

Improving California's Multifamily Buildings: Opportunities and Recommendations for Green Retrofit & Rehab Programs

*Findings from the Multifamily Subcommittee
of the California Home Energy Retrofit
Coordinating Committee*



DRAFT

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EXECUTIVE SUMMARY

In California, the single-family home weatherization and whole-house performance sector is very active, with many programs already in place and new ones rolling out in the fall of 2010. While these programs have the potential to achieve impressive energy savings, their approaches do not neatly carry over into the multifamily and affordable housing sector.

The multifamily and affordable housing sector is different from the single-family sector in many fundamental ways, and optimal energy improvements at the whole-building level cannot be accomplished by merely modifying or expanding the single-family programs. The opportunities and challenges unique to the multifamily sector can only be met if there are well-designed and well-coordinated programs and policies that address this sector's specific infrastructure.

In recent decades, California's building energy efficiency standards (Title 24 Part 6), the California Home Energy Rating System (HERS), utility incentives and local government programs have made major strides in improving the energy efficiency of the state's building stock. However, neither single-family nor commercial building retrofit programs fully address the unique aspects of the multifamily sector and its subsectors. Multifamily developer/owners find it time consuming and daunting to sort through the range of prescriptive and targeted programs that might apply to their properties, and to make sense of the varying application procedures and requirements associated with each program.

The Multifamily Subcommittee of the California Home Energy Coordinating Committee (MF HERCC) is working to address these challenges by coordinating development of standards, professional qualifications, verification procedures, and energy savings quantification and tracking tools. The California Home Energy Retrofit Coordinating Committee was convened by U.S. EPA Region 9 to develop consistent recommendations and standards for statewide home energy retrofit programs.

This report summarizes the MF HERCC's recommendations and analysis in five specific areas:

1. Program delivery
2. Professional qualification and training
3. Prescriptive vs. performance whole-building approaches
4. Energy analysis software
5. Low-income and energy efficiency program access and coordination

Summary of Recommendations

1. Program Delivery

- a. Use raters/verifiers and energy consultants to deliver multifamily incentive program services.*
- b. Give developer/owners the flexibility to hire and manage the construction and verification team.*

Incentive programs that deliver energy and green upgrade services for single-family homes, as well as prescriptive-based programs for multifamily buildings, typically rely on pre-approved contractors. These contractors serve as the conduit for participating in the program and provide services such as diagnostics, verification and documentation. This contractor-list delivery approach, however, is unlikely to be successful for California's diverse and professionalized multifamily and affordable housing sector, for a number of reasons. Developer/owners typically have long-established relationships with a variety of specialized sub-trade contractors whom they may be contractually obligated to use, making it problematic to use program-designated contractors. Using raters/verifiers instead of contractors to deliver multifamily incentive program services also aligns with the HERS program model. California already has a well-established network of professional HERS raters, and existing multifamily programs already successfully use a rater model for program delivery. To support program delivery by raters, the MF HERCC has already developed whole-building audit protocols for use by raters/verifiers who are auditing multifamily buildings.

2. Professional Qualification and Training

- a. Focus on qualifications of rater/verifier and add specialized expertise to audit team based on scope of upgrade.*
- b. Develop targeted training curricula and require completion of training by participating raters/verifiers, building operators, central systems contractors and users of energy analysis software.*
- c. Develop targeted education and outreach to building residents.*

The MF HERCC recommends targeting specialized training at four types of professionals who work on multifamily buildings: rater/verifiers, building operators, central water heating system contractors, and energy analysts. Each of these training courses focuses on making sure that key professionals working on multifamily building upgrades have the knowledge and expertise to make effective decisions about building improvements, program participation and ongoing operational savings. Minimum professional qualifications have been established for the verification/audit team.

The recommended training also includes education and outreach to building residents. Residents need information and tools to make smart decisions about using energy efficiently and keeping their homes healthy. A home environmental education component can increase behavior-based conservation, improve the lives of residents (especially low-income renters who may not have ready access to this information) and enhance relationships between property owners, tenants and the broader community.

3. Prescriptive vs. Performance Whole-Building Approaches

- a. *Offer funding programs based on a whole-building performance approach for multifamily energy efficiency improvements, rather than a prescriptive approach. This performance approach should be based on Title 24 Part 6 and HERS II protocols for multifamily residential buildings that consider the energy end-uses of heating, cooling, water heating (including solar pre-heat), appliances and lighting.*
- b. *Require a minimum of 10 percent energy efficiency performance improvement for all projects, with additional targets for projects to reach 15 percent and 20 percent improvement.*
- c. *Provide utility-funded incentives for the whole-building performance approach to stimulate demand for comprehensive energy upgrades.*

Single-family upgrade programs have traditionally taken a prescriptive approach, allowing for specific, clearly defined packages of improvements to be made to participating buildings as an option in parallel to the whole-building performance approach. This prescriptive path is seen as a “ramp-up” for increasing workforce capacity. After extensive analysis, the MF HERCC has concluded that a whole-building prescriptive approach is not feasible for the multifamily sector. Because of the diversity of building types, system types and other factors discussed throughout this document that distinguish multifamily buildings from single-family homes, a statewide prescriptive approach to multifamily upgrades would require 16 or more distinct packages of measures. This would likely create a huge administrative burden, confuse the market and drive up program costs.

For multifamily whole-building programs, the MF HERCC recommends a performance approach to energy savings analysis and upgrades. Performance improvement targets ranging from 10 percent to 20 percent are recommended based on the building’s vintage. Utility-funded incentives to developer/owners will drive demand for energy and green upgrades.

4. Energy Analysis Software

- a. *Use code compliance software as the standard baseline reference for energy savings reporting in programs funded by the American Recovery and Reinvestment Act (ARRA) or investor-owned utilities (IOUs).*
- b. *Use supplemental software programs where necessary to optimize analysis of energy savings opportunities.*
- c. *Apply California Energy Commission (CEC) HERS II-type residential multifamily low-rise protocols to high-rise multifamily in the code compliance software.*
- d. *Align funding programs' use of various software platforms for compliance to reduce administrative barriers to program participation.*

For multifamily developer/owners, a major barrier to carrying out energy performance upgrades is the complex and sometimes conflicting requirements of incentive and funding programs. Using standardized Title 24 Part 6 code compliance software is an important step toward streamlining program requirements. That said, there must be some flexibility to use other software programs when needed to analyze certain types of improvements not well addressed by the Title 24 Part 6 compliance software. The MF HERCC also recommends modifying HERS II code compliance software to address multifamily

buildings (it currently applies to single-family and low-rise multifamily buildings, and was designed primarily with single-family assumptions), and coordinating requirements of funding programs to reduce duplication of energy modeling and analysis efforts.

5. Low-Income and Energy Efficiency Program Access and Coordination

- a. *Coordinate and integrate energy efficiency retrofit and weatherization programs serving the low-income sector by developing consistent program requirements, standards and audit protocols; modifying program structures to provide more flexibility for multifamily building owners; and supplementing prescriptive approaches with whole-building performance approaches.*
- b. *Improve access to low-income energy efficiency programs for multifamily properties by streamlining eligibility procedures and providing “fair-share” allocation of funding.*

For the multifamily housing sector, one of the major barriers to upgrading a building’s energy performance is the plethora of sometimes confusing and often overlapping program requirements, incentives, financing sources, protocols and compliance software requirements. While this situation is a challenge for market-rate developers, it is even more challenging for developer/owners of income-restricted properties, who face additional complicated program and funding requirements. In addition, low-income energy efficiency (LIEE) programs funded by California Public Utilities Commission (CPUC) ratepayers and Weatherization Assistance Programs (WAP) funded by the U.S. Departments of Energy (DOE) and Housing and Urban Development (HUD) utilize a single-family program delivery model and have other barriers that make them inaccessible to multifamily properties. As a result of these factors, less than 1 percent of the more than 90,000 low-income apartments in California have benefitted from energy retrofit programs.¹ To reduce barriers to participation, improved access to these programs and coordination of their requirements is essential.

Adoption of the recommendations in these five areas will allow California's energy and green upgrade programs to more effectively and quickly serve the multifamily building sector.

¹ Green Rental Home Energy Efficiency Network, convened by California Housing Partnership Corporation, “Energy Efficiency in Multifamily Buildings: Problem Statement and Proposed Resolutions,” September 28, 2010.

INTRODUCTION

Challenges and Opportunities in the Multifamily Retrofit Sector

In California, the single-family home weatherization and whole-house performance sector is very active, with many programs already in place and new ones rolling out in the fall of 2010. While these programs have the potential to achieve impressive energy savings, their approaches do not neatly carry over into the multifamily and affordable housing sector.

The multifamily and affordable housing sector is different from the single-family sector in many fundamental ways, and optimal energy improvements cannot be accomplished by merely modifying or expanding the single-family programs. The opportunities and challenges unique to the multifamily sector can only be met if there are well-designed and well-coordinated programs and policies that address this sector’s specific infrastructure.

In California, approximately one-third of households reside in multifamily buildings (Figure 1).² Nationwide, more than 70 percent of multifamily housing units were constructed before building energy efficiency codes were established.³ Although multifamily buildings inherently tend to be more efficient on a per capita basis compared to single-family homes, the large population living in multifamily buildings combined with the age of these buildings means that the potential for energy savings in this sector is enormous.⁴

Figure 1. Distribution of California Households by Dwelling Type

(Source: CPUC Strategic Plan, 2008)

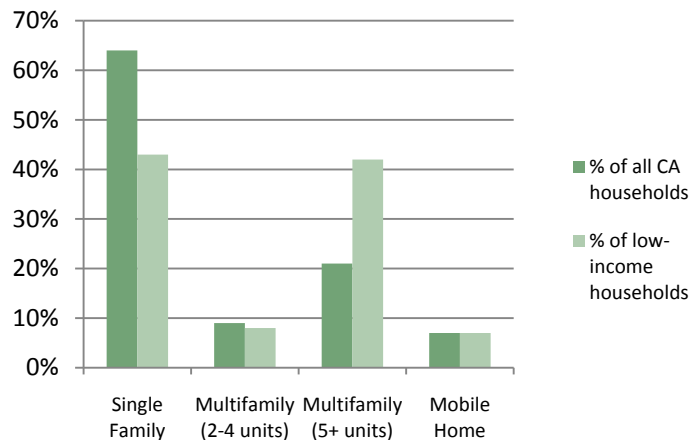
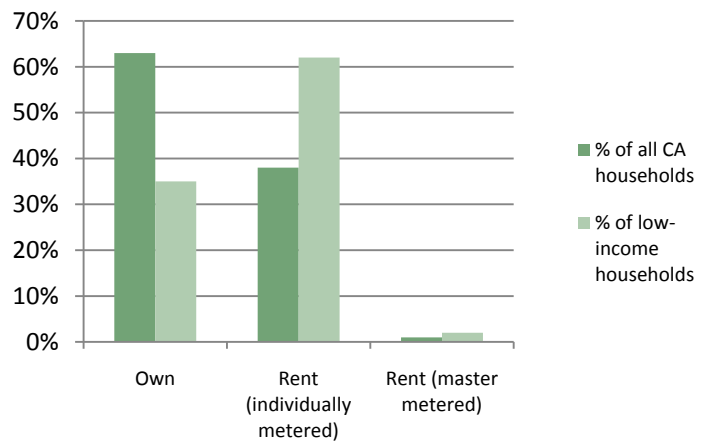


Figure 2. Distribution of California Households by Home Ownership

(Source: CPUC Strategic Plan, 2008)



² California Public Utilities Commission, “California Long-Term Energy Efficiency Strategic Plan,” September 2008.

³ Energy Foundation, “U.S. Multifamily Energy Efficiency Potential by 2020,” October 19, 2009, prepared by The Benningfield Group, Inc.

