2012, p. xiii. This is a commonly referenced resource for energy EM&V





evaluation studies may include estimates of the current market role of energy efficiency (market baselines), as well as the potential role of efficiency in a local, state, regional, or national market (potential studies). Market evaluation studies indicate how the overall supply chain and market for energy efficiency products works and how they have been affected by a program(s).

## Deemed Workpaper Savings

The deemed savings approach leverages a pre-approved set of workpapers that establish a limited number of variables to determine, and claim, energy savings.

The deemed savings approach allows for the most streamlined and cost-efficient approach to claiming energy savings. This approach involves drawing from existing, pre-approved workpapers available at the Database for Energy Efficient Resources (DEER) that document each measure's eligible specifications, baseline and savings, with a limited number of variables to account for project-specific savings differences. By tracking and recording these limited variables (typically basic items such as climate zone, size or efficiency of the existing or replacement unit, or building type), the program can comfortably and reliably claim savings for each measure. Ex post adjustments may be made after CPUC-led impact evaluations are performed. Adjustments may result because measure savings were overly optimistic in as stipulated in DEER or the net-to-gross ratio was evaluated to be lower than reported. The net-to-gross ratio is determined by the comparison between the net and gross savings. The commonly used formula for calculating NTG ratios is:  $1 - \text{Free Ridership Rate} + \text{Spillover Rate} = \text{NTG Ratio}$ .<sup>6</sup> The assessment of net savings is determined by impact evaluations. Net savings are the changes in energy consumption that are attributable to a program.

The challenge with deemed savings is that the workpapers do not account for variables that may significantly influence the net energy savings, leading to under or over-counting the potential energy savings. Additionally, workpapers typically assume an existing baseline that meets code, while in reality, existing baseline equipment is below (often far below) code, resulting in uncaptured savings. Finally, the program is also limited to selecting from measures with existing active workpapers; to offer an incentive and claim savings for measures outside of existing workpapers, the program would need to draft a new workpaper. Drafting a workpaper requires drawing on technical research that may or may not be existing, and coordinating with a utility and regulator to move the draft workpaper through an approval process that can take several months.

### Resources:

- Database for Energy Efficient Resources: <http://www.deeresources.com/>


## Custom Savings

The custom savings approach allows the program implementer the opportunity to claim custom, site-specific energy savings claims, subject to the project-level scrutiny of the CPUC.

The custom savings approach offers greater potential to maximize energy savings on a per-project basis, but also requires more extensive project documentation and review, and can create the potential for

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<sup>6</sup> Malone, E., Ong, W., Chang, M. (2015). *State Net-to-Gross Ratios*. Page 5. <http://www.synapse-energy.com/sites/default/files/NTG-Research-14-053.pdf>



project savings claims to be denied or adjusted after construction is complete. Depending on the program design, the denial or adjusted may impact the incentive paid to the customer. Additionally, using approved energy modeling software, such as EnergyPro Lite, does not exempt projects from going through the custom review process.

One key benefit is that the process opens the program team up to both greater variety of measures, as the program team can use documented energy modeling to model the predicted savings claims. It also allows the program team to capture details or variables that result in significant savings claims – for example, if the building has a greater number of occupants that might result in greater energy demand, and thus greater savings through efficiency.

**Resources:**

- Custom Projects Review Guidance Documents:  
<https://www.cpuc.ca.gov/General.aspx?id=4133>

## Normalized Metered Energy Consumption

The Normalized Metered Energy Consumption (NMEC) savings approach allows the implementer to claim actual savings at the meter, as determined by monitoring energy usage both before and after upgrades, and then normalizing the energy usage to determine energy savings. The baseline used depends on the whether the program follows site-level or population-level NMEC approach and typically a 12-month period leading up to the program intervention.

The NMEC pathway to claiming energy saving aligns with the CPUC’s overall direction to provide incentives that align directly with the amount of energy saved by the customer, and is therefore seen as an exciting method of EM&V for its potential to meet CPUC goals. However, because it has not been in practice for as long as deemed and custom pathways, there are a variety of unknowns that can impact the project – critical details including program documentation needs, usage normalization platforms, and project-specific review processes have not yet been fully defined to the mutual satisfaction of both PA/implementers and the CPUC.

