

Filling the Gaps in Green Jobs to Serve the Multi-Family Market

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ABSTRACT

With the recent trend of new multi-family building construction out-starting single-family and with an increasing number of building owners seeking assistance to audit, assess, and analyze their portfolios of existing multi-family buildings, there is a growing need for experts well-versed in multi-family buildings energy efficiency. The shortage of trained energy experts is impacted further by the historic single-family predominance in the residential sector, which limited past multi-family training opportunities.

Performance-based energy efficiency programs in California for existing and new construction multi-family buildings have given some insight into what workforce expertise is required. Based on a whole building approach, the programs are designed to capture deeper energy savings using a whole building holistic approach versus a piece-meal single system method. These programs have shown that experts are needed on a range of energy activities including: building simulation, diagnostic and verification protocols, funding and financing criteria, operations and maintenance, and energy efficiency within the context of green and PV/solar programs.

This paper will describe the landscape of technical skills and expertise needed to serve the multi-family market, for increasing energy efficiency in new and existing homes. The paper will assess current training curriculum in California, how it serves the current multi-family market, identify gaps, and conclude with recommendations that Home Energy Rating System (HERS) providers raters, building simulators, and other green workforce trainers in California can incorporate into their curriculum. This paper will also discuss the need to coordinate with national efforts to establish curriculum and protocols to accommodate building owners and developers who strive to meet performance and protocol requirements of California and national funding and financing programs.

Introduction

With California's state policies and initiatives currently focusing on comprehensive and whole-building retrofit programs that yield deeper energy savings, a historically large amount of funds are being funneled into residential retrofit programs. Given the lack of understanding of the variations of the residential markets among policy- and decision-makers, this effort is largely focused on single-family homes and aimed at homeowners. Utilities who are directed to use these funds for residential retrofit typically interpret residential to mean single-family homeowners and are ramping up program and funding efforts for homeowners and overlooking multi-family dwellings. This is a critical point for three reasons: 1) because the ratio of renters to homeowners is about 42% to 58%, 2) because about one third of Californian's live in apartments¹ and 3) because most low-income families live in multi-family dwellings. Further, about one-third of apartment dwellers (approximately 4 million) of apartment dwellers have

¹ California Public Utilities Commission, 2008. *California Long-Term Energy Efficiency Strategic Plan. Section 2 – Page 9* (Source cited: RASS 2003, HENS 2004)

household incomes less than or equal to 200% of the Federal Poverty Guidelines². Often they cannot afford to either purchase a home or to invest in energy efficiency. Thus, focusing on single-family homeowners leaves a large segment of the population underserved by whole-building programs, and in need of expertise specific to understanding the complexity of multi-family buildings, systems, metering and ownership structures, and energy consumption variations. .

Because apartments are smaller in size and typically adjacent to other conditioned spaces, the heating and cooling loads are generally smaller. Therefore, multi-family tenants generally use less energy than single-family homeowners, and consequently yield a smaller margin of potential energy savings. Conversely, the transaction costs per dwelling to the state (for public goods charge or other publicly funded programs) should be lower, because one multi-family participant in a state energy program can contain an average of 40-60 dwelling units, whereas one single-family participant consists of one home. The job size and expertise required for a multi-family retrofit, has the capacity to employ multiple experts and contractors, and therefore requires workforce expansion.

Single-family performance-based, whole-building multi-energy programs were developed much earlier than similar multi-family programs. The first such single-family programs were developed approximately two decades ago, whereas the first multi-family programs were not implemented until around the year 2000. Historically, multi-family new construction projects are served by energy consultants, engineers, and HERS raters that served either commercial or single-family. They were brought into the multi-family market as a result of the post-construction defect litigation resurgence in multi-family new construction. Subsequently, the utility programs implemented energy efficiency programs. About the same time, the first whole-building, comprehensive retrofit program for multi-family buildings came onto the market. Due to the lack of infrastructure for multi-family buildings, including the absence of energy audit and HERS verification protocols and California Energy Commission (CEC)-certified existing building simulation software, the Designed for Comfort Program was shoe-horned it into the existing new construction simulation and HERS infrastructure. This resulted in bringing energy consultants and HERS raters who, again, typically worked with single-family new construction into this rehab program and asking them to use this work-around system.