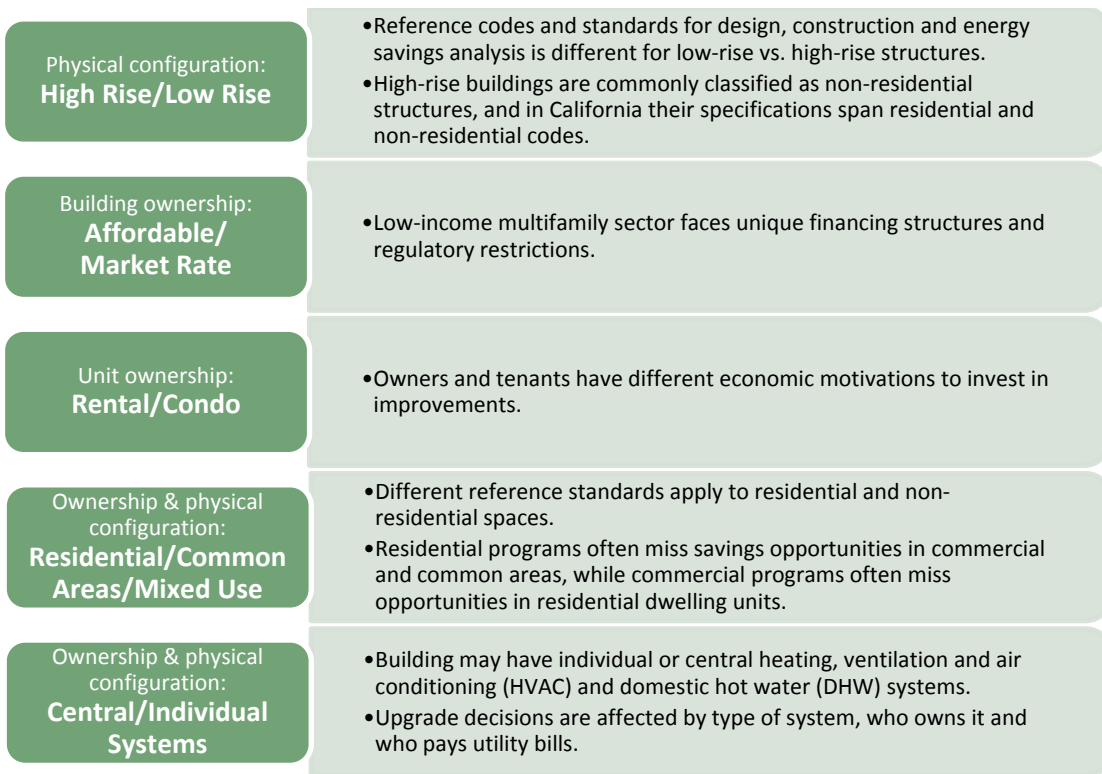
⁴ There are more than 2.4 million existing multifamily dwelling units in California. If 14 percent of those units were upgraded to improve energy performance by 25 percent, it would reduce annual energy consumption by 533,971 megawatt-hours (MWh) of electricity and 37 million therms of natural gas. Avoided greenhouse gas emissions

In the multifamily sector, energy savings and social equity are intertwined challenges. According to the California Public Utilities Commission, 42 percent of California households are renters rather than owners, and about one-third of these households qualify for low-income energy efficiency (LIEE) programs.⁵ Figure 1 and Figure 2 show dwelling types and home ownership rates for California households in general and for low-income households.

Compared to higher income homeowners, lower income renters spend a disproportionate amount of their income on energy, and yet they typically do not have the financial resources or ownership rights to make energy efficiency investments in their homes. Well-coordinated upgrade programs targeted at the multifamily and affordable housing sector can make a big difference in individual’s lives while supporting the state’s ambitious energy and climate change goals.

A central challenge to the successful implementation of market transformation strategies arises from the fact that the multifamily and affordable housing sector actually consists of a number of subsectors. These are shown in Figure 3 and discussed in greater detail in the “Understanding California’s Retrofit Market” section later in this report.

Figure 3. Multifamily Subsectors



would be 430,245 MTCO₂E annually. (Calculations done using methodology from the California Air Resources Board (CARB) AB 32 scoping plan.) On a national basis, estimates of achievable potential for energy efficiency improvements in existing multifamily housing by 2020 would save more than 51,000 gigawatt-hours (GWH) of electricity and more than 2,800 million therms of natural gas. Avoided CO₂ emissions are estimated from at least 50 million tons to more than 100 million tons per year (Energy Foundation, op. cit.).

⁵ CPUC, op. cit.

The various building configuration and ownership variables shown in Figure 3 influence:

- Which reference standards apply,
- Who is the decision maker and therefore which measures will be selected for energy investments and associated payback,
- What is the financing and regulatory structure of the project and how that might constrain energy efficiency decisions, and
- Whether the common areas, the dwelling units or both are the focus of the improvements.

In recent decades, California's building energy efficiency standards, California's Home Energy Rating System (HERS), utility incentives and local government programs have made major strides in improving the energy efficiency of the state's building stock. However, energy efficiency programs often do not fully recognize the unique characteristics—and potential for energy savings—of the multifamily industry's subsectors. In some cases, multifamily buildings are treated generically as housing and lumped together with single-family residential programs, standards and policies. In other cases, multifamily buildings are treated as if they were commercial buildings—in other words, large structures with complex ownership, financing, development and management.⁶

Neither single-family nor commercial building retrofit programs fully address the unique aspects of the multifamily sector and its subsectors. Multifamily developer/owners find it time consuming and daunting to sort through the range of prescriptive and targeted programs that might apply to their properties, and to make sense of the varying application procedures and requirements associated with each program. They would be more inclined to participate if programs, protocols and resources were better coordinated.

Fortunately, there is an opportunity for this systemic issue to be addressed in California today. Federal stimulus funds targeted at improving building energy efficiency, combined with ongoing programs such as those funded by utility ratepayers, are creating unprecedented opportunities for policymakers and program implementers to develop definitions, protocols and resources that are fine-tuned to the needs

Neither this nor that

In California's Building Energy Efficiency Standards, commonly known as Title 24, low-rise multifamily buildings are covered by the residential section of the code. The nonresidential code addresses envelope and HVAC in high-rise multifamily buildings, but the residential code addresses water heating, lighting and appliance energy use in high rises.

In this case and many others, the multifamily sector has to straddle the requirements of programs and standards designed for either single-family homes or commercial buildings. Deciphering which programs and reference standards apply requires the intervention of experts. As a result, too often multifamily retrofit projects wind up falling between the cracks, leaving substantial energy savings and other benefits on the table.

⁶ For some multifamily properties, the developer and owner are the same entity. In other cases, the property owner may not be a developer. In this report, the term “developer/owner” refers to a developer and/or owner, and is used to distinguish the more complex multifamily ownership structure from single-family home ownership.

of the multifamily sector and that are coordinated to reduce administrative inefficiencies and eliminate unnecessary costs and barriers to participation.

About the Multifamily Home Energy Retrofit Coordinating Committee (MF HERCC)

Dozens of entities across the state are actively involved in rolling out residential retrofit programs. To coordinate their efforts and accelerate the rate at which California's buildings undergo energy and green building improvements, many of these entities came together in early 2009 to form an ad hoc group—the California Home Energy Retrofit Coordinating Committee (HERCC).

Convened by the U.S. EPA's Region 9, this collaborative of utilities, government agencies, building experts and others is working together to develop consistent recommendations and standards for statewide home energy retrofit programs. In its first year, the HERCC focused on single-family programs. Starting in January 2010, a Multifamily Subcommittee (MF HERCC) was formed to address the application of residential energy and green building programs to the unique needs of the multifamily and affordable housing sectors.

The MF HERCC's goal is to minimize administrative barriers to participation in multifamily retrofit and rehab programs emerging as part of Energy Upgrade California.⁷ It is doing this by coordinating development of standards, professional qualifications, verification procedures, and energy savings quantification and tracking tools. Within the MF HERCC, Task Groups address specific tasks such as audit protocols, IT systems and weatherization programs. The MF HERCC is chaired by StopWaste.Org; the Acknowledgments section in this document includes a list of participants.

Purpose of This Report

This report is intended for people involved in developing and implementing multifamily retrofit policies, programs and incentive structures in California. The report summarizes the MF HERCC's recommendations for:

1. Program delivery
2. Professional qualification and training
3. Prescriptive vs. performance whole-building approaches
4. Energy analysis software
5. Low-income and energy efficiency program access and coordination

The following background information about California's multifamily building sector provides critical context for these recommendations and analyses.

⁷ Energy Upgrade California is a new statewide program that promotes improvement of California's building stock using funding from sources including utility ratepayers, local government and the American Recovery and Reinvestment Act (ARRA). Energy Upgrade California multifamily program elements and tools are scheduled to launch in 2011.

Understanding California's Multifamily Retrofit Market

The State of California, as well as local governments, regional agencies and many entities in the private sector, have established ambitious goals for reducing building energy use and related greenhouse gas emissions. To achieve these goals, retrofit programs must be quickly and effectively ramped up. But if these efforts are to succeed, multifamily buildings cannot be shoehorned into programs designed for single-family or commercial buildings. Instead, California needs well-coordinated programs tailored to the unique opportunities and market barriers faced by the multifamily sector. The following key issues are discussed below:

Multifamily buildings cannot be shoehorned into programs designed for single-family or commercial buildings.

- **Building types:** The diversity of multifamily building types makes it highly challenging to develop program delivery models, incentive programs and consistent packages of building upgrade measures that meet the needs of every situation.
- **Financing:** Programs that fund multifamily energy upgrades need to be coordinated with traditional sources of financing so that they serve as a stimulus rather than a barrier to retrofit activities.
- **Split incentives:** Upgrade programs need to take into account the divergent economic motivations of multifamily building owners and occupants, as well as the different ways in which energy is used and paid for by tenants and owners in multifamily buildings.
- **Trigger events:** During a multifamily building's lifecycle, there are specific times when it is most cost effective and convenient for the developer/owners to make energy and green upgrades. Retrofit programs should tailor their services to take advantage of these entry points.
- **Cost-effective energy savings measures:** There are many cost-effective energy savings measures that are unique to multifamily properties. These measures need to be taken into account when designing retrofit programs and incentives and conducting outreach to multifamily developer/owners.

Building Types

The multifamily sector encompasses a range of building sizes, system types and configurations of dwelling units and nonresidential areas. These configurations generally fall into the categories shown in Figure 4, and are consistent with Title 24 Part 6 building code definitions.⁸ When multifamily buildings undergo energy efficiency and green upgrades, these occupancy mixes and physical configurations affect how technical protocols and codes and standards (such as the residential vs. commercial versions of Title 24 Part 6) are applied.

⁸ Title 24 defines multifamily housing as three or more attached dwelling units. However, various programs define multifamily housing differently; for instance some IOU programs consider buildings with two or more units, including duplexes, to be multifamily.

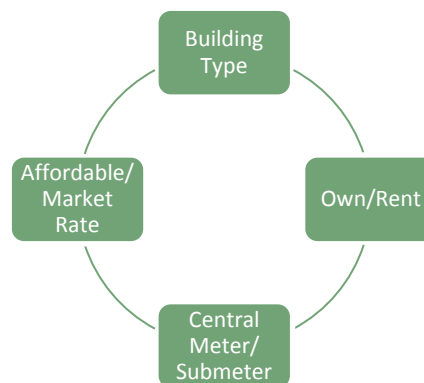
Figure 4. Multifamily Building Types

Low-rise Multifamily	<ul style="list-style-type: none"> • Three or more attached dwelling units with less than four habitable stories.
High-rise Multifamily	<ul style="list-style-type: none"> • Three or more attached dwelling units with four or more habitable stories. A mid-rise multifamily category is not defined separately from high-rise multifamily in Title 24 but it is generally accepted in the industry to refer to multifamily buildings of four to six stories.
Mixed-use Multifamily	<ul style="list-style-type: none"> • Three or more attached dwelling units as well as nonresidential spaces within one building envelope. Commercial spaces follow non-residential code; residential common area and corridors follow residential code unless they exceed 20 percent of total floor area.
Small Multifamily	<ul style="list-style-type: none"> • Three to eight attached dwelling units that are in the configuration of a single-family home, such as a Victorian house converted into apartments, to which single-family protocols can be applied on a case-by case basis.
Multifamily Central Systems	<ul style="list-style-type: none"> • Three or more attached dwelling units that share common water heating or space conditioning equipment.

