

Multifamily Energy Efficiency Retrofits: Barriers and Opportunities for Deep Energy Savings

Regional Energy Efficiency Organizations
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Prepared By



Midwest Energy Efficiency Alliance (MEEA) is the Midwest's key proponent and resource for energy efficiency policy, helping to educate and advise a diverse range of stakeholders on ways to pursue a cost-effective, energy-efficient agenda. Through partnerships, programs and a dynamic annual conference, we curate a forward-thinking conversation to realize the economic and environmental benefits of energy efficiency.



Northeast Energy Efficiency Partnerships (NEEP) supports the expansion and implementation of policies and programs to accelerate energy efficiency in the Northeast and Mid-Atlantic region. Our vision is that the region will fully embrace energy efficiency as a cornerstone of sustainable energy policy to help achieve a cleaner environment and a more reliable and affordable energy system. NEEP is available to assist utilities, state energy offices, legislators, regulators or administration officials in any of these areas.



Southeast Energy Efficiency Alliance (SEEA) drives market transformation in the Southeast's energy efficiency sector through collaborative public policy, thought leadership, programs and technical advisory services. SEEA promotes energy efficiency as a catalyst for economic growth, workforce development and energy security across 11 southeastern states.



South-central Partnership for Energy Efficiency as a Resource (SPEER) aims to accelerate the adoption of advanced building systems and energy efficient products and services in Texas and Oklahoma. These two states include nearly 30 million people and many of the fastest growing cities in America. There is a tremendous opportunity to increase energy efficiency in the region through building codes, retrofits for existing buildings, better training, innovative policies, and cooperative marketing to make it easier for the public to understand efficiency opportunities.



Southwest Energy Efficiency Project (SWEEP) is a public interest organization that advances energy efficiency in Arizona, Colorado, Nevada, New Mexico, Utah, and Wyoming. SWEEP analyzes and promotes policies and programs that result in efficient energy use in the utility, buildings, transportation and industrial sectors, in collaborative utilities, state agencies, local governments, energy efficiency professionals and clean energy advocates.

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Executive Summary

This product of the Regional Energy Efficiency Organizations (REEOs) was developed to help inform national stakeholders about the strategies that have been used to achieve deep energy savings in the multifamily housing sector through energy efficiency upgrades. These strategies could be used as models in areas across the country where utility program administrators and policymakers seek to achieve deep energy savings in the multifamily building stock for the purposes of reducing energy costs, creating comfortable and healthy homes, meeting regulatory requirements, or reducing the environmental impacts of energy consumption. This report includes a national multifamily market characterization, barriers and opportunities for program and policy efforts, and eight exemplary case studies from across the country.

There can be significant hurdles to achieving deep energy savings in the multifamily building stock. Some of these major barriers include:



Marketing and outreach to decision makers



Split incentives between tenant and owner investment in energy efficiency



Lack of capital or accessible financing options



Limited energy efficiency programs and services targeting the multifamily sector



Insufficient or inadequate data on energy consumption



Diversity in multifamily building stock across different **markets**



Lack of coordination among efficiency programs and contractors



Differing versions of **building energy codes**



Limited policies to advance energy efficiency in the multifamily sector

Opportunities for Utility Multifamily Program Administrators

The following opportunities are based on strategies that have led to deep energy savings in utility multifamily energy efficiency programs across the country. These are opportunities we see that help to overcome the barriers listed above in addressing the specific conditions present in the multifamily market. More specific information is included in the “Barriers and Opportunities for Utility Multifamily Program Administrators” and “Exemplary Multifamily Energy Efficiency Programs” sections of the full report.

Programs Targeted to the Multifamily Sector: Multifamily housing is sometimes incorporated into residential or commercial energy efficiency programs. Programs specifically designed for the multifamily market can drive higher participation rates and deeper energy savings because the incentives, outreach strategies, and other aspects of the program are designed for the intricacies of the multifamily housing market.