In the California Long-Term Energy Efficiency Plan, the California Public Utilities Commission (CPUC) recognized that the lack of programs and focus on the multi-family buildings market as a shortcoming. The CPUC does indicate that the multi-family market will be addressed as a longer term action item in the next version of the plan. Meanwhile, there are immediate multi-family market needs that the current strategic plan is unable to support. For example:

- The San Francisco Bay Area was awarded State Energy Program funds and a consortium of local governments, non-profits, and private sector entities are in the process of

² California Public Utilities Commission, 2008. *California Long-Term Energy Efficiency Strategic Plan. Section 2 – Page 9* (Source cited: Thirty percent (30%) is the proportion of IOU-served residential households qualifying for Low Income Energy Efficiency (LIEE) programs. IOUs serve about 10.5 million residential customers (CPUC at <http://www.cpuc.ca.gov/PUC/energy/>), or approximately 83% of California households. The proportion of LIEE qualifying households served by publicly-owned utilities is assumed to be similar.

developing an infrastructure to build the capacity and technical skills to serve their proposed multi-family programs.

- Simultaneously, lenders are piloting green or energy efficiency loan products that are primarily based on the ability to service the loan through the energy savings.
- Further, multi-family building owners with large portfolios of buildings who are balancing split incentive issues with the need to reduce operating costs and capital investments are looking for systematic and comprehensive approaches to energy efficiency across all of their buildings.

These efforts have left these entities searching for energy experts qualified to:

- Advise, support, and provide technical input to energy efficient new construction and to upgrades to existing multi-family building projects
- Produce technical results that are defensible to lenders and to public funding sources.

The following are several key steps needed for developing an infrastructure and capacity to serve the needs of the multi-family market: (1) understanding the needs of the multi-family market, (2) conducting inventories of existing training programs, (3) determining their applicability to multi-family, (4) identifying gaps, and (5) proposing strategies to fill those gaps. Each of these key steps is discussed in sequence below.

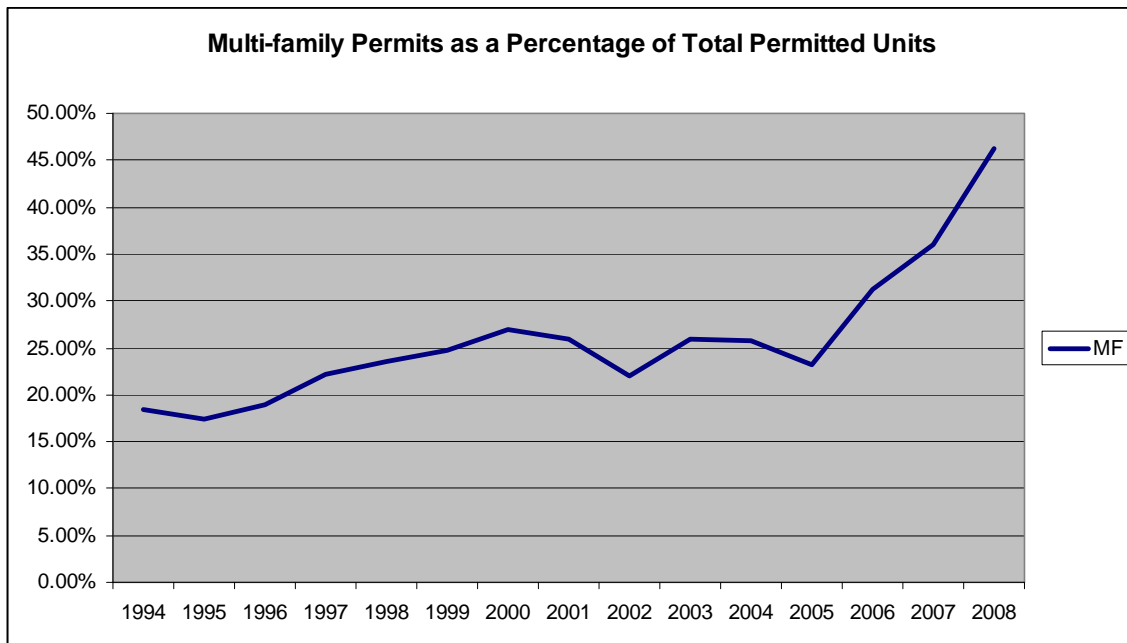
Understanding the Needs of the Multi-Family Market

To understand the argument that more multi-family specific training is needed, it is important to understand why multi-family buildings have not been in the forefront, why they should be, and how they are different than single-family buildings. Market shifts, building and mechanical system types, owner/tenant relationships, and construction processes all contribute to the need for training for multi-family experts.