In addition, the retrofit decision-making process and potential for improving the energy efficiency of these building types is further influenced by other factors, including whether the building is an affordable or market rate property, whether the units are rented or owned, and the type of utility metering and billing configurations in place (Figure 5).

Because multifamily building types are so diverse, it is highly challenging to develop program delivery models, incentive programs and consistent packages of building upgrade measures that meet the needs of every situation.

Figure 5. Factors Influencing the Multifamily Retrofit Decision-Making Process



Financing

A variety of incentives and financing options are available to property owners and developers interested in making green improvements to their buildings. In addition to conventional sources of multifamily and affordable housing retrofit financing, Energy Upgrade California will facilitate access to the following sources of technical assistance and funding to undertake green building improvements:

- Investor-owned utility energy efficiency and low-income programs
- Energy efficiency programs funded by the State Energy Program
- U.S. Department of Energy's Better Buildings Program
- Local government and private sector funding programs
- Federal and state housing programs⁹

Out of necessity, experienced multifamily housing owners and developers are adept at pulling together and layering myriad resources to complete a major construction, rehab or retrofit project. However, the decision to access incentive program resources is more complex for multifamily building owners than for single-family building owners. That's because:

- Construction in the multifamily and affordable housing industry is driven by multiple financing sources. These funding sources often have unique criteria that may limit the scope of a retrofit and supersede any requirements of an incentive program.
- Complex retrofit projects involve budgets ranging from tens of thousands to millions of dollars. For larger projects, it can take several years to line up capital. By the time a project is fully funded, design has advanced and opportunities to influence the scope are limited.
- Processes for permitting, insurance, general contractor and subcontractor arrangements, and ongoing building management bear more resemblance to the professionalized services in the commercial building sector than the single-family home sector.

The type of building ownership also has a direct impact on the economics of energy and green upgrades. As a recent report written by the Benningfield Group for the Energy Foundation explains,¹⁰ single-family homes "are typically built to sell," while multifamily buildings are built to be held and to produce income, or in the case of affordable housing, "to show a positive monthly cash position." The report makes clear that owners of these buildings are "very different groups with very different motivations, financial considerations, and costing horizons." Programs intended to incentivize developer/owners to upgrade their properties must take these differences into account.

Despite the complexity of multifamily retrofit financing and economics, the multifamily sector presents significant opportunities for green and energy efficiency programs because:

⁹ These include the California Tax Credit Allocation Committee (CTCAC), which administers federal and state low-income housing tax credit programs; California Debt Limit Allocation Committee (CDLAC), which allocates bond issuance authority to housing projects and programs; California Department of Housing and Community Development (HCD) programs; U.S. Department of Housing and Urban Development's (HUD) Green Retrofit Program (GRP) for multifamily housing; and U.S. Department of Energy's Weatherization Assistance Program (WAP) for low-income households.

¹⁰ Energy Foundation, op. cit.

- It is often more cost effective to perform efficiency upgrades on larger properties that have lower administrative and transaction costs per dwelling unit because of economies of scale.¹¹
- Major rehabilitation projects are common in the multifamily sector. These projects typically have large construction budgets and may involve everything from replacing finishes and fixtures to installing new building systems to reconfiguring dwelling units. It is cost effective and efficient to include energy efficiency upgrades at the time of these renovation projects.
- Standards and verification procedures developed by regulated retrofit incentive programs can provide quality assurance to financing sources that have green building criteria.
- Multifamily properties tend to be operated and maintained by professional building staff. Providing training and other resources to these people increases the odds that the building will be operated efficiently after energy upgrades are installed, and that persistent savings will be achieved.

To capitalize on these opportunities, it is important that the standards, verification and administrative requirements of newer energy funding programs be as complementary as possible with traditional sources of financing to help trigger more retrofit activities rather than creating barriers to participation.

Split Incentives

The multifamily sector provides a textbook case of the economic barrier often referred to as “split incentives.” When occupants pay their own energy and water bills, a multifamily building’s developer/owner has little incentive to invest in upgrades such as more efficient water heaters, higher levels of insulation or more efficient lighting. This obstacle to energy improvements is particularly acute in the affordable rental housing sector. In the cases where occupants pay their own utilities, tenants would greatly benefit from efficiency upgrades but may not have the authority (as non-owner occupants) or financial resources to carry them out.

As illustrated in Figure 6, among multifamily households, approximately 88 percent are renters. Household income in renter households is roughly half the income of households where the occupants own their home. Renters “pay a higher share of their monthly income for utilities, and yet they are less able to affect the efficiency of their homes,” according to the Energy Foundation/Benningfield Group report. Among low-income renters, the need for energy efficiency is particularly evident: nearly 20 percent of their monthly income goes to energy bills, compared to roughly 4 percent for the average household. For the more than 790,000 California households at or below 50 percent of the federal poverty level,¹² an average of 38 percent of their monthly income goes to paying utility bills.¹³

¹¹ A single-family program might deliver savings of approximately 2,000 kWh per home. A multifamily program might deliver savings of approximately 650 kWh per dwelling unit. Accordingly, a 100-unit multifamily building would deliver 65,000 kWh per program participant, hence increasing the energy savings per program transaction.

¹² U.S. Census Bureau.

¹³ U.S. Energy Information Administration, 2005.

Although there is a great need to address energy efficiency in the multifamily sector, the split incentive issue creates a barrier to progress. Appliances such as refrigerators and clothes washers and dryers, for example, are often owned by the building developer/owner, who has little economic incentive to upgrade them to more efficient models. This is particularly true in markets where vacancy rates are low and the owner doesn't have to compete for tenants. Even when renters own their appliances, they may not be able to afford to replace them since renter-household incomes are typically about half that of owner-household incomes (Figure 6).

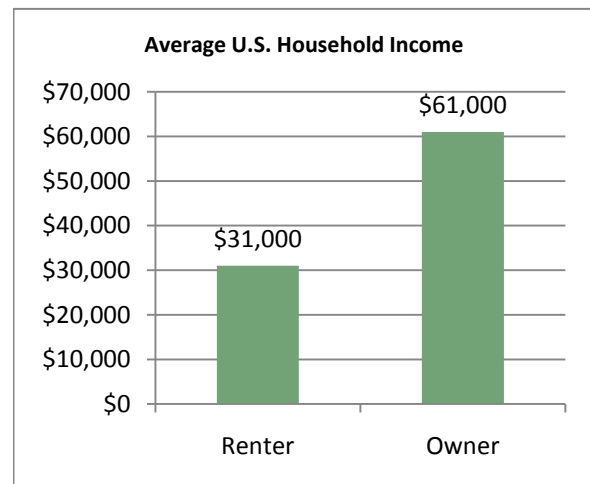
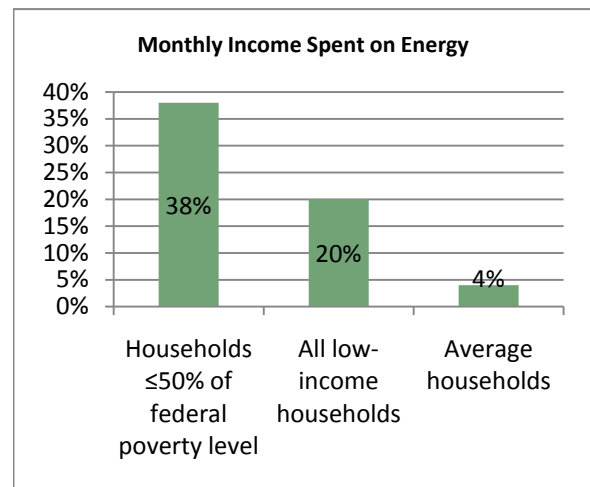
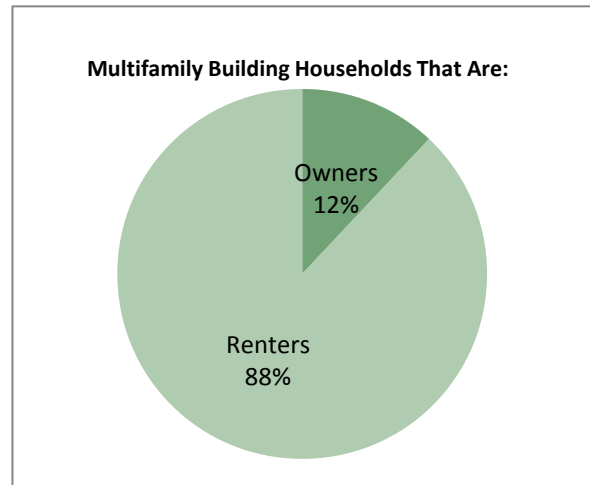
The predominance of central systems, particularly central water heating systems, in multifamily buildings often skews the split incentive: the developer might pay for central utility bills and therefore only be interested in upgrading the systems for which they will see a financial payback. This tends to make central system upgrades the "easiest sell" in a multifamily building upgrade. However, the opportunity associated with central systems is often offset by lack of a price signal to tenants, which in turn limits behavior-based conservation.

It is critical that retrofit programs involve residents, managers and landlords alike to take into account these energy-use differences in the multifamily sector, as well as the "disincentives" caused by split incentives. The more that residents are educated and engaged in the retrofit process, the more reductions in energy use will occur.

Trigger Events

There are many discrete economic, financial and even regulatory events that may prompt a developer/owner to upgrade a multifamily building. However, in general, there are a few specific points in a multifamily building's lifecycle when it is typically more cost effective, convenient and efficient to make green and energy improvements. To maximize effectiveness, retrofit tools, resources and incentives

Figure 6. U.S. Household Demographics



Sources: Energy Foundation, "U.S. Multifamily Energy Efficiency Potential by 2020," October 19, 2009, prepared by The Benningfield Group, Inc.; U.S. Energy Information Administration, 2005; U.S. Census Bureau.

need to be aligned with these “trigger events” so that developer/owners are motivated to incorporate energy efficiency and other green improvements into their overall upgrade plans.

Figure 7 lists the most common trigger events; all of these are excellent entry points for energy and green upgrade programs. The scope varies greatly depending on factors such as the age of the building, its condition, the type of occupancy, the history of previous improvements, and whether the building is an affordable or market rate property.

Figure 7. Events That Trigger Energy and Green Upgrades

Trigger Event	Scope of Upgrade
Tune-up/ Spruce-up	Ongoing maintenance of mechanical equipment or lower cost, easier-to-implement measures that spruce up a property at time of sale or purchase such as servicing mechanical equipment, repainting common areas, or making landscape and irrigation improvements.
Replacement	Replacement of specific central or individual equipment that is broken or aging, including water heaters, boilers, furnaces, air conditioners, appliances, lighting and irrigation systems.
Unit turnover	Unit-specific improvements made when occupants vacate. Upon vacancy, it is common practice to paint units, replace carpets, address moisture intrusion and other minor repairs, replace appliances, and make accessibility improvements.
Retrofit	Usually more limited in scope than a whole-building rehab, retrofits typically consist of a package of coordinated improvements designed to achieve a specific goal, such as seismic safety or energy efficiency.
Rehab	Building-wide overhaul may include remodeling common areas, upgrading structural elements, installing new electrical, plumbing and mechanical equipment, and more.

Current programs tend to recognize and capture savings from only one of these entry points—typically either replacement or full rehab. Because programs don’t focus on the full spectrum of entry points, owners will typically either carry out limited energy improvements that don’t optimize whole-building performance, or they postpone energy upgrades until they are ready for a full-building rehab, which may entail years of raising funds.