Direct-Install Programs as a Gateway to Comprehensive Programs: Direct-install programs can be combined with more comprehensive rebate or custom measure programs as a way of creating retrofit projects with deeper energy savings that still have attractive returns on investment. The quick payback period of direct-install measures, when paired with more comprehensive measures that may have a longer payback but provide significant energy savings, can help make the project more appealing as an investment and lead to more of these comprehensive projects being completed.

"One-Stop Shop" Program Design: A "one-stop shop" design connects the building owner or manager with a single point of contact who is able to help coordinate and streamline the process. This simplicity can lead to more projects being completed and more satisfied customers.

Multifamily Market Assessments to Understand Customer Needs: Conducting a thorough analysis of the multifamily market in a service area can help with designing a program that addresses the needs of that market and can lead to more customer engagement and more program participation.

"Pay-For-Performance" Programs to Incentivize Deeper Retrofits: Offering increased incentives if an energy efficiency project meets a certain level of savings can provide the incentive necessary for building owners to decide to invest in a more comprehensive project rather than just go for a project with a quick payback period that yields lower energy savings.

Low-Income Multifamily Buildings Targeted: Multifamily building owners with low-income tenants often aren't able to recoup investments in energy efficiency without raising rent on those residents who already spend a disproportionately high amount of their income on rent. Offering higher rebates, enhanced technical assistance, and customized outreach and marketing for these buildings can lead to deeper energy savings.

Streamlined Access to Energy Data: Building owners need streamlined access to building energy data in order to prioritize and make informed energy efficiency investments. Some utilities offer building owners aggregated, whole-building energy data in an easily accessible and standardized format.

Geo-targeted Energy Efficiency Programs as a Means to Defer Grid Investments: Certain investments in transmission and distribution infrastructure can be delayed or even eliminated by investing in energy efficiency at a significant savings to customers. Programs can develop protocols to determine which of these projects have the potential to be deferred by targeted efficiency and other demand-side energy resources.

Outreach and Customer Engagement Strategies that Leverage Established Community Partners: Establishing relationships with city governments, multifamily building developers, property management companies, housing advocates, and trade associations can be beneficial

in identifying new developments or anticipated capital improvements which can provide opportunities for incorporating energy efficiency measures.

Knowledgeable Contractor and Association Networks: Ensuring that the networks of contractors are coordinating in their outreach and interactions with customers helps to minimize confusion if there are multiple program offerings through different organizations. These networks of contractors can also make sure customers are aware of all the different program offerings and point them towards the most relevant ones for their buildings.

Opportunities for Policymakers and Other Stakeholders

In addition to opportunities for program administrators, the project team recognized the following opportunities for policymakers and others working to create a regulatory environment that supports energy efficiency retrofits in the multifamily housing stock. More specific information is included in the “Barriers and Opportunities for Policymakers and Other Stakeholders” section of the full report.

Building Energy Benchmarking and Transparency Policies: Policies requiring the benchmarking and disclosure of building energy data can incentivize building owners to invest in deep energy efficiency retrofits because of the desire to attract and retain tenants, and increase property values.

Building Energy Data Transparency in the Real Estate Market: Policies that make other building energy information available to the real estate market can also ensure the accurate market valuation of the energy efficiency of a building. Metrics like energy asset ratings and estimated utility costs can be useful for a potential buyer or renter in determining the operating costs of the building.

Adoption of the Latest and Most Efficient Model Energy Code: Building energy codes set a floor for the minimum allowable efficiency of buildings in a state or jurisdiction. Adopting the latest energy codes ensures that new construction and major renovations are built to a higher standard of energy efficiency.

Building Officials, Plan Reviewers, Code Inspectors, Architects, Builders, and Trades Trained on Energy Code Compliance for Multifamily: Multifamily code compliance can be complicated because of its inclusion in either the residential or commercial provisions of the code based on the building size. Trainings on compliance can ensure that buildings are meeting the requirements of the code and streamline the design, construction, and inspection processes.

Multifamily-Specific Chapter in the Energy Code: Multifamily buildings include unique characteristics that differentiate them from low-rise residential and commercial buildings. Efforts are underway to develop a multifamily specific section of the energy code to reduce confusion and increase rates of compliance.