The growing stock of multi-family buildings poses an enormous opportunity for cost-effective energy savings. As the economy slows, there is more demand for multi-family and affordable housing units. Families and individuals uprooted by foreclosure, a lost job, or a pay cut are forced to downsize and move into smaller homes and rental units. Often these are apartment buildings and condominiums. Though new construction as a whole has slowed substantially, multi-family construction has fared better than single-family construction. From 1995 to 2008 the percentage of total residential building permits in California for multi-family rose from 17 percent to 46 percent, as shown in Figure 1. Despite the collapse of the housing market and current economic recession that began in December 2007, multi-family units permitted in the state are up from less than 15,000 in 1995 to more than 29,000 in 2008.³

³ U.S. Census Bureau (<http://www.census.gov/const/www/C40/table2.html#annual>)

Figure 1: Multi-Family Permits as a Percentage of Total Residential Permits



In addition to the 2008 economic downturn the trend to “go green” with programs such as LEED and GreenPoint Rated⁴ provides additional incentive for urban infill, smaller homes and walkable communities. Because multi-family dwelling units typically have a smaller carbon footprint, encouraging multi-family living may potentially lead to a more and a sustainable future⁵.

Targeting multi-family buildings for energy efficiency makes financial and environmental sense. Energy efficiency in one multi-family building is energy efficiency for a minimum of 3 housing units and potentially hundreds all at once. One efficient multi-family building can make a large impact. In addition, multi-family buildings are able to take advantage of economies of scale. Bulk discounts allow for upgrades to all of the units in a multi-family building at reduced rates.

Improving the energy efficiency of multi-family buildings can also have a large positive social and economic impact. Most affordable housing properties are multi-family housing properties. Reducing energy bills for affordable housing tenants has a much larger impact on low-income households that spends a much larger percentage of their income on utility bills. Typically, middle-income households spend about 4% of their income on utility bills as compared to low-income families and seniors on social security who pay between 19% and 26%

⁴ Build it Green GreenPoint Rated program and requirements <http://www.builditgreen.org/greenpoint-rated/>

⁵ National Association of Home Builders, Nation's Building News, May 31, 2020, Green Homes Said to Sell Faster, But Appraisals Remain a Sticking Point, <http://www.nbnnews.com/NBN/issues/2010-05-31/Front%2BPage/index.html>

of their income⁶. In the worst months of 2001, when the California energy crisis⁷ pushed energy prices to an all-time high, low-income households spent as much as 70% of their income on utility bills.

Multi-family building characteristics, equipment types, financing, and metering structures can be very different than in a single-family home, and from one multi-family building to the next. Therefore, cost-effective energy upgrades in multi-family buildings can differ greatly from single-family and are not necessarily consistent across multi-family projects. For instance, because the exterior wall area to floor area ratio tends to be lower in multi-family buildings than in single-family homes, heating and cooling loads are less affected by envelope improvement options. Though envelope improvement may still be the most cost-effective improvement, the impact may not be as significant as in a single-family home. Furthermore, water heating can constitute a much larger proportion of overall energy use in multi-family buildings than in single-family buildings and may be a more cost-effective upgrade than heating and cooling equipment upgrades. Because of the varying building types, configurations, metering structures, central versus individual systems, etc, the proportion of energy end uses will vary greatly and there is no one-size-fits all approach. Adding to the complexities of multi-family buildings, variables can include tenant access from interior or exterior corridor and conditioned or unconditioned space, number of stories, and building floor plan. The domestic hot water systems in multi-family buildings are frequently a central system serving an entire building of dwelling units. The distribution of the hot water and recirculation controls then becomes as important as the efficiency of the water heater or boiler. Recirculation systems are much less common in single-family homes.