**Resources:**

- [Rulebook for Programs and Projects Based on Normalized Metered Energy Consumption](#)

## Additional Sources

- Energy Efficiency Policy Manual:  
<https://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=6442465683>
- Ex Ante review process: <https://www.cpuc.ca.gov/General.aspx?id=4132>
- [Energy Efficiency Program Impact Evaluation Guide](#), December 2012



## TRI-COUNTY REGIONAL ENERGY NETWORK

SAN LUIS OBISPO • SANTA BARBARA • VENTURA

# TASK F: PROGRAM RECOMMENDATIONS

*Prepared by Frontier Energy | September 2020*

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## Overview

This document presents information and recommendations on program design, marketing and outreach, electrification technologies, implementer approaches, and evaluation, measurement, and verification (EM&V) to support 3C-REN's multifamily program development process.

## Program Design


### Market Characterization

Frontier Energy conducted research to characterize the potential market for a multifamily energy efficiency program offering in 3C-REN territory. Understanding the local multifamily building sector and demographics of customers can help grow efforts in the tri-county market. If participation barriers can be overcome, significant energy efficiency potential and benefits may be realized for both property owners and occupants. Key takeaways are described below.

**Housing Composition:** Multifamily housing (buildings with five or more housing units) in the Tri-County region provides 82,178 homes, or 17.7% of the total housing stock in the region.

Renters are the primary occupants of multifamily housing in the three counties—just over 90% in each county. San Luis Obispo shows the highest ownership percentage, where Santa Barbara shows the lowest. Multifamily units comprise between 25%-41% of all rental housing in the tri-county region. San Luis Obispo County sees a lower percentage of its rental housing in multifamily units at only 25%, while Santa Barbara and Ventura County have approximately 40% of their rental stock in multifamily units.

Housing in the region varies in age, and the region's older multifamily building stock poses an opportunity for energy efficiency. There was a significant uptick in multifamily housing construction in the 1960s, with a focus on midsize buildings (5 to 19 units). Of the total existing tri-county building stock, 54.5% of multifamily units were constructed prior to 1979 and the development of the energy code. An additional 29% of total existing multifamily units were built between 1980-1999, and these units could likely benefit from updated efficiency measures as well.



**Occupant Demographics:** The region faces income disparity. While 40% of tri-county households have annual incomes greater than \$100,000, another 31% of households earn less than \$50,000, potentially making them eligible for income-based utility programs. The California Alternative Rates for Energy (CARE) program offered by the IOUs tiers the income limits based on household size. For a household of three, the limit is \$43,440 or less, and a household of four is \$52,400 or less.

In areas with high property values like the tri-counties, high income levels alone can create a false perception of disposable income. Instead, it can be more useful to examine the relative cost of housing in connection with income levels. As discussed in Task A, federal guidelines state that those paying more than 30% of income on housing are cost burdened. Research conducted for 3C-REN's Market Characterization shows that 55%-58% of renter households in each of the three counties spend over 30% of their income on rent. When designing the program and determining eligibility requirements, 3C-REN can consider serving a wider segment of multifamily residents by including both income-qualified and market rate housing.

### **Program Adoption Considerations**

- **Existing programs:** The IOUs have existing program offerings for multifamily properties, including rebates, income-qualified direct install programs, benchmarking, financing, and solar. These comprehensive programs continue to offer no-cost or rebated measures such as attic insulation, door and window repairs, caulking, weather stripping, power strips, efficient lighting, showerheads, low-flow toilets, and faucet aerators. The California Department of Community Services and Development also provides the Low-Income Weatherization Program (LIWP), a statewide program focusing on greenhouse gas reductions from heating and cooling, water heating, and whole building upgrades.
- **Affordable housing shortage:** Unstable funding has stagnated affordable home development, preventing demand from being met. Lack of supply and rising costs have had the highest impact on low income households, and housing ownership has dropped to its lowest rate since the 1940s.
- **Energy burden:** Statewide energy burden for low-income multifamily households is significant. 5.5% of low-income customers statewide experience disconnections for nonpayment. Financial strains drive low income households to seek more affordable rental units, which are often in older, less efficient buildings with poor insulation and energy intensive HVAC systems and appliances. As a result, these households often pay more per square foot on energy. California IOUs mitigate this burden through bill assistance programs CARE and FERA, and other programs specifically targeting low-income customers.
- **Skilled contractor availability:** Frontier Energy reviewed ten common license types held by contractor companies participating in existing energy efficiency programs. According to the California Contractors State License Board (CSLB), the tri-county region has 9,161 active contractor entities with one or more of these licenses.