Affordable, Easily-Accessible Financing: The upfront costs of energy efficiency investments can be a major barrier for building owners. Policies and programs that create streamlined access to low-cost capital can enable building owners to account for the costs of a potential energy efficiency project over time and determine the financial savings

Energy Efficiency Requirements in Qualified Allocation Plans for Low-Income Housing Tax Credits: Owners of affordable housing have few options for incorporating energy efficiency into their buildings without raising rent on their tenants. Incorporation into state QAPs is one method of incentivizing energy efficiency in new construction and renovation projects.

National, Regional, or Statewide Multifamily Energy Challenge for Existing Apartment Portfolios: Voluntary energy reductions challenges can work well in providing a competitive environment for building owners to reduce their portfolio energy consumption while sharing best practices and lessons learned with other building owners. Support for these initiatives can include marketing and outreach, technical assistance, and financial incentives.

Streamlined Access to Energy Analysis and Planning Tools: Support for the development of energy analysis tools that are free or low-cost for building owners enables the identification and prioritization of energy efficiency projects. These tools ensure building owners are able to monitor the energy performance of their portfolio and measure the results of energy efficiency projects.

Case Studies

The case studies detailed in the report were chosen because of their success in overcoming many of the barriers we identified to achieving deep energy savings in the multifamily market. The case studies include:

- Michigan Saves Multifamily Energy Financing Program
- Florida's Multifamily Energy Retrofit Program
- Set the PACE St. Louis
- City of Chicago Energy Benchmarking
- Energy Outreach Colorado
- Massachusetts Low-Income Multifamily Energy Retrofit Program
- ConEdison's Brooklyn Queens Demand Management Program
- Foundation Communities: Utilizing the Energy Consumption Model for Utility Allowances

Introduction

Driven by the financial crisis that began in 2008, an increasing number of Americans have been renting rather than buying homes¹, and this trend has continued throughout the subsequent economic recovery. A majority of these rentals are in multifamily buildings, which have consequently seen falling vacancy rates and rising rental prices.^{2 3} This shift has served to both highlight the lack of energy efficiency attributes in this sector of the housing market, and led to renewed efforts to address the energy efficiency of these multifamily buildings as a way of reducing operating costs, increasing tenant comfort and health, and meeting environmental goals.

The benefits of energy efficiency retrofits are well documented in both the market-rate and low-income multifamily sectors. In addition to operational cost savings, owners can expect to realize lower vacancy rates, and higher property values.⁴ Tenants benefit from lower utility bills, a healthier indoor environment, and increased comfort.⁵ More efficient multifamily housing also leads to significant societal benefits through lower wholesale energy costs and a more reliable and sustainable energy system, with reductions in associated air pollution and greenhouse gas emissions.

Low-income multifamily residents tend to spend higher proportions of their income on utility bills and therefore are the most susceptible to the high costs of wasted energy.⁶ They also stand to benefit significantly from retrofits that reduce their energy costs and free up their budgets for other essential expenses. Renters also tend to live in less efficient buildings⁷ than owner-occupied multifamily units or even renters in single occupancy units, which makes the goal of increasing energy efficiency for low-income renters a vital policy objective in order to provide healthy, comfortable and affordable living environments for those in affordable housing.

¹ Mark Uh. "From Own to Rent: Who Lost the American Dream?" *Trulia*. February 11, 2016.

<http://www.trulia.com/blog/trends/own-to-rent/>

² "Quick Facts: Resident Demographics" *National Multifamily Housing Council*.