In addition to understanding energy loads and building system types specific to multi-family buildings, an energy expert must also understand the many variables affecting cost-effectiveness and feasibility in this unique sector of buildings. Cost analysis is complicated by variations in owner/tenant relationships and payment of utility bills. For example, an apartment owner might not see the benefit of increasing energy efficiency in the dwelling units if the tenants pay the utility bills and reap the financial savings. Another complication with existing multi-family rental properties is gaining access to the dwelling units to complete the upgrades. This may affect the cost effectiveness equation if tenants must be relocated temporarily, or if the building would need to be vacant to complete the upgrade. The lost rental income may outweigh the financial benefits of the upgrade. In the case of condominiums, units may be owner-occupied, but home owner association (HOA) rules limit the ability of the condo owner to make upgrades to the building envelope. Additionally, in properties that were converted from apartments to condos, the water heating is sometimes central. A condo owner often must go through the HOA to make energy upgrades, or have limited possibility for improvement.

The design and construction processes can also be quite different from single to multi-family buildings, especially on retrofit/rehab projects. For instance, the decision making process can be complicated by the financial structure of the project. If a property needs approval from multiple stakeholders invested in the property, getting to a decision can take quite awhile and being able to justify a financial investment and communicate the benefits is more significant in

⁶ US Department of Housing and Urban Development. Utility Bills Burden the Poor and Can Cause Homelessness, <http://www.hud.gov/offices/cpd/library/energy/homelessness.cfm>

⁷ A California state of emergency resulting from a combination on deregulation, market manipulation, and hot summer days resulting in an artificial shortage of electricity, inflated price bidding resulted in all time high electricity prices in southern California and power outages.

multi-family projects. A single-family home owner may make energy upgrades simply for comfort, but a rental property will have a much more objective and finance-driven approach. Typically a multi-family project undergoing a whole-building rehab will have multiple contractors on the job, one to conduct the audit and analysis, and then one for each upgrade measure. A single-family home is more likely to have all of the work completed by a single building performance contractor.

Existing Trainings and Practices

A common, and problematic, strategy for addressing energy in multi-family buildings is to extend single-family standards, best practices and programs to low-rise multi-family buildings. The California Building Energy Efficiency Standards took this approach until 2005, when the multi-family baseline standard was changed to reflect common building practice specific to multi-family buildings. Before 2005, multi-family building projects were able to receive undue compliance credit for mainstream multi-family building practices because they were being compared to a single-family baseline. For instance, central hot water heating systems, typical in multi-family buildings, were compared to a baseline of individual hot water heaters. Also, the baseline window-to-floor ratio, typically smaller in multi-family buildings than in single-family buildings, gave multi-family projects another route for achieving code compliance with sub-par efficiency. This would suggest that the multi-family building stock built in the years before the 2005 California Building Energy Code change has proportionally more room for improvement than single-family buildings because of the lack of code stringency before the code correction.

The California standards for energy efficiency in multi-family buildings are located in two places, depending on whether the buildings are low-rise or high-rise. Low-rise residential buildings are addressed in the residential standards, while high-rise residential buildings are covered in the non-residential standard. With the development and implementation of a multi-family code, separated from single-family and non-residential standards, many of the gaps in multi-family training may consequently be filled. Since the California Association of Building Energy Consultants (CABEC) and the California Home Energy Rating System (HERS) providers use the California Building Energy Efficiency Standards to structure their trainings, a standalone multi-family standard would likely catalyze the development of trainings for multi-family energy consultants and HERS raters. The introduction of a multi-family energy efficiency standard would also trigger the improvement of assessment tools and compliance software, as it is improved with each change to the standards.

Energy Consultant Training and Certification

Because multi-family lies somewhere between single-family and commercial building, it often falls through the energy consultant building simulation training and certification cracks. A Certified Energy Plans Examiners (CEPE), certified by the California Association of Building Energy Consultants (CABEC), has the option of taking two exams, residential and non-residential. This California Building Energy Efficiency Standards-based training and exam is the only certification available for energy consultants in the state of California, and does not specifically address the unique features or complexities of multi-family buildings. An energy consultant wishing to be a CEPE for both low-rise and high-rise multi-family buildings would need to take both tests. CABEC publishes a directory of residential and non-residential CEPEs,

but a building owner has no way of identifying those with expertise in multi-family, low-rise or high-rise, through this directory. If CABEC offered a multi-family training and certification, including applicable components from both residential and non-residential energy standards, not only could energy consultants become certified more efficiently, but the consequent multi-family CEPE directory could direct building owners to qualified experts.