Retrofit programs that recognize these entry points and tailor their outreach and services to these opportunities will increase their likelihood of success.

Cost-Effective Energy Savings Measures

The approach to selecting energy savings measures is different for multifamily than other building types. Although there are opportunities (depending on the climate zone) to save space-conditioning energy, the shared wall geometry of dwelling units and reduced external surface area in multifamily buildings means that less heating and cooling energy is lost to the exterior. Therefore in multifamily buildings, less of the savings will come from building envelope and heating, ventilation and air conditioning (HVAC) measures, and more will come from water heating efficiency gains and appliances. The predominance of water heating as the primary energy use is exaggerated in coastal areas where there is little need for heating and cooling.

The single largest and most consistent opportunity in multifamily housing is reducing the energy consumed to heat domestic water, particularly when central systems are present. It is common for multifamily buildings to have central water heaters, typically gas appliances with a large distribution system and recirculation loop. Increasing the AFUE¹⁴ of the water heater, combining the water heater with solar pre-heat systems, and implementing distribution system strategies such as extra insulation, recirculation controls and high-efficiency recirculation pumps, represent significant opportunities for cost-effective savings. These savings are weighed against the limitations in hot water sub-metering of central systems.

The single largest and most consistent opportunity in multifamily housing is reducing the energy consumed to heat domestic water.

There are many other ways in which multifamily savings opportunities diverge from single-family opportunities. For example:

- Common area and garage lighting in multifamily properties can use significant amounts of energy.
- There are operational efficiencies associated with ongoing equipment commissioning and professional energy management in multifamily properties.
- Multifamily properties may have fairly extensive irrigation and lighting of the exterior landscape and site.
- Multifamily buildings often have limited room for installation of photovoltaic arrays.
- Compared to single-family homes, taller residential buildings have a smaller roof area relative to the overall building envelope area. As a result, measures such as attic insulation and radiant barriers will have less impact.
- Air infiltration to the exterior is less of an issue with multifamily buildings than is heat and air transfer between dwelling units, and between dwelling units and common areas.
- Multifamily properties often have common ventilation systems utilized to exhaust kitchens, bathrooms and laundry rooms. These can contribute substantially to energy use.

¹⁴ Annual fuel utilization efficiency (AFUE) is a measure of the thermal efficiency of combustion appliances such as gas-fired boilers, water heaters and furnaces.

- Cooking and refrigeration comprise a larger portion of the energy budget in multifamily homes. Appliances in single-family homes are almost always owned by the occupant, whereas in multifamily, appliance ownership is less common.
- Almost all single-family homes have a washer and dryer, while apartment buildings often have central laundry facilities or no on-premises laundry at all.

Each of these differences will impact energy efficiency decisions and need to be taken into account when designing retrofit programs and incentives and conducting outreach to multifamily property owners.

MF HERCC RECOMMENDATIONS FOR PROGRAM DESIGN AND IMPLEMENTATION

Since the beginning of 2010, the MF HERCC has focused on coordinating development of standards, professional qualifications, verification procedures, and energy savings quantification and tracking tools for the multifamily building upgrade sector. This report presents the subcommittee's recommendations and analysis in five specific areas:

1. Program delivery
2. Professional qualification and training
3. Prescriptive vs. performance whole-building approaches
4. Energy analysis software
5. Low-income and energy efficiency program access and coordination

1. Program Delivery

Recommendation

- a. *Use raters/verifiers and energy consultants to delivery multifamily incentive program services.*
- b. *Give developer/owners the flexibility to hire and manage the construction and verification team.*

Background and Analysis

Incentive programs that deliver energy and green upgrade services for single-family homes, as well as prescriptive-based programs for multifamily buildings, typically rely on pre-approved contractors. These contractors serve as the conduit for participating in the program and provide services such as diagnostics, verification and documentation. This contractor-list delivery approach, however, is unlikely to be successful for California's diverse and professionalized multifamily and affordable housing sector, for the reasons described below. Instead, the MF HERCC recommends a rater delivery model.

a. Rater Delivery Model

- **HERS has an established network of professional raters.** Using raters/verifiers and energy consultants to delivery multifamily incentive program services aligns with the HERS program model, which uses raters and energy consultants to prepare compliance documentation, conduct audits and diagnostics, and verify project installation. For new construction, the robust statewide HERS system has succeeded in building a large workforce of professional raters with expertise in building energy standards, auditing, energy analysis and diagnostic testing proficiency for both single-family homes and multifamily low-rise buildings. Given this well-established HERS network and protocols, it is practical and logical to continue to refine the HERS program to apply to multifamily retrofits and rehabs.

- **Existing multifamily programs already use successful rater/energy consultant models.** Performance-based incentive programs¹⁵ for multifamily building upgrades already successfully utilize a program delivery model in which an energy consultant or rater, not a contractor, is the primary conduit for these services.
- **Multifamily owners need to integrate incentives with multiple funding sources.** Since the developer/owner makes the purchasing decisions and is responsible for completing the project, it is important that the incentives and services go directly to the developer/owner so they can integrate them with the overall project financing.

b. Hiring Flexibility

- **Multifamily owners will resist being limited to program-approved contractors.** Given the market factors discussed in this report's Introduction, it is important that multifamily developer/owners not be limited to using contractors approved by the incentive program. Developer/owners tend to have relationships with general contractors and trade contractors they trust, which is very different from single-family homeowners who don't typically have a suite of construction professionals under contract to them. Structuring incentive programs to deliver verification services via an energy consultant/rater/verifier team rather than a contractor gives multifamily developer/owners the flexibility and control to include energy and green building experts among the multitude of professionals they will hire in the overall design and development process.

To streamline program delivery across regions and project types, the MF HERCC has already developed whole-building audit protocols for multifamily building upgrade programs in California. These baseline protocols are designed to be tailored to the needs of individual programs. Provided in the form of a template, the protocols describe best practices for conducting whole-house energy, water and green building audits of multifamily buildings. The document includes sample language that programs can use to create their own customized Audit Specifications or Audit Protocol document.

2. Professional Qualification and Training

Recommendations

- a. Focus on qualifications of rater/verifier and add specialized expertise to audit team based on scope of upgrade.*
- b. Develop targeted training curricula and require completion of training by participating raters/verifiers, building operators, central systems contractors and users of energy analysis software.*

¹⁵ Multifamily performance-based programs include the statewide ENERGY STAR for new construction program, the California Advanced Homes Partnership, California Multi-Family New Homes, the Green Point Rated Existing Home Multifamily Pilot Program and the (discontinued) statewide Designed for Comfort program.

Background and Analysis

a. Verification Team Qualifications

In the recommended rater-based program delivery model, the rater/verifier (may also be the energy consultant) will be required to have minimum qualifications as specified in Table 1. To meet the qualification requirements for specific tasks, the rater can assemble multidisciplinary teams consisting of internal employees or contracted partners with complementary skill sets. Raters will be responsible for ensuring that their personnel and any contractors assigned to perform services have the necessary qualifications, licensing, bonding, insurance, competence, skill sets and experience required to fulfill their respective responsibilities.

Table 1. Required Minimum Qualifications for Audit/Verification Team

	Task	Minimum Qualification
Required for all multifamily projects	Energy Modeling and Utility Data Analysis	<ul style="list-style-type: none"> ▪ California Home Energy Analyst ▪ California Association of Building Energy Consultants (CABEC) Certified Energy Plans Examiner (CEPE)
	Whole Building Energy Audit, Recommendations and Third-Party Verification	<ul style="list-style-type: none"> ▪ HERS II Rater (CA Whole-House Home Energy Rater) ▪ California Green Multifamily Retrofit Training
Required depending on scope	HVAC system efficiency and balancing (including duct testing)	California Field Verification and Diagnostic Testing Rater
	<ul style="list-style-type: none"> ▪ Central domestic water heating and distribution system efficiency ▪ Commissioning and retrocommissioning 	<ul style="list-style-type: none"> ▪ C-36 plumbing or C-4 boiler contractor license ▪ Multifamily Green Contractor Training
	<ul style="list-style-type: none"> ▪ Water, IAQ and resources measures ▪ Whole-building retrofits over time <ul style="list-style-type: none"> ○ EnergyPro MF Module: Improvement over baseline ○ Dwelling unit turn-over ▪ High-rise multifamily proxy to HERS II ▪ Central systems operational efficiency (BPI) 	GreenPoint Rated Existing Home Multifamily Rater
	Combustion appliance safety	BPI Analyst
	Feasibility of renewable energy installation	CSI Approved Contractor (C-46 Solar Contractor license)
	Energy audit and recommendations for non-residential spaces > 20% floor area	ASHRAE II Auditor
	Operations and maintenance	BPI Multifamily Building Operator or NAHMA Green Building Operator

b. Training

The recommended training consists of curricula targeted at four types of professionals who work on multifamily buildings: rater/verifiers, building operators, central water heating system contractors, and energy analysts. Each of these courses focuses on making sure that key professionals working on

multifamily building upgrades have the knowledge and expertise to make effective decisions about building improvements, program participation and ongoing operational savings.

Rater/Verifier Training

To help ensure that multifamily upgrade programs are robust and lead to energy savings that persist over time, California needs third-party raters/verifiers who:

- Are well-versed in program and incentive requirements
- Have expertise in evaluating multifamily buildings and developing appropriate scopes of work for energy and green improvements
- Are skilled in verifying the quality of the completed work, including conducting post-installation verification tests

Training currently offered in conjunction with the California Whole-House Home Energy Rating System (HERS II) program addresses some of these areas. To build a market of raters/verifiers specially qualified to evaluate multifamily building upgrades, the MF HERCC has supported the development of a new training curriculum. This curriculum builds on the current HERS II curriculum and supplements it by training participants to rate multifamily buildings in various upgrade scenarios from replacements to unit turnovers, retrofits and comprehensive rehabs. Topics include:

- Central system retrocommissioning
- Central domestic hot water (CDHW) controls
- Common area improvements (such as central system replacements)
- Tenant space improvements at unit turn-over
- High-rise multifamily protocols
- BPI operational efficiency and combustion safety protocols
- Water conservation
- Materials resource efficiency in rehabs
- Indoor air quality

The curriculum is intended to equip the multifamily rater with the broad range of skills necessary to act as the verification agent for various programs that provide incentives and financing to multifamily projects. To streamline delivery of the many upgrade programs available to multifamily building owners, the rater/verifier training should be coordinated with other available green upgrade programs. These include CPUC ratepayer-funded programs, the U.S. Department of Housing and Urban Development's Green Retrofit Program (GRP) and Weatherization Assistance Program (WAP), Enterprise Green Communities, GreenPoint Rated, and Residential Energy Conservation Ordinances (RECO) and Commercial Energy Conservation Ordinances (CECO).

Property Management Staff and Building Operator Training

Because multifamily buildings have professional management and operations staff, training them in green operations and management will likely result in some persistence of conservation-based savings.

For this training, the MF HERCC recommends the Building Performance Institute (BPI) existing Multifamily Building Operator training.¹⁶ The training includes technical content on:

- Energy-efficient building systems operations
- Concepts that would be included in any retrofit project's customized green building maintenance manuals
- Green product specifications
- Access to bulk procurement of ENERGY STAR equipment and green materials to bring down the cost premiums
- Materials they can use to educate residents about the building's green features and access to resident-oriented upgrade rebates (such as for compact fluorescent light bulbs, faucet aerators and appliance upgrades)
- Available incentive programs, particularly those applicable to trigger events such as unit turnover or equipment replacement (for example, IOU prescriptive rebate programs for refrigerators or other appliances or technologies owned by the resident)

Multifamily Central Water Heating Systems and Combustion Safety Training

Because of the sheer number of specialized subcontractors on any given comprehensive multifamily rehab project, it does not make sense to require a single contractor certification for all contractors and sub-trades. Rather, it will be more effective to target very specific professional training at the sub-trade that has the greatest potential for delivering efficiency improvements: contractors who work on water heating systems in multifamily buildings. As discussed earlier, in multifamily buildings, water heating systems account for a much higher portion of energy consumption compared to single-family buildings.