## Program Concierge

To ensure ease of participation and to reduce confusion among offerings and entities, Frontier Energy recommends a streamlined concierge approach similar to the Bay Area Multifamily Building Enhancement Program (BAMBE). Initially, potential participants submit interest forms and are screened for eligibility. After this screening, participants are assigned a technical assistant (TA) who serves as a single point-of-contact (SPOC). The TA stays with the participant from project start to completion, discusses options and energy savings potential, and works to ensure program requirements are met. They offer support to the property owner as well as facility staff, general contractors, and other parties as needed to ensure project success. The TA can also help participants identify opportunities to layer other incentives and funding sources to support their projects.

## Alignment with 3C-REN Goals

RENs are uniquely positioned to be able to incorporate their organization’s non-energy values in energy efficiency program design. 3C-REN’s Multifamily program can employ strategies to advance the REN’s overall goals and values as shown below.

**Table F-1. Strategies for Aligning 3C-REN Values with Multifamily Program Design**

3C-REN Values	Program Design Strategies for Alignment with Values
<b>Diversity, Equity, and Inclusion</b>	<ul style="list-style-type: none"> <li>Establish program parameters to prioritize underserved populations, such as timelines, budget set-asides, and incentive caps (Task B).</li> <li>Incorporate a single point of contact or “Program Concierge” in coordination with in-house quality assurance/quality control (QA/QC) to increase diversity among project scopes and locations (Task B &amp; D).</li> </ul>
<b>Service</b>	<ul style="list-style-type: none"> <li>Involve community groups and local government agencies to help identify and conduct outreach to underserved populations (Task A &amp; B).</li> <li>Use local jurisdictions’ definitions of low income/affordable housing (Task B).</li> </ul>
<b>Climate</b>	<ul style="list-style-type: none"> <li>Include electrification measures with training for contractors on emerging technologies such as heat pump water heaters and heat pump mini splits (Task C).</li> <li>Develop leave-behind collateral for tenants with energy efficiency and water conservation tips and information on other climate-related resources, e.g. County Climate Action Plans and initiatives like CoolBlock.org.</li> </ul>
<b>Economic Impact</b>	<ul style="list-style-type: none"> <li>Prioritize measures and projects that deliver bill savings to tenants (Task B)</li> <li>Support contractors for successful participation in the program, through technical assistance and/or “approved contractor” lists.</li> </ul>



## Program Simplicity

When interviewed for their insights into program design, multiple program administrators (PAs) cited simplicity as a key factor in the success of their multifamily programs. Simplicity of program design has benefits for participating property owners and PAs. Some examples include the following:


- **Single point of contact (concierge):** As discussed earlier, the concierge approach is crucial to creating an easy experience for the participating property owner and helps the PA establish and maintain relationships with property owners. Both the BayREN and SoCalREN programs utilize a concierge approach to support participants.
- **Internal clarity on program logic:** For the PA and implementer, having clearly defined and well-understood program logic is critical to success, as noted in multiple interviews. This clarifies roles among the program team and guides decision-making and effective communication. Documented program processes also support quality assurance/quality control, and program evaluation.
- **Open contractor network:** An open contractor network allows owners to select contractors of their choice. This results in lead sourcing, eliminates participation barriers, and allows owners to leverage existing relationships.