Home Energy Rating System (HERS) Training and Certification

A similar example is the California Home Energy Rating System (HERS). HERS providers train energy raters to understand residential buildings for verifying residential code compliance, but focus on single-family homes and do not offer multi-family specific training. The residential training HERS raters receive for verifying quality installation and efficiencies of building components, though it does include some basic building science, is limited to the list of HERS code compliance measures in the California Building Energy Efficiency Standards. For code compliance purposes, this training may be appropriate. However, a number of utility incentive and green labeling programs also rely on HERS raters for audit and/or verification for program qualification. No formal training is available to HERS raters to bridge the gap between code compliance and program compliance, though participation in these programs requires a more detailed understanding of energy upgrade measure synergies at a whole-building level. At this whole-building level, the difference between single-family and multi-family buildings is magnified. Where a single-family building addresses one or two residential dwelling units, a multi-family building addresses a large number of units, as well as common spaces. The spatial configuration of the dwelling units adds an additional layer of variability that ultimately affects the heating, cooling, and water heating loads on the building.

Because of differences in building features and equipment types, diagnostic testing protocols for single-family are not always applicable to multi-family. Multi-family diagnostic testing protocols are not addressed in HERS training in California. The best example of this is the blower door test for home infiltration. Blower door tests offer a fairly simple and straightforward method of revealing envelope infiltration from outside through pressurization or depressurization of a whole house. The same test performed on a multi-family dwelling unit has different implications. Infiltration can come from outside, which has the greatest impact on heating and cooling loads, adjacent dwelling units (above, below, and beside), and adjacent corridors. In order to understand the infiltration from outside the building in an individual dwelling unit, you would have to pressurize all of the surrounding interior spaces in addition to the individual dwelling unit. In order to test a whole multi-family building at once, you would need a much bigger fan than is provided with the typical blower door. While techniques for testing infiltration in multi-family buildings have been available since the mid 90s, they are not part of HERS training in California.

The HERS training gap becomes even larger with high rise multi-family buildings. High-rise residential buildings fall under non-residential code, where few HERS measures exist for code compliance credit. A HERS rater certified to verify compliance with the California Building Energy Efficiency Standards for a high-rise residential building in California is likely have knowledge based on commercial buildings, and therefore not have the educational background or experience to reliably verify measures in a high-rise residential project for participation in a residential incentive or labeling program. Again, there is also no distinction in the HERS rater directories to identify individuals with experience in multi-family buildings.

Building Performance Institute Training and Certification

The Building Performance Institute (BPI) offers Multi-family Building Analyst and Multi-family Building Operator trainings. Currently the trainings are offered only in New York, requiring substantial expense for California-based energy auditors and analysts, HERS raters, and building managers to attend a 5-day training. BPI is working to expand their reach through telecast trainings across the nation. According to the Association for Energy Affordability, this medium allows that the presenter and audience to see each other on screen and interact much like they might in person. BPI has a number of affiliate organizations educated to conduct local trainings across the nation. However, these organizations do not appear to be hosting trainings specific to multi-family building energy efficiency. While there are seven BPI affiliates in California, none of them offer multi-family specific training.

Building Performance Institute (BPI) affiliates provide training on whole-house approach to energy efficiency, whereby a BPI certified contractor can assess the energy opportunities through an audit and diagnostic testing and complete the upgrade measure installation. While this whole house audit and construction approach is an efficient method for upgrading single-family homes, the role of building performance contractor has not yet been translated into multi-family terms.

Program Demand for Multi-family Experts

With the increased focus on and funding for existing buildings, many existing and developing whole-house or whole-building, programs in California and across the nation require or suggest that project owners should acquire audit, analysis or verification services from an energy consultant or HERS rater. Because of lack of resources, few of these programs offer training to these experts. Further, there is no resource (such as energy consultant association or HERS provider directories) for matching multi-family projects with multi-family experts. With the introduction of whole-building, multi-family programs, program implementers needed experts to audit, analyze, and verify the participating multi-family properties. Because of the widespread lack of specific expertise, program implementers have had to ‘hand-train’ a select few of interested energy consultants and HERS raters who had at least building simulation experience and HERS certification of single-family. The result was that participating building owners were directed to these few consultants and raters to conduct the work. Competitive rates, timely service, and market growth are all difficult to promote under this model. As more programs are launched, these small pools of consultants will not be able to handle the volume of projects needing technical assistance. Further, developing a sustainable market includes developing the financial incentives, infrastructure and technical expertise to serve the market beyond programs and incentives.