These contractors, who have C-4 boiler contractor or a C-36 plumbing contractor license, maintain and install centralized residential and commercial-sector energy-consuming equipment for water heating and space heating and cooling. Specialized training will give these contractors the expertise needed to optimize the specifications and operations of these systems.

This training would focus less on the verification methods and more on the efficiency gains to be made to conventional construction and operation practices. This training also includes combustion safety measures, and could incorporate retro-commissioning.

Energy Analysis Software Training

To help ensure that energy consultants have the capability to properly analyze multifamily buildings, a specialized curriculum should be developed that includes advanced training in multifamily-specific topics not included in the core HERS II trainings, energy analysis training or in the training required to become a Certified Energy Plans Examiner (CEPE) or Certified Energy Analyst (CEA). This advanced Multifamily Energy Consultant Curriculum would include instruction in the use of the California Utility Allowance

¹⁶ Longer term training plans should investigate coordination with other related training programs, such as Building Operator Certification (BOC) and National Affordable Housing Management Association (NAHMA) training programs.

Calculator, Energy Pro's GreenPoint Rated and high-rise Multifamily HERS II Modules, and supplemental operational energy auditing software (Treat and EA-QUIP).

3. Prescriptive vs. Performance Whole-Building Approaches

Recommendations

- a. Offer funding programs based on a whole-building performance approach for multifamily energy efficiency improvements, rather than a prescriptive approach. This performance approach should be based on Title 24 Part 6 and HERS II protocols for multifamily residential buildings that consider the energy end-uses of heating, cooling, water heating (including solar pre-heat), appliances and lighting.*
- b. Require a minimum of 10 percent energy efficiency performance improvement for all projects, with additional improvement targets for projects to reach 15 percent improvement and 20 percent improvement.*
- c. Provide utility-funded incentives for the whole-building performance approach to stimulate demand for comprehensive energy upgrades.*

Background and Analysis

a. Performance Approach Based on Title 24 Part 6 and HERS II Protocols

For multifamily whole-building programs, the MF HERCC recommends a performance approach to energy savings analysis and the selection and funding of upgrades. This recommendation means that emerging whole-building programs should offer a performance-based approach but multifamily building developer/owners and tenants should still have access to prescriptive incentives for change-out of individual pieces of equipment.

Single-family upgrade programs have traditionally taken a prescriptive approach, allowing for specific, clearly defined packages of improvements to be made to participating buildings as an option in parallel to the whole-building performance approach. This prescriptive path is seen as a “ramp-up” for increasing workforce capacity. After extensive analysis, the MF HERCC has concluded that a whole-building prescriptive approach is not feasible as a primary tactic for the multifamily sector. Because of the diversity of building types, system types and other factors discussed earlier that distinguish multifamily buildings from the single-family residential sector, a comprehensive statewide prescriptive approach to multifamily whole-building upgrades would require 16 or more distinct packages of measures.¹⁷ This would likely create a huge administrative burden, confuse the market and drive up program costs.

A performance approach to whole-building improvements is well-suited to the multifamily sector, which is more professionalized than the single-family residential sector. Multifamily developer/owners are

¹⁷ Sixteen packages would cover the variables of inland vs. coastal (cooling or no cooling) strategies, central vs. individual mechanical systems, and high-rise vs. low-rise building types. This number of packages would not take into account building-specific variables, ownership types or nuances among the 16 climate zones. If a prescriptive whole-building package per climate zone were developed, it would require four packages per climate zone, resulting in 64 packages statewide.

likely to have the motivation and resources to undertake a more sophisticated analysis to target the best investment of available funds to serve the unique energy savings needs of their project.

The MF HERCC further recommends that the performance approach be based on Title 24 Part 6 and HERS II protocols for residential buildings. These protocols consider the energy end-uses of heating, cooling, water heating, appliances and lighting. The protocols also include renewable energy such as solar photovoltaics and solar domestic hot water (although solar hot water is already part of the Title 24 Part 6 performance calculation, photovoltaics is not). The HERS II methodology for multifamily buildings is being piloted by the GreenPoint Rated Existing Home Multifamily¹⁸ program, building on the protocols of the performance-based Designed for Comfort program.

b. Performance Improvement Targets by Building Vintage

Many statewide policy objectives cite the California Public Utility Commission's (CPUC) strategic plan, which has set a goal of reducing energy consumption in existing homes by 20 percent by 2015 and 40 percent by 2020. In accordance with these policy objectives, a 20 percent performance improvement might at first glance seem to be the initial target to require of project upgrades. A subset of the MF HERCC members¹⁹ analyzed what it would mean to achieve a range of performance-based energy improvement targets for various multifamily building types. This analysis suggests another approach: while a 20 percent minimum savings target would exclude upgrades to be undertaken in newer buildings, a 15 percent or 10 percent improvement might be feasible for newer buildings that are already reasonably efficient. This analysis establishes feasible minimum energy savings targets for buildings based on the year they were built. This feasibility analysis is described below.

The consultant team developed baseline models of three prototype multifamily buildings: a 4-unit low-rise, a 40-unit low-rise, and an 80-unit high-rise. These were then modeled in Title 24 Part 6 code compliance/HERS II software to demonstrate measures necessary to achieve 20 percent and 40 percent energy performance improvements. The modeling was done for each of the 16 California climate zones with both central and individual domestic hot water systems and with both gas and electric heating systems. From this analysis it was determined that:

- 10 percent energy improvement was feasible across the board for all building types, system types, vintages and climate zones.
- 20 percent improvement required upgrades to both windows and wall insulation in many climate zones.

¹⁸ The Energy Foundation and StopWaste.Org are jointly funding the development of a third-party rating system for multifamily retrofits as an extension of Build It Green's GreenPoint Rated program. As of August 30, 2010, approximately 500 pilot multifamily dwelling units have been constructed meeting GreenPoint Rated Existing Multifamily pilot program criteria including required energy reduction targets according to HERS II methodology.

¹⁹ StopWaste.Org (project lead), Douglas Beaman & Associates (lead HERS II analysis), Heschong Mahone Group, Inc. (prototype development based upon Designed for Comfort projects), Nehemiah Stone (central water heating tune-up measures), Energy Soft (code compliance software baselines and improvements), California Energy Commission (HERS II direction), and various third-party HERS and GreenPoint Raters (pilot project energy measures verification, Title 24 documentation created and submitted to Doug Beaman for HERS II conversion).

- Older buildings and buildings with deferred maintenance will have many measure upgrade options for achieving a minimum 20 percent energy improvement target and are therefore the most likely program participants. However, programs should not be structured to exclude the portion of the building stock that has already undertaken some improvements and therefore might not achieve a 20 percent improvement in the current program enrollment.
- 40 percent improvement is often not possible to achieve in coastal climate zones without the use of solar pre-heat for domestic water heating.

For each of the prototype buildings analyzed, the following minimum targets for performance improvement were determined to be feasible (see Table 2). The MF HERCC recommends using these as baseline assumptions when designing multifamily energy upgrade programs.

Table 2. Feasible Performance Improvement Targets

Building Vintage	Minimum % improvement	Baseline
Pre-1980 (pre-Title 24)	20%	CEC default (statewide average data)
1980–2000	15%	CEC default (statewide average data)
2001–2008	10%	Code compliance (detailed energy performance data by climate zone)

California’s Building Energy Efficiency Standards (Title 24) were established in 1978, so it is reasonable to assume that by 1980 they had taken effect and were being enforced. Buildings built before the code took effect represent the greatest opportunity for percent improvement over baseline. In this case, the baseline used for modeling improvement is based on average statewide data provided by the California Energy Commission (CEC).

In 2001, Title 24’s energy efficiency requirements became much more stringent than they had been. As a result, buildings constructed from 2001 to 2008 will have fewer opportunities for improving energy performance, hence the lower recommended target of 10 percent. Buildings built in the two decades between 1980 and 2000 were not required to be as energy efficient as more recent buildings, and thus are targeted for a 15 percent level of improvement.

Cost/Benefit Analysis of Performance Improvement Targets

What will it cost multifamily developer/owners to achieve these levels of performance improvement? To answer that question, the team analyzed a variety of scenarios, looking at the costs of various energy-saving measures in different building types and climate zones.

The Appendix includes tables showing the results of some of these scenarios. These tables serve to illustrate typical measures that might be used to achieve the performance targets for different types of

buildings in different climate zones with different water heating systems. These tables are merely examples and should not be construed as recommendations for specific packages of measures.

What follows is a summary of these illustrative examples; refer to the Appendix for details. (Note that these costs are construction-related expenses only and do not include any administrative costs, energy analyst costs, or other ancillary costs).

- **For a 40-unit low-rise building built before 1980**, achieving a 20 percent performance improvement might include improving the attic and wall insulation, replacing windows and sealing ducts. The estimated cost would be \$2,861 per dwelling unit, with a straight line payback ranging from 5.2 years to 14.3 years, depending on the climate zone.
- **For the same prototype building built between 1980 and 2000**, achieving a 15 percent performance improvement might include improving attic insulation, sealing and insulating ducts, verifying refrigerant charge, and replacing air conditioners and water heaters. The cost per dwelling unit is estimated at \$3,117, with a payback ranging from 6.6 years to 9.9 years, depending on climate zone.
- **For the same prototype building built between 2001 and 2008**, achieving a 10 percent performance improvement might include improving attic insulation, verifying refrigerant charge, sealing and insulating ducts, and replacing water heaters for an estimated cost of \$1,970 per dwelling unit and a payback ranging from 9.5 to 19.1 years.

As discussed below, stimulating demand for these improvements will require appropriately structured incentive programs.

c. Incentives

Current incentive programs for multifamily buildings are not typically attractive enough to motivate building developer/owners to undertake costly and complex retrofit projects. Instead, these incentive programs are structured to “piggyback” onto the owner’s existing substantial retrofit budget. The incentive amount may be enough to partially offset the cost of higher efficiency equipment, for example, but is typically not enough to be the deciding factor for whether to undertake the retrofit project. As an added complication, it can take years for owners to assemble financing for complex retrofit projects that include energy upgrades; in the meantime, energy savings opportunities are lost.

Although this report does not provide recommendations for specific incentive levels, the MF HERCC does recommend offering:

- Utility-funded rebates and technical assistance based on a Title 24/ HERS II performance approach requiring a minimum of 10 percent to 20 percent energy savings depending on the vintage of building.
- Utility-funded rebates in combination with technical assistance, professional training and marketing benefits. Table 3 shows an example multifamily incentive package. This comprehensive approach to incentivizing improvements is utilized by the well-established multifamily programs offered by the New York State Research and Development Authority (NYSERDA).

Table 3. Example Package of Incentives for Multifamily Developers/Owners

Type of Incentive	Function of Incentive
Cash rebates for meeting performance targets	Offset or cover hard cost of installed upgrade measures
Added cash incentives (“kickers”)	Encourage exceptional performance well beyond the program goals; encourage comprehensive third-party verified green building program certification
Rater verification rebate	Offset cost to developer of hiring rater/verifier
Energy consultant rebate	Offset cost to developer of hiring energy consultant
Technical assistance	Help owners meet program requirements and align energy compliance documentation with other funding sources
Building operator training	Provide free or discounted building operator training to improve developer/owner’s ability to operate buildings efficiently
Marketing assistance	Assist developer/owner with promoting energy efficiency efforts through benefits such as labeling programs, awards, publicity opportunities and collateral material

4. Energy Analysis Software

Recommendations

- a. Use code compliance software as the standard baseline reference for energy savings reporting in ARRA or utility funded programs.*
- b. Use supplemental software programs where necessary to optimize analysis of energy savings opportunities.*
- c. Apply CEC HERS II type residential multifamily low-rise protocols to high-rise multifamily in the code compliance software.*
- d. Align funding programs' use of various software platforms for compliance to reduce administrative barriers to program participation.*

Background and Analysis

a. Code Compliance Software and HERS II

For energy code, incentive or green building program compliance in California, the performance approach to energy savings documentation most commonly utilizes Title 24 Part 6 energy code compliance software. The calculation rules used with the software are defined in the Alternative Calculations Method (ACM) manual.