<http://www.nmhc.org/Content.aspx?id=4708>

³ "Multifamily Outlook 2016" *Freddie Mac*. 2016.

http://www.freddiemac.com/multifamily/pdf/freddieMac_mf_outlook_2016.pdf

⁴ Deborah Philbrick, Rachel Scheu, and Ann Evens. "Preserving Affordable Multifamily Housing Through Energy Efficiency" *Elevate Energy*. 2014. http://www.elevateenergy.org/wp/wp-content/uploads/Preserving_Affordable_Multifamily_Housing_Through_Energy_Efficiency.pdf

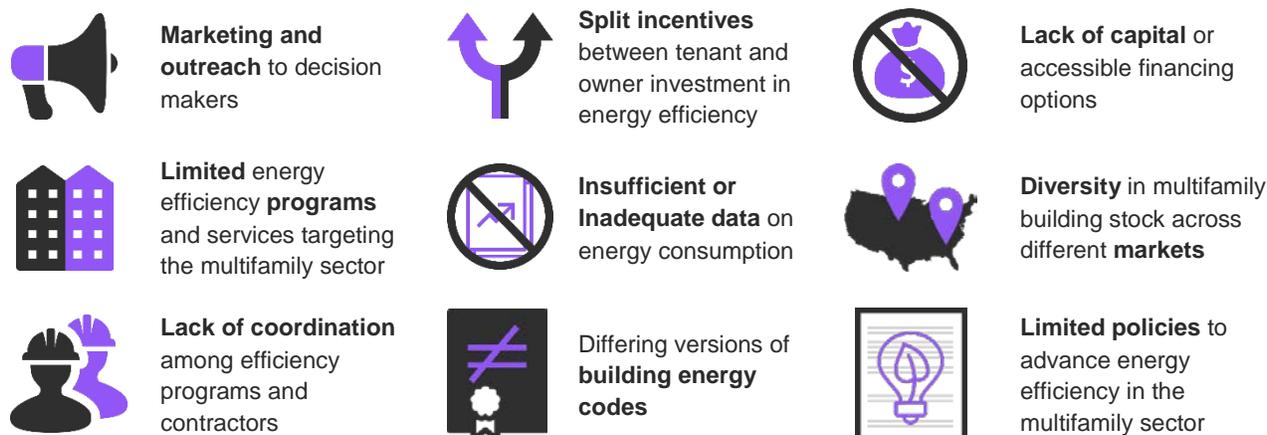
⁵ Ibid.

⁶ American Council for an Energy Efficient Economy (ACEEE), Drehobl, A., L. Ross, "Lifting the High Energy Burden in America's Largest Cities: How Energy Efficiency Can Improve Low Income and Underserved Communities," 2016, www.aceee.org/sites/default/files/publications/researchreports/u1602.pdf

⁷ Gary Pivo. "Energy Efficiency and its Relationship to Household Income in Multifamily Rental Housing" *Fannie Mae*. 2012. https://www.fanniemae.com/content/fact_sheet/energy-efficiency-rental-housing.pdf

The potential for energy reductions in multifamily buildings is enormous; by pursuing cost-effective, deep-energy retrofits that reduce energy consumption by between 15 and 30 percent, the annual energy bill cost savings nationally could be nearly \$3.4 billion.⁸

However, there are significant hurdles to achieving these levels of energy savings in the multifamily building stock. Some of these major barriers include:



These barriers have hindered multifamily energy efficiency retrofit efforts for many years and are still only rarely effectively addressed. Utilizing the experience and research from Regional Energy Efficiency Organizations (REEOs) across the country, this paper aims to address these barriers by answering the following questions:

- What is the current state of the multifamily sector in the United States?
- What has been most effective in the implementation of utility, state, and local multifamily energy efficiency initiatives?
- What else can be done to support energy efficiency in multifamily buildings, beyond traditional utility or municipal programs?
- How can the REEOs play a role in supporting efforts to increase the energy efficiency of multifamily buildings?

The answers to the questions above are included throughout this report and are intended to inform energy efficiency program administrators and policy makers as they look to energy efficiency in multifamily buildings as a part of broader energy savings and sustainability efforts.