Utility companies have energy efficiency and renewable energy incentive programs requiring use of energy consultants and/or HERS raters. The New Solar Homes Partnership, for example, is available for homes served by Pacific Gas & Electric (PG&E), San Diego Gas & Electric (SDG&E), and Southern California Edison (SCE), and requires that both a Certified Energy Plans Examiner⁸ (CEPE) and a HERS raters have project roles. The CEPE is a California Building Energy Efficiency Standards certification program, which includes training and testing for Residential and Nonresidential plan checkers, field inspectors and energy

⁸ <http://www.cabec.org/cepeinformation.php>

consultants. The CEPE test is an objective demonstration of a person's technical expertise and application skills for the California Energy Standards. While there are varying HERS certification programs, they primarily entail training and certification to allow raters to perform verifications of new homes, collect data on existing homes, conduct diagnostic testing, to conduct building simulation on homes to meet EPA ENERGY STAR® Homes requirements.

The CEPE-generated compliance documentation to show the project is at least 15% better than required by the California Building Energy Efficiency Standards (Title 24), and the HERS rater verifies that the energy measures specified in the compliance documentation are installed. The utility companies rely on the training and certification processes of CABEC and the California HERS providers to equip the workforce with the knowledge needed to perform the compliance analysis and verification tasks required by the program. As mentioned previously, these trainings are too general to address issues specific to multi-family buildings.

PG&E and SCE have both acknowledged this gap in training specific to multi-family buildings and have offered workshops, through their new construction and rehab programs to address multi-family building systems and other topics. On behalf of PG&E's California Multi-family New Homes Program (CMFNH), HMG is currently the only program implementer that offers intermediate and advanced multi-family energy efficiency trainings to building owners, architects, energy consultants and others interested parties. These workshops do not, however, provide any certification which might identify a trained participant as having expertise with multi-family buildings. CMFNH also relies on residential HERS raters for verification of energy measures in low-rise multi-family projects, and only requires that they be certified through an approved California HERS provider. No multi-family specific training is required. Because HERS raters certified to inspect non-residential buildings, which also encompasses high-rise residential, have a smaller scope of training when it comes to verification, until 2010, the utilities have relied on one program implementer (HMG) to conduct the HERS verification inspection for high-rise multi-family projects coming through the program. However, working with market raters, the program implementer has identified a subset of raters that now have sufficient experience to verify installations in high-rise multi-family buildings. This, again, brings us to the issue of multi-family buildings being split between the residential and non-residential energy standards. Though it is logical for CABEC and the HERS providers to follow the same structure as the California Building Energy Efficiency Standards, the result is insufficient training for energy experts working with multi-family buildings. SCE, through the Affordable Housing Energy Efficiency Alliance (AHEEA), offered similar multi-family trainings to those offered through CMFNH. AHEEA also offered design assistance for housing projects intending to increase the energy efficiency in planned or existing multi-family buildings.

Build it Green's GreenPoint Rated⁹ programs (a California-based green rating system where the home is graded on five categories: resource conservation, indoor air quality, water conservation, community, and energy efficiency) for new and existing multi-family homes relies on GreenPoint Advisors and Raters to help home owners through the program and labeling process, and to verify green measures have been installed as specified. The GreenPoint Advisor and Rater trainings are not exclusive to single-family or multi-family advisors and/or raters. Build it Green does include information about the multi-family programs and implementation in these trainings, but does not address many of the multi-family variables and issues. Because

⁹ Build it Green GreenPoint Rated program and requirements <http://www.builditgreen.org/greenpoint-rated/>

Built it Green requires experience in green building as a prerequisite, it is understandable for them to assume a rater that will work in the multi-family arena will already have an understanding of multi-family buildings and projects.

ENERGY STAR® New Homes and Home Performance with ENERGY STAR®¹⁰ are national programs from the U.S. EPA and U.S. DOE, which require a comprehensive, whole-house approach to improving energy efficiency in new and existing homes. These programs have been, or are in the process of being widely adopted by California utilities. Both require that HERS raters verify energy measures, and relies on the HERS providers to sufficiently train the raters verifying ENERGY STAR® projects. Indirectly, the program also relies on energy consultants to get projects to 15% more energy efficient than required by code for new projects and to improve efficiency in existing homes, though hiring an energy consultant is not a mandatory requirement. The ENERGY STAR® New Homes program is an example of a program that began with a focus on single-family and has expanded to include multi-family. However, the Home Performance with ENERGY STAR® has not yet been extended to multi-family buildings. While HERS raters and energy consultants with residential training have sufficient knowledge of single-family buildings and protocols, the same pool of consultants and raters may not be sufficiently trained for multi-family applications, which can lead to errors in analysis and in the field.