Code compliance software programs, which are often referred to as ACM software, are limited to measures that can be shown to have cost-effective savings in Title 24; these programs do not include any kind of operational savings that can be calculated using other energy auditing performance

software. Despite this, it is preferable to use the ACM software programs as the common platform in multifamily retrofit programs because:

- They are standardized statewide and include the various baselines, assumptions, and time dependent valuation (TDV) consistent with the energy code for new construction.
- There is a large workforce of professionals who are proficient with these programs.
- Projects are required by state law to utilize them for building permit purposes; requiring another program would be redundant and add cost to the design process.

The HERS II program has a special module built into the ACM software, as well as integrated to the HERS provider's registries. This module allows the user to:

- Compare multiple runs (several proposed improvement package options) against existing conditions (baseline) and receive a building performance score relative to Net Zero Energy.
- Create a summary report of resulting energy savings in therm, kWh and kW for baseline versus options (proposed) using California TDV methodology.
- Integrate the proposed measures with the statewide system established for measure installation verification.

The HERS II software is currently being improved to:

- Better allocate savings from residential appliances and lighting to multifamily projects (the software's original algorithms were based on single-family assumptions);
- Treat high-rise multifamily similarly to low-rise multifamily; and
- Compare building improvements not only to existing conditions but also to Title 24 Part 6 (benchmark)/CEC vintage defaults. This will enable the energy analyst to account for improvements made to a building over the life of the structure.

Longer term plans to improve HERS II software for multifamily that will require a Title 24 Part 6 code change process for adoption include:

- Modeling and savings estimates for central domestic hot water (CDHW) recirculation controls (time-clock, temperature modulation controls and demand controls).
- Modeling and savings estimates for ventilation in high-rise multifamily buildings.

b. Supplemental Energy Auditing Software

While it is ideal for California retrofit programs to require energy analysis and reporting in standardized software programs, there are benefits to using other programs that might do a better job of analyzing operational energy improvements associated with building commissioning, maintenance, adding controls, optimizing daylight and other measures. Unlike EnergyPro, which is a software program commonly used for Title 24 Part 6 code compliance, other software programs such as TREAT and EA-QUIP are specifically designed to handle energy auditing. One of the primary benefits of TREAT and similar programs is that the building model can be made more accurate by using actual billing data.

c. Software for High-rise Buildings

Currently, the HERS II compliance software addresses low-rise but not high-rise multifamily buildings. The MF HERCC recommends that the HERS II version of the compliance software be modified to apply also to high-rise multifamily buildings. This improvement in the software will allow the HERS II report to show the non-residential and residential end-use calculations embedded in the code assumptions for high-rise buildings all in one performance calculation.

d. Software Required by Funding Programs

As discussed in the Introduction to this report, to carry out complex building construction or improvement projects, multifamily developers/owners typically have to access funding from a variety of sources. Currently, many of these funding programs require developers to use different compliance software. If an owner is pursuing multiple sources of funding, it is expensive and inefficient to have to produce multiple models and compliance reports using different software for the same building.

For example, there are a number of software programs, including TREAT, that the U.S. Department of Energy has approved for use by weatherization programs. In California, implementation entities require multifamily projects to use these DOE-approved programs. As a result, multifamily projects often have to undergo energy analysis in multiple software programs to meet the requirements of code compliance, utility incentive programs and Weatherization Assistance Programs (WAP).

Coordinating the software compliance requirements of these funding sources will eliminate barriers to participating in utility, WAP and other building upgrade programs.

5. Low-Income and Energy Efficiency Program Access and Coordination

Recommendations

- a. Coordinate and integrate energy efficiency retrofit and weatherization programs serving the low-income sector by developing consistent program requirements, standards and audit protocols; modifying program structures to provide more flexibility for multifamily building owners; and supplementing prescriptive approaches with whole-building performance approaches.*
- b. Improve access to low-income energy efficiency programs for multifamily properties by streamlining eligibility procedures and providing “fair-share” allocation of funding.*

Background and Analysis

For the multifamily housing sector, one of the major barriers to upgrading a building’s energy performance is the plethora of sometimes confusing and often overlapping program requirements, incentives, financing sources, protocols and compliance software requirements. While this situation is a challenge for market-rate developers, it is even more challenging for developer/owners of income-restricted properties, who face additional complicated program and funding requirements. In addition, CPUC ratepayer-funded low-income energy efficiency (LIEE) programs and DOE/HUD funded Weatherization Assistance Programs (WAP) utilize a single-family program delivery model and have other barriers that make them inaccessible to multifamily properties.

As a result of these factors, less than 1 percent of the more than 90,000 low-income apartments in California have benefitted from energy retrofit programs.²⁰ To reduce barriers to participation, improved access to these programs and coordination of their requirements is essential.

a. Coordination and Integration

Low-income program services are not coordinated with other energy efficiency programs, incentives or rebates, making it difficult for owners to maximize benefits and energy efficiency opportunities. This lack of consistency between requirements in low-income and energy efficiency programs holds true when speaking in the broader sense of low-income programs (for example, affordable housing financing through TCAC, HUD, CDLAC or HCD that requires energy efficiency and sustainable practices) as well as the energy-specific programs within the CPUC-funded Low-Income Energy Efficiency (LIEE) and DOE/HUD-funded Weatherization Assistance program (WAP).

For the developer/owner, it is difficult to decipher which programs they are eligible for, what the various compliance and verification requirements are, and whether it is worthwhile to piece together multiple prescriptive programs to undertake a comprehensive building rehab. While there is significant funding in low-income programs, owner/developers of affordable multifamily rental housing who attempt to participate in LIEE and WAP programs confront many barriers. The following strategies would substantially minimize those barriers:

- **Coordinate delivery of energy efficiency and weatherization programs.** Program implementers oriented toward single-family homes often assume that their programs work equally well for multifamily buildings. However, as discussed in Sections 1 and 2 above, their delivery mechanisms and protocols are designed for single-family homeowners and are not appropriate for the developer/owner who provides housing for tenants. In addition, low-income and weatherization programs each have their own unique service delivery structure. Unless, for example, a provider for the weatherization assistance program is the same provider for a utility low-income energy efficiency program, energy services cannot be leveraged or combined without utilizing a separate set of contractors. For multifamily properties, this fragmentation can be addressed by empowering the multifamily owner to carry out the approved scope of work by hiring and managing qualified contractors, with concurrence or approval from the program providers.
- **Adopt whole-building performance approaches.** Implementers of some low-income programs for single-family, energy efficiency and weatherization programs have typically limited the range of measures available to multifamily properties. This prescriptive-list approach constrains the scope of work undertaken by property owners and residents, and often misses opportunities to make substantive improvements to central heating, cooling and hot water systems and other building elements contributing to energy use. A whole-building performance-based approach, as described in Section 3 above, would expand the scope of the improvement and contribute to greater resource leveraging.

²⁰ Green Rental Home Energy Efficiency Network, convened by California Housing Partnership Corporation, “Energy Efficiency in Multifamily Buildings: Problem Statement and Proposed Resolutions,” September 28, 2010.

- **Adopt consistent energy audit protocols.** Multifamily energy efficiency and weatherization programs use different energy auditing and assessment protocols for determining the range of allowable investment. The federal Weatherization Assistance Program relies on TREAT or EA-QUIP, which is markedly different than the energy analysis requirements under Title 24 Part 6 or those used by other energy retrofit programs. Allowing cross-use of the auditing tools and protocols would enable greater integration and leveraging.

b. Improved access

Because most low-income energy efficiency and weatherization programs were originally designed to serve single-family homeowners, certain program requirements or restrictions make it difficult if not impossible for multifamily properties to participate. The following strategies will improve access for multifamily properties:

- **Streamline eligibility procedures.** Low-income energy efficiency and weatherization programs require individual households to complete applications for energy efficiency improvements and assistance. These programs also require each household to individually agree to participate and individually allow access, even though lease agreements usually give building owners/managers the right to authorize such work. This process impedes participation by low-income properties. Allowing property owners to apply for and authorize energy improvements on behalf of low-income households would reduce barriers to reaching this market segment and enable whole-property energy retrofit approaches. For regulated affordable housing properties, this process can be further streamlined by permitting households to be qualified for the program based on certified income records maintained by the property owner pursuant to state or federal regulations.
- **Provide “fair share” allocation for multifamily programs.** Affordable multifamily properties are underserved by existing energy efficiency and weatherization programs. The limited and fragmented nature of energy funding for this market has constrained the development of whole-property performance-based approaches. Targeted funding would enable the development of models needed to bring energy retrofits to scale.

CONCLUSION

In California, policies and programs for energy and green building improvements have traditionally treated multifamily buildings as a subset of the single-family residential or commercial building sector. Tremendous energy savings opportunities have been overlooked because these policies and programs have not adequately recognized the unique infrastructure and market realities of the multifamily building sector.

The MF HERCC's work has brought to light the importance of tailoring energy and green retrofit policies and programs to the specific market opportunities and challenges faced by the multifamily sector. By adopting the recommendations in this report, energy and green upgrade programs can more quickly and effectively deliver their services and achieve their goals of energy savings, greenhouse gas emissions reduction and job creation.

ACKNOWLEDGMENTS

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REFERENCE STANDARDS

The following standards comprise a basis for reference in multifamily retrofit programs:

- ASHRAE, Commercial Building Audit Standards (2004)
- Building Performance Institute, Inc., *Technical Standards for Multifamily Building Analysts* (2008)
- California Energy Commission, "Energy Efficiency Standards for Residential and Nonresidential Buildings" (Title 24–2008)
- California Energy Commission, *HERS Technical Manual* (2008)
- City of Berkeley, "Money For Energy Efficiency Audit Standard"
- Enterprise, Low-Income Investment Fund (LIIF) & SF Mayor's Office of Housing, "San Francisco Bay Area Affordable Multifamily Retrofit Initiative Audit Protocol"
- GreenPoint Rated Existing Home Multifamily program
- RESNET, *RESNET Standards*, Chapter Seven, Comprehensive Home Energy Audit
- U.S. Department of Housing and Urban Development, *Energy Conservation for Housing—A Workbook* (1998)

APPENDIX A: Cost/Benefit Analysis for a 40-unit Low-rise Prototype

The tables below illustrate the cost/benefit analysis process described in the Recommendations section of this report. The cost/benefit analysis is shown for a 40-unit low-rise prototype in representative climate zones 3, 8, 10 and 12. These tables are not recommendations for specific packages of measures; rather, they are merely examples intended to demonstrate the types of measures—and their associated costs—that might be used to achieve a certain performance target for a specific building type, vintage and climate zones.