⁸ "Fact Sheet: The Multifamily Energy Savings Project" ACEEE. <http://aceee.org/files/pdf/fact-sheet/FS-multifamily-project.pdf>

Market Characterization

In order to understand the current and future opportunities related to energy efficiency in multifamily buildings, it is helpful to know how multifamily buildings fit into the broader housing market landscape, the common features and characteristics of multifamily buildings, and the demographics of multifamily building occupants. In the United States, over 23 million housing units—18 percent of the total housing market—are categorized as multifamily. These structures are typically defined as buildings with five or more housing units. While not usually considered multifamily, information on two-to-four-unit buildings has been included in some of the data that follows as a comparison.

The following section includes information on the physical attributes of the national multifamily building stock including the number of units in each structure, their location, the age of the structure, equipment, and energy efficiency levels. Also included is information on multifamily building owners and occupants, including the percentages of owners versus renters, their income, and their energy burden or percentage of household income that is spent on energy expenditures.

Number of Units in Structure

Multifamily units account for approximately 18 percent of the nation's housing units. Table 1 below shows the number of units associated with each housing type. Figure 1 illustrates the segmentation of the multifamily market as a whole based on number of units. Structures with five to nine units accounted for 27 percent of multifamily buildings, properties with 10-19 units accounted for 25 percent, and properties with more than 20 units accounted for 48 percent.

Table 1. Composition of National Housing Market

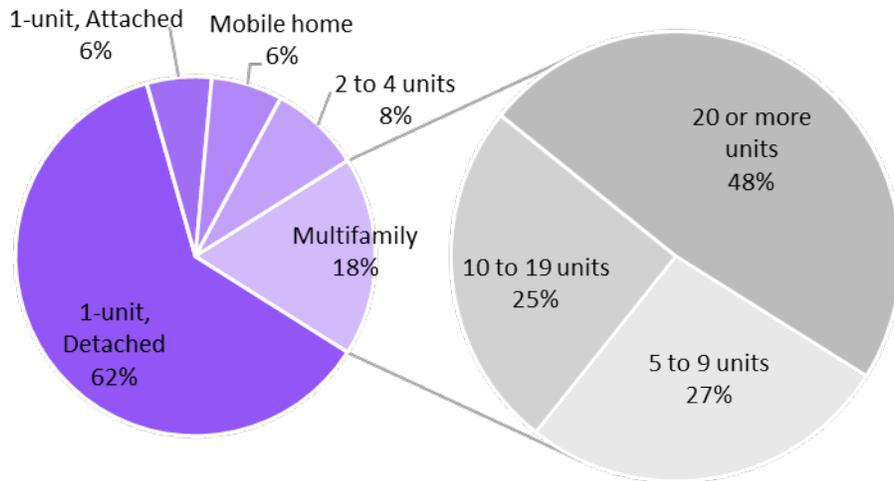
Housing Type	No. of Housing Units	Percent of Total
1-unit detached	81,840,073	62%
1-unit attached	7,725,793	6%
Mobile home	8,506,996	6%
2 to 4 units	10,856,886	8%
5 to 9 units	6,341,597	5%
10 to 19 units	5,950,183	4%
20 or more units	11,410,553	9%
Total Housing Units	132,632,081	

Source: U.S. Census Bureau⁹

*Does not include housing units attributed to boats, vans or RVs

⁹ U.S. Census Bureau, 2010-2014 American Community Survey 5-Year Estimates. *Selected Housing Characteristics*.

Figure 1. Composition of National Housing Market



Source: U.S. Census Bureau¹⁰

Location and Age of Structures

Over 96 percent of multifamily buildings can be found in urban areas^{11,12} Reasons for the higher occurrence of multifamily buildings in urban areas include zoning ordinances, the cost of land, population density, and historical patterns of development.¹³

The age of a building can have an impact on its energy performance due to the nature of how building construction standards have evolved over time. Over 78 percent of the multifamily buildings in the United States were built prior to 1990 as illustrated in Figure 2 below.¹⁴ Older housing can be significantly less efficient or more difficult to operate efficiently due to the design of the building and outdated equipment.¹⁵ The age of a structure can impact how economical it may be to make envelope improvements or other efficiency improvements. Additionally, a higher number of low-income renters live in older buildings compared higher-income renters.¹⁶

¹⁰ U.S. Census Bureau, 2010-2014.