Affordable housing loan and grant programs in California also rely on the same set of energy consultants and HERS raters, to estimate energy savings for new construction and rehab projects, and verify measure installation. Enterprise Community Partners is an example of a non-profit association offering grants and loans for increased energy efficiency in affordable housing. A requirement of 15% more efficient than required by code for new construction or better than existing conditions for rehab suggests consultation with an energy consultant for participation in the Green Communities Program. Consistently, project owners have experienced difficulty finding multi-family experts to assist them, Enterprise has contracted with their technical consultants to fill the gap by offering energy efficiency design assistance to some of these projects with an audit and building simulation to serve the needs of their Green Communities and green rehab pilot loan program.

Filling the Gaps in Multi-family Training with Green Jobs

There are three outlying gaps in terms of trained market actors for energy efficiency in the multi-family buildings: energy consultants, HERS raters, building managers, and contractors. All three create space for new energy technical expertise in the field, and increase demand as well for the training in such expertise. To improve the quality of services CEPEs provide to building owners and developers, a multi-family training and certification should be offered, covering both low-rise and high-rise building types. Though this training and certification in code compliance may not reveal the ins and outs of the cost benefit equation and decision making process for multi-family owners and developers, it will give multi-family CEPEs a niche to settle in and become experts. The general residential certification that may have attracted a large variety of project types would be replaced with two more focused certifications on single-family and multi-family buildings, providing higher quality analysis services to building owner and developers.

¹⁰ Environmental Protection Agency, ENERGY STAR® Web site: http://www.energystar.gov/index.cfm?c=home_improvement.hm_improvement_hpwes

Similarly, if HERS providers offered multi-family training modules, there would be less reliance on program implementers for measure installation verification. A multi-family training module for new construction, including high-rise buildings, would offer a deeper understanding of systems common to multi-family buildings and would direct building owners to raters that could truly offer quality assurance through measure verification. A multi-family training module for the whole house rating process would also offer this deeper understanding of multi-family system types for more accurate ratings. Additionally, training on cost analysis and variables in tenant/owner relationships, financing structures, and utility metering would help raters, under HERS II, to provide better upgrade recommendations to multi-family building owners.

Also, multi-family building owners are in need of a one-stop shop for energy efficiency recommendations and upgrades. Because whole building rehabilitation for multi-family buildings typically involves multiple contractors, one for each energy measure, building performance contracting can be challenging. A multi-family version of the building performance contractor could conduct audits, offer upgrade recommendation, and then act as a construction manager and general contractor in the construction phase of the project. Training in this area would generate new jobs, alleviate the stress multi-family building owners undergo managing a rehab project, and encourage more building owners to seek energy improvements.

Lastly, energy management practices tend to be focused on commercial buildings. Because most tenants in California pay their own utility bills, multi-family building managers generally don't focus on energy management unless equipment is failing.

There is a huge gap in training multi-family building managers who need guidance to persist in saving energy through employing consistent and comprehensive energy management best practices. This training and guidance should reflect best practices to help building owners to annually assess, evaluate, plan, and implement energy management. This should include not only operations and maintenance training, but also a process and tools to help building owners know when to invest or maintain and at what juncture in the building lifecycle. This training should also encompass tracking energy use and how to influence tenant behavior to properly use the equipment and to conserve energy.

In summary, there are gaps in training specific to energy efficiency in multi-family building due to the predominant focus of code compliance and related training and certification programs on single-family construction. Filling these training gaps represents an enormous opportunity for potential energy savings in California. These gaps could easily be filled by existing organizations through separation of existing training modules, for added detail, or the addition of multi-family specific modules. The development and implementation of a separate multi-family energy efficiency standard would inevitably activate improved training for energy efficiency in multi-family buildings. Collectively, these efforts would create training jobs, create openings for additional energy experts in the multi-family sector, improve the quality of recommendations made to multi-family building owners, and increase program participation and encouragement for multi-family building owners to upgrade for energy efficiency.