## Project Prioritization

In interviews, multiple program partners mentioned the importance of finding balance between designing an attractive program and pushing the market forward, while also seeking to advance the REN's values. 3C-REN's organizational values should inform the development of program eligibility requirements and other program variables to prioritize projects that fit with 3C-REN's energy efficiency and non-energy goals. The following are examples of requirements and variables observed in other multifamily programs, and how they can be used to prioritize projects.

Eligibility requirements:

- **Measure and fuel types:** The BAMBE program prioritizes in-unit measures that benefit tenants, and they also promote an electrification pathway for deeper decarbonization to help meet climate goals. The 3CP MUD Electrification Grant Program requires new construction projects with no gas appliances or infrastructure.
- **Number of units:** The minimum number of units varies between programs and should be based on market research and how best to serve the REN territory. This requirement can be used to encourage program benefits for tenants in small and large properties. The BAMBE program requires more value-based project elements from large (100+ unit) properties.
- **Project location:** RENs require projects to be located in their own service area, but they can use program rules to prioritize underserved/DAC/low income areas within their territory.
- **Affordable housing/DAC:** Program parameters related to affordable housing/DAC-status ensure the program reflects REN values associated with equity and economic impact. All programs examined in Task B incorporated some parameters around this topic.
- **Property ownership type:** The BAMBE program prioritizes projects using property ownership type, e.g. not-for-profits, HOAs, and cooperatives.



Program variables:

- **Incentives and percentage of project cost:** The MUD program pays a higher incentive per unit for affordable housing than for market-rate. SoCalREN’s Multifamily program will pay up to 75% of project costs for DAC projects, versus 50% for market rate.
- **Project and budget caps:** The MUD program uses a \$240,000 cap per housing development. At launch, the MUD program had budget caps for 70% of funds to be allocated for affordable housing and 30% for market rate.
- **Timeline:** The program may typically use a “first come, first served” prioritization method – that is, projects that apply first have first access to program funding. However, the program may have separate timelines for different project types. For example, in the BAMBE program, projects that the program wishes to prioritize are encouraged to apply starting at the beginning of the program year, giving them first access to available program funds. Market rate properties over 100 units are not eligible to apply until July, after prioritized projects are given access, unless they are located in an underrepresented county, participating in the electrification pathway, or include 50% or more measures accruing benefits to tenants.

## Pipeline Management

Managing projects in queue in the “pipeline” is critical for ensuring the program delivers on its energy savings goals. The following are recommendations from other multifamily PAs and implementers for effective pipeline management:

- **Early Outreach:** Other programs recommend expecting extensive lead times from initial engagement to final adoption, nuanced financial trade-offs and investment in the decision-making process. Patience is required, as energy savings is not the critical element for customers.
- **Financial Screening:** At intake and initial screening of potential participants, ensure the property owner has operating reserves or plans to acquire additional funding. This may be of even greater importance given recent economic challenges associated with COVID-19.
- **Maintain Communication:** From the initial interest form to the final rebate payment, multifamily projects may take anywhere from three months to three years to be completed. Having a concierge approach as detailed earlier helps maintain communication during the sometimes lengthy decision-making process with property owners, and throughout the construction phase.
- **Program Stability & Consistency:** In an interview with a multifamily program implementer, they stated that across their work with various multifamily programs, stability and consistency of program rules and incentive offerings is important. Property owners need time to plan for participating in the program, and they need to feel confident that when they are ready to begin the participation process, the program’s benefits and requirements will not have substantially changed.





## Marketing and Outreach

Effective marketing and outreach will heavily depend on directly targeting those who make decisions for the unit or building, and entities whose built-in audience or clients can be leveraged for promotion.

### Stakeholders & Marketing Methods

A full list of potential stakeholder types, outreach and engagement methods, and example entities are provided in Task A. In particular, presentations to industry organizations and associations, outreach to local government organizations requesting that they contact their multifamily building partners, and outreach (such as direct email and in-person meetings) to building professionals and contractors stand out as key marketing methods.