Table A- 1. Pre-code Baseline
Example measures to achieve at least 20% energy savings across climate zones

Energy Efficiency Measures Used in Calculations			DEER Cost Data unless noted			
Measure	Baseline	Improved	Material	Labor	Total/DU	
Attic Insulation	R-11	R-38	0.75/s.f.	0.61/s.f.	\$478	Total Cost for building divided by 40
Wall Insulation	SEER 8.9	SEER 13.0	0.32/s.f.	0.62/s.f.	\$263	
Window Replacement	Single Pane Metal Frame	Dual Pane Vinyl Frame	16.00/s.f.	5.70/s.f.	\$1,622	
Seal Duct Leakage	28%	15%	\$56/DU	\$442/DU	\$498	
Estimated Material & Installation Cost			Total		\$2,861	

CZ	Estimated Improvements Summary				First Year Savings		Estimated Installation Cost	Straight Line Payback (yrs)
		HERS Index	kWh	Therm	Total	Per Dwelling		
3	Vintage Baseline	154	138,121	13,530	\$73,567			
	Improved House	127	129,243	10,020	\$65,572			
	Savings		8,878	3,510	\$7,995	\$199.88	\$2,861	14.3
	Percent Improvement	17.5%	6.4%	25.9%	10.9%			
8	Vintage Baseline	174	166,072	10,403	\$82,349			
	Improved House	142	144,347	8,939	\$71,021			
	Savings		21,725	1,464	\$11,328	\$283.20	\$2,861	10.1
	Percent Improvement	18.4%	13.1%	14.1%	13.8%			
10	Vintage Baseline	214	208,770	11,321	\$102,461			
	Improved House	163	169,236	9,191	\$82,351			
	Savings		39,534	2,130	\$20,110	\$502.75	\$2,861	5.7
	Percent Improvement	23.8%	18.9%	18.8%	19.6%			
12	Vintage Baseline	229	194,862	15,597	\$101,119			
	Improved House	164	156,889	11,118	\$79,103			
	Savings		37,973	4,479	\$22,016	\$550.40	\$2,861	5.2
	Percent Improvement	28.4%	19.5%	28.7%	21.8%			

Table A- 2. 1980-2000 Code Baseline
Example measures to achieve at least 15% energy savings across climate zones

Energy Efficiency Measures Used in Calculations			DEER Cost Data unless noted				
Measure	Baseline	Improved	Material	Labor	Total/DU		
Attic Insulation	R-19 or R-30	R-38	0.4/s.f.	0.45/s.f.	\$300	Total Cost for building divided by 40	
Duct Leakage	28%	15%	\$56	\$442	\$498		
Refrigerant Charge	Standard	Verified	\$12/ton	\$37/ton	\$72	1.5 ton AC system	
Replace A/C system	SEER 8.9	SEER 13.0	\$12/ton	\$37/ton	\$72		
Duct Insulation	R-4.2 or R-2.1	R-8	\$612/ton	\$448/ton	\$1,590	Cost Estimated	
Water Heater	EF .52	EF .62	\$550	\$200	\$750		
Indoor Lights	Incandescent	CFL	\$25	\$0	\$25		
Outdoor Lights	Incandescent	CFL & Sensor	\$10	\$100	\$110		
Estimated Material & Installation Cost			Total			\$3,117	

CZ		HERS Index	kWh	Therm	First Year Savings		Estimated Installation Cost	Straight Line Payback (yrs)
					Total	Per Dwelling unit		
3	Vintage Baseline	133	134,399	10,670	\$67,280			
	Improved House	110	107	9,024	\$54,722			
	Savings		134,292	1,646	\$12,558	\$313.95	\$3,117	9.9
	Percent Improvement	17.3%	99.9%	15.4%	18.7%			
8	Vintage Baseline	151	151,230	9,188	\$74,362			
	Improved House	119	119,141	7,520	\$58,203			
	Savings		32,089	1,668	\$16,159	\$403.98	\$3,117	7.7
	Percent Improvement	21.2%	21.2%	18.2%	21.7%			
10	Vintage Baseline	180	182,592	9,621	\$88,771			
	Improved House	143	142,996	7,917	\$69,241			
	Savings		39,596	1,704	\$19,530	\$488.25	\$3,117	6.4
	Percent Improvement	20.6%	21.7%	17.7%	22.0%			
12	Vintage Baseline	184	169,778	12,069	\$85,917			
	Improved House	149	132	9,935	\$67,002			
	Savings		169,646	2,134	\$18,915	\$472.88	\$3,117	6.6
	Percent Improvement	19.0%	99.9%	17.7%	22.0%			

Table A- 3. 2001-2008 Code Baseline
Example measures that will achieve at least 10% energy savings across climate zones

Energy Efficiency Measures Used in Calculations			DEER Cost Data unless noted			
Measure	Baseline	Improved	Material	Labor	Total/DU	
Attic Insulation	R-30	R-38	0.40/s.f.	0.45/s.f.	\$300	Total Cost for building divided by 40
Refrigerant Charge	Standard	Verified	\$12/ton	\$37/ton	\$72	1.5 ton AC system
Seal Duct Leakage	28%	15%	\$56/DU	\$442/DU	\$498	
Duct Insulation	R-2.1	R-8			\$350	Estimated Cost
Water Heater	EF .575	EF .62	\$550	\$200	\$750	
Estimated Material & Installation Cost				Total	\$1,970	

Estimated Improvements Summary					First Year Savings		Estimated Installation Cost	Straight Line Payback (yrs)
CZ		HERS Index	kWh	Therm	Total	Per Dwelling		
3	Vintage Baseline	125	131,044	9,407	\$66,838			
	Improved House	116	124,151	8,486	\$62,717			
	Savings		6,893	921	\$4,121	\$103.03	\$1,970	19.1
	Percent Improvement	7.2%	5.3%	9.8%	6.2%			
8	Vintage Baseline	144	150,527	8,071	\$73,934			
	Improved House	130	139,091	7,321	\$67,995			
	Savings		11,436	750	\$5,939	\$148.48	\$1,970	13.3
	Percent Improvement	9.7%	7.6%	9.3%	8.0%			
10	Vintage Baseline	172	180,983	8,442	\$87,870			
	Improved House	152	163,665	7,918	\$79,237			
	Savings		17,318	524	\$8,633	\$215.83	\$1,970	9.1
	Percent Improvement	11.6%	9.6%	6.2%	9.8%			
12	Vintage Baseline	175	168,413	10,733	\$84,943			
	Improved House	155	152,763	9,567	\$76,655			
	Savings		15,650	1,166	\$8,288	\$207.20	\$1,970	9.5
	Percent Improvement	11.4%	9.3%	10.9%	9.8%			

APPENDIX B: Investor-Owned Utility Programs Available for the Multifamily Sector

The following table is a draft list of investor-owned utility programs available for the multifamily sector.

Type	Program	Target Audience	Offering	Eligibility	Application Requirements	Target # Units (2010-2012)	Program Budget (2010-2012)	Program Websites
STATEWIDE RESIDENTIAL	Low Income Energy Efficiency (LIEE) Program	Low income households ¹	No-cost energy efficiency and appliance repair and replacement measures. Most measures available to single family are available to MF units as long as occupants are income qualified and building owner/property manager has consented to the work.	Tenants are eligible with approval of property owner or manager. In program year 2009 MF dwellings accounted for 27% of total LIEE project work. Entire complexes can also be verified based on the 80-20 rule.	Income must be verified by service provider and each participant must sign an application. Utility verified CARE recipients are automatically eligible though still require independent income verification.	Total: 747,054 PG&E: 249,982 SCE: 166,890 SCG: 289,414 SDG&E: 40,768	PY2010: \$310,685,254 PY2011: \$318,786,772 (LIEE program budget cycle is from 2009-2011; only figures for applicable years are listed.)	www.socalgas.com/residential/assistance www.sdge.com/residential/assistance/energyTeam.shtml www.pge.com/energypartnerswww.sce.com/residential/income-qualified/ema/energy-management-assistance.htm
	California Advanced Home Program (CAHP)	Developers/builders for new construction and significant remodel	Performance based incentives starting at \$0.18/kWh, \$0.73/therm, and \$27.63/kW at 15% > Title 24, with incentive caps at 45% > Title 24. \$100 unit base incentive. PV kicker; additional incentives for compact and green certified homes. Design and technical assistance provided.	New MF construction and performance-based "gut and remodel" of existing MF structures. New construction, affordable, and market-rate MF complexes of three dwelling units or more.	Projects can apply any time between 1/1/2010 and 12/15/2012, prior to project completion (defined as prior to drywall installation). Applying early in design phase is highly recommended. Project applications should be submitted six months prior to any financing applications. Recommended project documents for submittal include a letter of intent, building plans, lot plan, application form, Title 24 checklist and other Title 24 documentation, and other energy efficiency documentation.	No specific unit goal for the multifamily segment.	\$51,383,787 total PG&E: \$13,521,688; SCE: \$24,894,000; SDG&E: \$4,398,013; SCG: \$8,570,086	www.pge.com/newhomes www.CaliforniaAdvancedHomes.com www.sce.com/builder www.sdge.com/builderservices/newHomes.shtml

¹ Household income less than 200% of federal poverty level. Multifamily is defined as 5 or more units.

Type	Program	Target Audience	Offering	Eligibility	Application Requirements	Target # Units (2010-2012)	Program Budget (2010-2012)	Program Websites
STATEWIDE RESIDENTIAL	Energy Upgrade California	MF complex owners/managers of existing buildings	Single family: performance incentives up to \$4,000 for installation of measures reducing energy use by 20%; prescriptive incentives up to \$1,000 for installation of basic package of measures. ² MF incentive packages currently under development.	Existing buildings, major energy efficiency upgrades.	Application available on Energy Upgrade California website.	No specific target for MF	Currently only available for single family dwellings; incentives aimed at MF market expected in 2011.	www.sdge.com/energyupgrade www.sce.com/residential/rebates-savings www.socalgas.com/rebates/residential PG&E website to be determined.
	Multifamily Energy Efficiency Rebate Program	MF complex owners/managers of existing buildings	Prescribed rebates on a range of energy efficiency lighting, appliances, and building envelope for dwelling and common areas. Non-incentive offerings include education on the value of energy efficiency and cross-marketing with LIEE offerings.	Existing buildings, minor energy efficiency upgrades. Affordable and market rate complexes of 2 dwelling units or more. Tenants eligible to receive services with landlord approval.	Funds available until depleted, held on a first come, first serve reservation basis. Supporting documents must be submitted within 45 calendar days of reservation. Documents include Multifamily Reservation Form, Rebate Application, Invoice / Proof of Purchase. SDG&E documents also include Product Location Forms for common area and apartments.	PG&E: 15,000 direct mailers/year. SDG&E, SCE: 20,000 mailers/year. SCG: No stated targets. ³	\$80,188,539 total PG&E: \$20,856,887; SCE: \$45,732,227; SDG&E: \$5,131,751; SCG: \$8,467,674	www.pge.com/multifamily www.sdge.com/residential/multiFamilyRebate.shtml www.sce.com/residential/rebates-savings/multifamily/multifamily-energy-efficiency.htm www.socalgas.com/rebates/multifamily

² Blower-door-based air sealing, attic insulation, pipe wrap for all accessible domestic hot water heater piping, duct sealing, and an optional measure—low flow showerhead or thermostatic control valve for showerheads.

³ IOU's have also established non-program delivery targets such as ensuring properly licensed contractors and direct outreach to large property managers (3 per year for PG&E, SDG&E, SCE).

Type	Program	Target Audience	Offering	Eligibility	Application Requirements	Target # Units (2010-2012)	Program Budget (2010-2012)	Program Websites
STATEWIDE RESIDENTIAL	Appliance Recycling Program (Not SCG)	Res. and comm. building occupants, either existing occupants or at the time of transfer	Free pick-up and recycling of eligible, functioning appliances along with a monetary incentive.	Refrigerators, freezers, and room AC units (excluding SCE) available for pick up from residential and commercial locations.	Participants phone-in or schedule a pick up via website.	15,722 recycled appliances per year. There is no specific MF target.	\$67,784,646 total PG&E: \$20,241,876; SCE: \$39,342,770; SDG&E: \$8,200,000	www.appliancerecycling.com/weborder/rebatex.aspx?ProgramID=1 www.sce.com/residential/rebates-savings/appliance/fridge-freezer-recycling.htm www.sdge.com/residential/rebates.shtml
	Home Energy Efficiency Survey	Residential households	HEES provides opportunities for residents to assess the energy impact of their dwelling spaces, appliances and plug load devices.	Residential single family and multifamily units.	Customer may take the survey on line or via mail.	PG&E: 42,000 on line, 7,245 mail in, 4,000 in home, and 105 phone surveys. SCE: 21,875 on line, 13,125 mail in, 7,875 in home, and 875 phone surveys. SDG&E: 2,500 on line, 800 mail in surveys. SCG: 5,000 on line, 5,000 mail in, and 5,500 in home surveys.	\$32,396,994 total PG&E: \$21,018,892; SCE: \$6,950,911; SDG&E: \$2,049,080; SCG: \$2,378,112	www.socalgas.com/residential/energysurvey/index.html 1 No website info has been supplied by PG&E, SCE, or SDG&E for this program.