¹¹ According to U.S. Census Bureau definitions, urbanized areas of 50,000 or more people form the urban cores of metropolitan statistical areas, while urban clusters of at 10,000-50,000 people form the urban cores of metropolitan statistical areas.

¹² Energy Information Administration (EIA), Residential Energy Consumption Survey, Table HC2.2 Structural and Geographic Characteristics of U.S. Homes, by Owner/Renter Status, 2009.

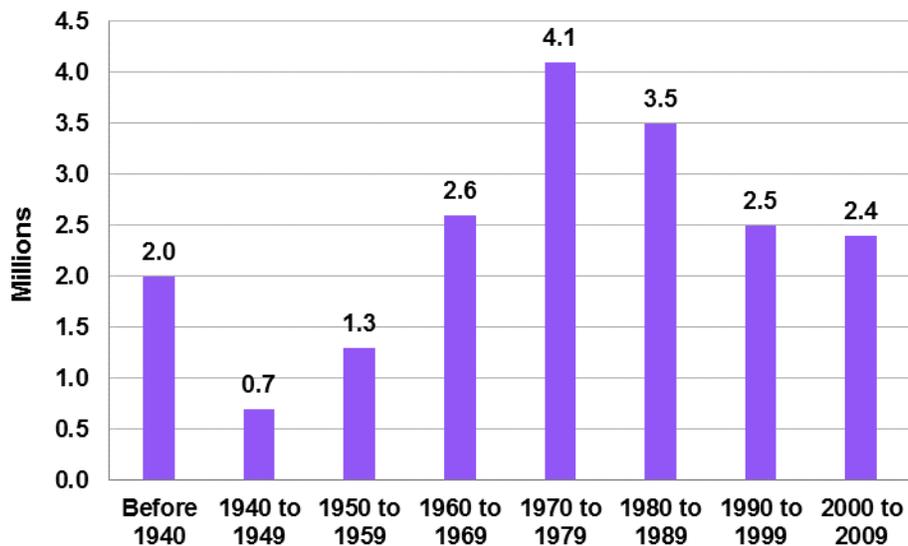
¹³ Joint Center for Housing Studies of Harvard University (JCHS), America's Rental Housing: Evolving Markets and Needs, 2013, www.jchs.harvard.edu/sites/jchs.harvard.edu/files/jchs_americas_rental_housing_2013_1_0.pdf

¹⁴ Energy Information Administration (EIA), Residential Energy Consumption Survey, Table HC2.1 Structural and Geographic Characteristics of U.S. Homes, by Housing Type, 2009.

¹⁵ JCHS, 2013.

¹⁶ JCHS, 2013.

Figure 2. Multifamily Buildings by Year of Construction



Source: U.S. Energy Information Administration¹⁷

Equipment and Energy Efficiency

Reviewing the equipment and features found in multifamily buildings can illustrate the sizable opportunity that still exists to address energy efficiency in multifamily buildings. Table 2 compares the existence of certain energy efficiency measures in multifamily structures. Energy audits or assessments are useful tools in identifying energy savings opportunities, but only three percent of multifamily buildings have received an energy audit. This indicates a tremendous opportunity for identifying and addressing efficiency in multifamily buildings. Additionally, installation of equipment such as programmable thermostats, efficient lighting, and ceiling fans are inexpensive measures that can have a sizable impact on a multifamily unit's efficiency. Upgrading to more efficient windows and additional insulation are also areas for energy efficiency improvement.

¹⁷ EIA, HC2.1, 2009.