Best practices recommended by ACEEE and Better Buildings reports include:

- Partnering with multifamily financing entities, including local housing authorities, development agencies, nonprofits, and green certification programs. Other industry players to focus on include affordable housing developers, real estate management companies and public housing entities, and tenant advocacy groups. Contractors and upgrade services are also key partners, who can mention the program when a decision maker calls them in for work.
- Local apartment and property manager associations make good program allies and have close contact to decision makers or may be the decision makers themselves.
- Messaging should be focused on benefits specific to the decision maker, whether it is the owner, property manager, tenant, etc. Highlighted benefits can include direct savings to utility bills, reduced maintenance costs, decreased tenant turnover, “low hanging fruit” measures that can provide immediate impact or return, increased property value, improved comfort, and multiple upgrades can be completed at once when units are vacant.

### Local Government Outreach


In research and interviews, multifamily programs cited the importance of outreach activities in partnership with local governments:

- **BayREN Bay Area Multifamily Building Enhancements (BAMBE) Program:** In addition to working with community groups during the program ideation and program design phase, BayREN works with counties to advertise the program. They send out letters on county letterhead and use case studies to describe successful projects.
- **Central Coast Community Energy (3CE)<sup>1</sup> Multi-Unit Dwelling (MUD) Electrification Grant Program Grant Program:** 3CE reached out to local building departments to ask that they share the program through their networks as they engage with builders on code updates. By leaning on local stakeholders to spread the word, they avoided paying for outside marketing.
- **Tax Credit Allocation Committee (TCAC) and Community Services Department:** PG&E found success integrating and collaborating activities with other organizations, such as TCAC and

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<sup>1</sup> Monterey Bay Community Power changed their name to Central Coast Community Energy (3CE) in September 2020.





California Community Services Department Low Income Weatherization Program (CSD LIWP). This has allowed the team to develop relationships with staff and potential property owner participants, break down barriers, and streamline participation for the multifamily customer. However, it is critical to consider timing when working with TCAC. Project delays may occur if measures are not accounted for prior to re-syndication eligibility.

## Split Incentive Barriers

In each county, 90-93% of multifamily units are renter-occupied. For rental properties, the split incentive barrier poses a challenge to program uptake. While in-unit measures can offer considerable energy savings, property owners are more likely to prioritize updating central measures. Tactics to address this should align interests of owners or landlords with energy efficiency improvements that tenants would benefit from or appeal to tenants who do not want raised rent as a result of improved amenities.

Although additional avenues for exploring the split incentive barrier can be found in Task A, Frontier recommends considering a combination of the strategies below:

- **General program design efficiencies:** Participants should be highly targeted. Cost-effective measures with fast returns can be used as a lead-in for decision makers, taking the opportunity to educate and upsell as appropriate. Forms and process should be streamlined.
  - Benefits/Concerns: Eases participation process for property owner. However, need to be mindful of maintaining efficiencies if also integrating concierge services.
- **Energy efficiency loan:** Consists of an externally funded loan. External parties such as CAEATFA or a private lender may serve as a resource to PF program participants.
  - Benefits/Concerns: Improvements can be completed under a single financing product. More affordable monthly payments make investment easier on landlord and prevents tenants from incurring higher rent increase. However, benefits remain with property. Loan transfer may complicate resale and involve potential liability for owner.
- **Niche offerings or programs:** Concierge services that can provide comprehensive energy education and assistance.
  - Benefits/Concerns: Likely to have high success for efficiency improvements and behavioral changes. More accessible to low income and disadvantaged participants. However, may be costly to effectively scale.

## Potential Electrification Technologies

3C-REN is funded by ratepayer dollars, including both gas and electric ratepayers, and thus its funds are to be used to support both gas and electric ratepayers. However, 3C-REN also must support California's energy and climate goals and align with its own internal goals to support GHG reductions, which can be achieved by electrifying existing buildings. Therefore, 3C-REN should identify ways to offer electrification options for multifamily buildings.