Type	Program	Target Audience	Offering	Eligibility	Application Requirements	Target # Units (2010-2012)	Program Budget (2010-2012)	Program Websites
STATEWIDE COMMERCIAL	Commercial Calculated Incentives	Buildings on a commercial rate, including portions of buildings	Calculated and tailored incentives for non-residential retrofits. Non-incentive offerings include technical assistance for application preparation.	Common areas of multifamily complexes.	Standard application form available online. Pre and post project inspections.	All commercial rated customers - no specific target for multifamily.	\$149,047,635 total PG&E: \$84,820,223; SCE: \$52,007,662; SDG&E: \$4,248,850; SCG: \$7,970,900	www.sce.com/customized_solutions/www.sdge.com/business/esc www.pge.com/mybusiness/energysavingsrebates No website info has been supplied by SCG for this program.
	Non-Residential Audits	Non-residential; MF property owners/managers.	Three audit levels: basic audits, integrated audits, and retrocommissioning (RCx) audits. Basic and online integrated audits target users below 200 kW; RCx audits are intended for larger users. Each audit generates a final audit report with recommendations for improvements. Program offers technical assistance to increase conversion rates.	All non-residential commercial establishments. Specific audits geared towards different customer types.	Online energy audits available for specific business types (including apartment complexes). To request a more in-depth audit, customers are routed to the business customer service center.	Only commercial rated customers.	\$34,192,073 total PG&E: \$20,237,598; SCE: \$10,559,031; SDG&E: \$1,562,143; SCG: \$1,833,301	www.pge.com/mybusiness/energysavingsrebates/analyzer/index.shtml www.sce.com/business/ems www.sdge.com/business/rebatesincentives/programs/allPrograms.shtml www.socalgas.com/rebates
	On-Bill Financing	Commercial, Industrial, Institutional	Full upfront cost covered for eligible measures and customers with good credit, as determined by IOU. Estimated energy savings must be greater than debt servicing. Financing provided at 0% interest over 5 years, ⁴ \$5,000 to \$100,000 loans tied to meter.	Active accounts in good credit standing with at least two years bill payment history. Multifamily common area locations (owner not living on premises). Financing does not qualify for residential applications. Measures must qualify for a rebate or incentive through IOU program.	Standard application form available online. IOU inspects project prior to commencement and verifies calculated energy savings. Must submit energy saving workbook indicating existing and proposed equipment, operating hours, and technical specifications.	All commercial and industrial customers.	\$143,554,308 total PG&E: \$18,500,000 SCE: \$15,000,000 SDG&E: \$5,000,000 SCG: \$3,500,000	www.sdge.com/obf No website info has been supplied by SCG, PG&E, or SCE for this program.

⁴ Loan terms can be lengthened to match expected life of measure.

Type	Program	Target Audience	Offering	Eligibility	Application Requirements	Target # Units (2010-2012)	Program Budget (2010-2012)	Program Websites
STATEWIDE COMMERCIAL	Commercial Deemed Incentives	Non-residential; multifamily property owners/managers	Provides rebates to non-residential customers for installing energy efficient lighting, refrigeration, food service, natural gas (PG&E and SDG&E only) and other technologies.	All nonresidential commercial establishments. Portions of multifamily complexes / facilities on a commercial rate (i.e., corridors, atriums, etc.)	Standard application form available online.	All commercial customers.	\$143,554,308 total PG&E: \$58,516,685; SCE: \$53,263,233; SDG&E: \$16,520,919; SCG: \$15,253,471	www.pge.com/businessrebates www.pge.com/tradepro www.sce.com/Express_Solutions www.sdge.com/businessrebates www.socalgas.com/energyefficiency
	QI/QM Duct Test and Seal, Refrigerant Charge and Airflow	Residential and commercial building occupants	Service providers promote program through participating HVAC contractors who receive incentives to perform quality installation and quality maintenance service on new and existing HVAC systems.	Customer must have an active residential single family or small commercial electric account. Installation must take place at a PG&E service address, and must be located in Climate Zones 2, 4, 11, 12, or 13 for DTS. No climate zone requirement for RCA.	Contractor is paid an incentive for performing work for customer. Contractors enter into agreements with Verified Service Providers who administer program and quality assurance checks.	N/A	Residential QI: PG&E: \$13,711,409 SCE: \$3,080,674 SDG&E: \$83,481 SCG: \$87,168 Comm. QI: PG&E: \$7,383,067 SCE: \$2,499,972 SDG&E: \$61,695 SCG: \$55,996 Res / Com QM: PG&E: \$9,378,683 SCE: \$28,486,042 SDG&E: \$97,751 SCG: \$203,209	www.pge.com/myhome/saveenergymoney/rebates/coolheat/duct/ No website info has been supplied by SoCal Gas, SCE, or SDG&E for this program.

Type	Program	Target Audience	Offering	Eligibility	Application Requirements	Target # Units (2010-2012)	Program Budget (2010-2012)	Program Websites
PARTNERSHIP PROGRAMS	Palm Desert Demonstration Pilot	Commercial and residential customers in the City of Palm Desert.	Big Bold Energy Efficiency Strategies and innovative approaches to encourage energy efficiency. Effective behavioral messaging pilot, Set-To-Save marketing campaign and pilot projects. One-Stop-Shop for Palm Desert residents, On-Bill Financing for public agencies and businesses. Support to City's AB811 Energy Independence Program (EIP).	Commercial and residential customers in the City of Palm Desert.	Palm Desert Applications on Set-To-Save website.	457,072 gross Therm (2010-12 goal) ⁵	\$649,300 (Approved budget through 12/31/2010)	www.settosave.com
	San Francisco Energy Watch MF Plus Program (PG&E)	MF property owners and managers	Free energy audit and incentives for efficiency measures for lighting, HVAC and building envelope. MF Plus serves both dwelling units and common space.	Deemed and calculated incentives are provided to participating contractors for the installation of qualified energy efficiency products in existing MF complexes with 2 or more dwelling units.	Participating contractor must submit Incentive Application Form and signed Site Access Agreement prior to installation. Following completion of project, participating contractor submits an Installation Verification Form and supporting documentation.	N/A	Approx. \$3,000,000 for PY2010-2012	www.sfenergywatch.org/multifamily.html
	Moderate Income Direct Install (MIDI) Program**	Moderate income customers.	Free energy assessment and free installation of efficiency measures, such as comprehensive lighting, attic insulation, pipe wrap, hot water heater blankets, and low flow showerheads and faucet aerators. MIDI serves both multifamily dwelling units and common space.	MIDI targets customers at 200% - 400% above federal poverty level. Tenants eligible with approval of property owner/mgr. Also serves common spaces in low income buildings (LIEE does not serve common spaces). Consistent with LIEE, MF dwellings are defined as those in buildings with five or more dwelling units. Also serves single family.	MIDI serves multifamily customers who are approached by LIEE but determined to be ineligible for LIEE during the income verification process.	N/A	\$4,352,000 for PY2010-2011	TBD

⁵ Local Government Partnership Programs are non-resource programs that coordinate and support all Core Program offerings including Residential Multi-family by leveraging the authority, unique local expertise and roles of local governments in the communities they serve. Through its effort in energy efficiency education, training, reach codes and community outreach, the M&O component of each LGP Program is designed to increase energy efficiency practices and stimulate greater participation in all Core Programs including those for Multi-family.

Type	Program	Target Audience	Offering	Eligibility	Application Requirements	Target # Units (2010-2012)	Program Budget (2010-2012)	Program Websites
THIRD-PARTY PROGRAMS	Multifamily Solar Pool Heating Program (SCG)	MF complex owners/managers of existing buildings	Aims to encourage large apartment building owners and property mgrs. to install solar water heating systems for swimming pools. Requires installation of solar collectors, booster pumps, solar system controller, and additional material and appurtenances (including, but are not limited to hot water CPVC piping, valves, fittings, drains, air separators, sensors, and insulation and collector structural support).	Apartment complexes with minimum of 40 occupied residential units with pools that are heated throughout the year.	Customers qualify to receive products and services through completion of a Customer Enrollment Form and Installation Agreement: contractor shall provide for review and approval a copy of Installation Agreement Form that program will use to document execution of those services selected by the customer.	Goals for 2010-11 are 105 installations/projects	\$1,497,491	www.energxsolar.com
	Multifamily Direct Therm Savings (MFDTs) and Multifamily Home Tune-Up Program (MFHTUP) (SCG)	MF property owners and tenants	Offers no-cost direct installation of water heating devices (low-flow showerheads, bathroom aerators, kitchen aerators, and common area pipe wrap) and provides valuable efficiency education to both multifamily property owners and tenants.	MFDTs: Existing buildings within the following SCG service counties: Los Angeles, Ventura, Kern, San Luis Obispo, and Santa Barbara. MFHTUP: Existing buildings within the following SCG service counties: Orange, San Bernardino, Riverside, and Imperial.	Customers who have qualified to receive energy efficiency devices and services complete a Customer Enrollment Form. The Customer Enrollment Form records program participation and contains relevant customer information.	Target # of installations or projects: 2010 - MFDTs: 1,200 MFHTU: 21,067. 2011- MFDTs: 600 MFHTUP: 44,123.	MFDTs: \$3,044,872 MFHTUP: \$1,895,109	MFDTs: https://buildingsolutions.honeywell.com/Cultures/en-US/Markets/Utilities/ MFHTUP: www.ecosconsulting.com/solutions/utility
	On Demand Efficiency (SCG)	Residential; MF building owners or management	Program sells and installs demand control recirculation pumps to qualified customers.	MF residence apartment complexes with central boilers and a timeclock or no control.	Potential participant is contacted via phone and screened for applicability; participant is sent program collateral and directed to program website for more info; participant submits a rebate application.	810	\$2,575,400	www.oderebateprogram.com

Type	Program	Target Audience	Offering	Eligibility	Application Requirements	Target # Units (2010-2012)	Program Budget (2010-2012)	Program Websites
THIRD-PARTY PROGRAMS	Hot Water Control (SDG&E)	Non-residential; MF property owners/managers	Program implements domestic hot water (DHW) control systems in hotels, motels, resort condominiums, and senior care facilities plus other associated hot water end uses (e.g., on-site kitchen and laundry facilities).	DHW control systems in hotels, motels, resorts and senior care facilities plus other associated hot water end uses (e.g., on-site kitchen and laundry facilities).	Customers will participate in a web-based interactive presentation which uses as an example technology on similar facilities to those installed (size and plumbing configuration).	# of installed lodging rooms: 55,000 # of installed kitchen/laundries: 360	\$2,985,110	www.savegas.com/PagesPublic/Programs.aspx
	California Multifamily New Homes (PG&E)	Developers/builders for new construction and significant remodel	Performance based incentives starting at \$0.18 / kWh, \$0.73 / therm, and \$27.63 / kW at 15% > Title 24. Incentives plateau at 45% > Title 24. \$100 / unit base incentive. Additional incentives for energy consultants at \$50/unit and third party verification at \$60/unit that cap at 200 units.	New MF construction and performance based "gut and remodel" of existing MF structures. New construction, affordable and market rate MF complexes of three dwelling units or more.	Though projects can apply at any time prior to completion between 1/1/2010 through 12/15/2012, applying early in the design phase is highly recommended to ensure acceptance of proposal. Application package includes signed application, W9 form, building plans, Title 24 documentation, and service territory verification	N/A	\$4,408,293	http://multifamily.h-m-g.com/