Table 2. Selected Multifamily Structural Characteristics

Energy Efficiency Measure	Yes	No
Energy Audit Performance	3%	97%
Energy Efficient Light Bulbs	48%	52%
Programmable Thermostat	15%	85%
Ceiling Fans	47%	53%
Double or Triple Pane Windows	48%	52%
Adequate Insulation	79%	21%

Source: U.S. Energy Information Administration¹⁸

Characterizing Multifamily Building Owners and Occupants

The majority of multifamily building occupants, nearly 88 percent, are renters.¹⁹ This creates a unique situation regarding the motivation and impacts of energy efficiency upgrades in these buildings. In most multifamily buildings the owner is responsible for making decisions related to building operations and upgrades. However, frequently, tenants are responsible for utility costs for their individual units. The tenant would therefore reap many of the benefits of energy efficiency upgrades including lower utility costs and increased comfort. This conflict of interests between the owner and tenant is often referred to as a split incentive—a common challenge that some of the successful programs profiled in the report have found innovative ways to address.

Household Income

Table 3 shows that households in multifamily buildings tend to have lower incomes than those in single family detached homes. Additionally, there are more than twice as many households that are considered below the poverty line living in multifamily buildings and two to four unit buildings compared to those in single family detached buildings.

Households with lower incomes tend to spend a greater proportion of their income on energy costs, giving them a higher household energy burden. This concept is explained further in the section below. Many multifamily building tenants have little influence over efficiency upgrades in their units and are therefore reliant upon building owners to make upgrades that will increase efficiency and decrease their energy burden.

¹⁸ EIA, HC2.1, 2009.

¹⁹ Ibid.

Table 3. Household Income

Structural and Geographic Characteristics	Below Poverty Line*	Less than \$20,000	\$20,000 to \$39,999	\$40,000 to \$59,999	\$60,000 to \$79,999	\$80,000 to \$99,999	\$100,000 to \$119,999	\$120,000 or More
Single Family Detached	9%	12%	20%	18%	13%	9%	6%	13%
Unit in 2 to 4 Unit Buildings	23%	31%	21%	12%	7%	3%	2%	3%
Unit in 5 or More Unit Buildings	19%	30%	22%	14%	8%	4%	1%	3%

Source: U.S. Energy Information Administration²⁰

**Number of households below the poverty line, the annual household income and number of household members were compared to the 2009 Poverty Guidelines for families published by the U.S. Department of Health and Human Services.*

Energy Burden

Energy burden is defined as the percentage of household income that is spent on energy expenditures.²¹ Table 4 below illustrates that renters have a lower annual median income and higher median annual utility cost and energy burden compared to owners.

Low-income multifamily households²², in particular, have a higher energy burden of 5 percent compared to non-low-income multifamily and average households of 1.5 percent and 3.5 percent, respectively.

²⁰ U.S. EIA, Structural and Geographic Characteristics of U.S. Homes, by Household Income, Table HC2.5, 2009.

²¹ American Council for an Energy Efficient Economy (ACEEE), Drehabl, A., L. Ross, "Lifting the High Energy Burden in America's Largest Cities: How Energy Efficiency Can Improve Low Income and Underserved Communities," 2016, www.aceee.org/sites/default/files/publications/researchreports/u1602.pdf

²² Defined in ACEEE's report as households with "income at or below 80% of the area median income".

Table 4. Selected Household Characteristics

Household Type	Median Annual Income	Median Size of Unit (sq. ft.)	Median Annual Utility Spending	Median Annual Utility Cost (per sq. ft.)	Median Energy Burden
Renters	\$34,972	1,000	\$1,404	\$1.40	4.0%
Owners	\$68,000	1,850	\$2,172	\$1.17	3.3%
Low-income multifamily	\$21,996	800	\$1,032	\$1.29	5.0%
Non-low-income multifamily	\$71,982	950	\$1,104	\$1.16	1.5%
All Households	\$53,988	1,573	\$1,932	\$1.23	3.5%

Source: American Council for an Energy Efficient Economy²³

²³ American Council for an Energy Efficient Economy (ACEEE), Drehobl, A., L. Ross, "Lifting the High Energy Burden in America's Largest Cities: How Energy Efficiency Can Improve Low Income and Underserved Communities," 2016, www.aceee.org/sites/default/files/publications/researchreports/u1602.pdf