## Consider Offering an Electrification Pathway Pilot

Currently, offering incentives for electrification measures can reduce program cost-effectiveness. The current Cost-Effectiveness Tool calculator does not fully consider the net energy benefits and lifecycle emission reductions achieved when replacing an existing gas measure with an efficient electric measure (“fuel substitution”). As a result, electrification measures can result in claiming negative kWh, reducing cost effectiveness. Although the CPUC is working on updating this, at present 3C-REN should explore ways to offer electrification measures alongside more cost-effective upgrade measures.

- 3C-REN could consider pursuing electrification measures as a “pilot” or test effort, ideally leveraging non-CPUC funds alongside CPUC funds to offset the additional incentive costs. This would allow the program team time to explore the best way to promote electrification upgrades even before the cost-effectiveness tool.
- The BAMBE program includes a set of “electrification readiness” building upgrades as an eligible measure in its electrification pathway (note that the project must still meet energy savings goals with its remaining measures). Although the project cannot claim additional energy savings for this work, and thus potentially reduces the project’s cost effectiveness, this aligns with BayREN’s goals of supporting future electrification upgrades. When considering an electrification pilot, 3C-REN should determine whether their own goals and values might align with offering their program participants this opportunity.

## Claiming Savings for In-Unit and Central Measures

3C-REN will likely need to pursue a custom savings claim approach to claim electrification savings, as using the deemed approach will confine the program to a constrained list of existing workpapers. Existing electrification measures for which there are approved workpapers are currently limited to in-unit measures. In-unit measures offer the greatest tenant benefits, but due to the split incentive barrier, can be challenging to incentivize a property owner to upgrade.

That said, SCE developed and submitted a central heat pump water heater (HPWH) workpaper in June 2020, with anticipated approval in early 2021. If a deemed approach is pursued for program simplicity, the program could potentially leverage the Central HPWH for that. Before investing heavily in this, the team should examine the approved workpaper to understand how the region’s existing buildings will likely be able to take advantage of the measure.

Among the existing electrification measures with approved workpapers, in-unit ductless HVAC heat pump offers the greatest potential for lifecycle emissions savings. Additionally, updates are expected to this workpaper in late 2020 that will enable a project to claim the savings on the heating load, even if adding a cooling load. 3C-REN should strongly consider including this measure as an electrification option in its program design.



# Implementer Approach

## Program Delivery Model

This section outlines the potential benefits and cautions associated with both open and closed rater program models, with insights from interviews with various multifamily program partners.

**Open Rater:** the participating multifamily property owner contracts with a rater or energy assessor of their own choosing. Also referred to as a “rater pathway” within a program.

- **Benefits:** In interviews, one of the benefits identified with the open rater model is that the program creates opportunities for raters and assessors to participate in the local marketplace and earn rater incentives for supporting the program. Another cited benefit was that raters could leverage their existing connections in the local market to identify potential projects and boost participation in the program.
- **Cautions:** In an interview, one PA shared that in their experience with the open rater model, raters were disincentivized to pursue diverse measures and project types and tended to recommend low cost, high savings projects with central measures and controls. In the experience of PAs and implementers this led to less tenant-benefit measures being recommended and increased the need for desktop quality control (QC), sometimes leading to delayed project timelines. An energy rater firm shared in an interview that transparency is needed from PAs and implementers in these programs to assure raters that funds would be available for the projects that raters put time and effort into developing.

**Closed rater:** energy assessment and technical assistance services are provided free to participating property owners by a designated firm such as the program implementer.

- **Benefits:** In an interview, a PA asserted that the closed rater model better suited their organization’s goals of prioritizing tenant-benefit measures and building relationships with property owners. The PA had better visibility into the project pipeline with the closed rater program, with more awareness of which projects would succeed or fail. In addition, they said that participation barriers were reduced for property owners because they do not have to locate, contract with, and pay a rater or assessor.
- **Cautions:** Because the closed rater approach does not incorporate raters as trade allies to bring in projects, outreach to property owners is important to fill and maintain the project pipeline. A rater firm that has participated as a general contractor through a closed rater program indicated that in their experience with both program models, the closed rater model sometimes meant more coordination and site visits were needed between the implementer and contractor. From the implementer’s perspective, they agreed that more coordination was needed but that this process was still quicker than the desktop QC necessary in the open rater model.



## Implementer Approach

Different types of organizations serve as implementers for energy efficiency programs, and 3C-REN can select one or a combination of different implementer types. This section briefly summarizes potential benefits and cautions for different types of organizations, as well as a hybrid approach combining multiple implementers.


- **Traditional third parties** offer a variety of administrative and technical services and may have deep organizational resources to support changes in program staffing needs. However, they may be costly and may lack the “social capital” needed to connect with underserved communities.
- **Non-profit organizations** bring specialized, mission-driven expertise and thought leadership. They may have social capital to serve as a trusted messenger for program outreach to local communities and may bring connections to other funding sources that can be layered to benefit participants. However, they may have less internal resource flexibility and require close support from the PA throughout the program cycle.
- **Energy Service Companies (ESCOs)** tie compensation to savings to ensure the program delivers on its goals and may bring a project development perspective where they assume the technical and performance risks associated with projects. However, performance-based contracting methodology may skew efforts away from hard-to-reach and underserved audiences.
- **A hybrid approach** can be taken, where the PA hires more than one type of implementer to capitalize on multiple organizations’ strengths. This can provide flexibility in resources and allows for crossover in market connections and mission. However, clear communication is needed to prevent information silos between entities.

## Quality Assurance/Quality Control

Best practices in quality assurance and quality control (QA/QC) dictate that an unbiased party should be responsible for reviewing project work. QA/QC is important for ensuring continuous improvement and supporting program evaluation. Establishing thorough QA/QC processes also help prepare the PA to respond to CPUC evaluation questions by ensuring that the program collects appropriate documentation about projects.

QA/QC for a multifamily program generally consists of desk review of projects and onsite verification, and general oversight and approvals. While general oversight and final approvals are typically provided by the PA, desk reviews and onsite verification can be performed by the PA or by another party. Three approaches to QA/QC and the potential benefits or cautions for each are described below.

- **In-house review by 3C-REN staff** provides the PA with a hands-on understanding of project processing, and the highest level of oversight to be sure that projects are completed and reported accurately. However, it can be time-intensive and may detract from the program administration staff’s bigger-picture tasks.
- **The prime implementer could conduct QA/QC** under the same contract, acting as a one-stop shop for the program. However, process and procedures must be clearly defined because with this approach, the external “checks and balances” aspect of work review is lost.

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- **A second implementer can be hired to perform QA/QC** as an unbiased party and can also provide additional technical and administrative resources to the program. However, clearly defined tasks and communication procedures are important to avoid information silos.

Note also that the program delivery model (closed rater vs. open rater) has implications for QA/QC. Some raters or assessors also provide general contracting or installation services, which could introduce bias in the project scopes they recommend to participants. Rigorous QA/QC provides checks and balances to address this potential issue.

## EM&V Approach

The program's approach to evaluation, measurement, and verification (EM&V) will determine how energy savings will be claimed. The EM&V approach impacts data collection, measure selection and program processes.

- **Custom Savings Approach** allows for a greater mix of both in-unit and central measures and is adaptable to integrate electrification measures. The custom approach allows the program to capture stranded savings seen with the deemed approach and allows for measures to be modeled on a per project basis to ensure each site is getting a solution that will maximize savings while fitting tenant and building owner needs.
- **Deemed Savings Approach** is likely to be too restrictive in offering eligible measures if the program wishes to integrate both in-unit and common area measures. This approach is likely to leave potential savings on the table and deliver superficial energy savings without supporting the deeper retrofits that have been directed by the CPUC to multifamily programs. The deemed approach places a heavy emphasis on in-unit measures such as lighting and infiltration, which can be challenging to attract owners to invest in due to the split-incentive barrier.
- **Normalized Metered Energy Consumption** method would operate on a lengthy timeline, including one year of post-retrofit review before providing incentives. This is unlikely to attract building owners as energy upgrade investments would be all or mostly out-of-pocket with uncertain incentives after a long evaluation period. This method of savings verification is not as well-documented, creating the potential for hurdles in the program review and approval process.