Barriers and Opportunities for Utility Multifamily Program Administrators

Utilities across the country offer programs that deliver energy efficiency to the multifamily sector. Administrators of these programs face numerous barriers for delivering energy efficiency given the complexity of ownership, utility metering and financing structures in multifamily buildings. While every situation is unique, many of these barriers are commonly encountered regardless of the location or building profile. However, every barrier presents an opportunity for utilities to tailor their programs to effectively serve the needs of multifamily building owners and tenants. Some of these programs elements include:

1. Design energy efficiency programs specifically for multifamily buildings.
2. Focus on achieving whole building, deep energy savings through a single program offering or have highly coordinated residential and commercial program offerings.
3. Provide building owners and landlords with streamlined access to their building's energy usage and performance.
4. Coordinate with other types of programs that leverage ratepayer and private capital to serve the needs of the market.

Many factors must be addressed in order to design and deliver highly effective multifamily energy efficiency programs. The following section includes barriers and opportunities to address issues that program administrators may face when designing and managing multifamily energy efficiency programs. The opportunities and recommended solutions are based upon previous program experiences that have proven effective in achieving multifamily energy efficiency goals. Examples of applications of these solutions are illustrated in case studies included in the following section of this report.

Programs Targeted to the Multifamily Sector



Limited energy efficiency programs and services targeting the multifamily sector: Many utilities will group multifamily buildings in either their residential or commercial portfolio of programs. The offerings and outreach strategies in these programs do not always match up well with the multifamily sector and can lead to low participation.

The multifamily sector's unique attributes in construction, ownership, and management require programs and services that address those specific circumstances. Often times, multifamily energy efficiency programs are incorporated into either a utility's residential or commercial program portfolio. This can result in multifamily building owners and operators being targeted with incentives and marketing approaches that are not applicable or the wrong scale for what is needed to address their specific needs. The impact of this practice is that multifamily building owners and operators may not take advantage of programs if they do not feel the offering is

valuable or accessible for their needs. Utilities and program administrators can address this issue by developing energy efficiency program offerings that are designed and targeted specifically to multifamily building owners and operators. This can help to address the need for energy efficiency resources in multifamily buildings while ensuring utility program resources are being applied to the appropriate audiences.

Direct-Install Programs as a Gateway to Comprehensive Programs



Limited energy efficiency programs and services targeting the multifamily sector: Direct-install programs that provide low- and no-cost measures to multifamily buildings are a good place to start, but are most effective when incorporated into a more holistic deep retrofit program.

A direct-install program is a great place to start for a utility that does not yet have a dedicated multifamily energy efficiency program. These programs typically provide easy to install items like shower heads, faucet aerators, lightbulbs, pipe insulation, weather stripping, smart thermostats, or other similar measures typically at no cost to the multifamily owner or tenant. They either use trained contractors who can install equipment at the time of an energy audit, or they mail them directly to the residents. The split incentive is addressed by providing measures that benefit both owners and tenants.

Direct-install programs are a great opportunity to build relationships with customers who may not be aware of the incentives available for energy efficiency improvements or may not understand the value those improvements will provide. These measures tend to provide a quick payback and if the building owner is engaged, can be combined with other measures with deeper savings potentials to create more comprehensive retrofit projects with attractive returns on investment. One way to achieve these deep savings is to include a scoping audit for other energy conservation measures along with the installation of the direct-install measures and to educate the building owner on the opportunities for deeper energy savings and any available incentives.

"One-Stop Shop" Program Design



Limited energy efficiency programs and services targeting the multifamily sector: Building owners may lack the time or resources to manage a retrofit project from start to finish or encounter other hurdles that prevent the successful completion of the project. A one-stop-shop program can help coordinate and streamline the process.

A one-stop shop program model provides personalized concierge-style service for efficiency retrofit projects. Program advisors lead customers through every step of the audit and retrofit process to completion. They serve as a single point of contact who can answer questions along the way, thereby simplifying and streamlining what can otherwise be a complicated and time-

consuming process. A one-stop shop model combines all of the behind-the-scenes services required for a utility program and places them under one roof.

Typically run by a third-party organization, a one-stop-shop can help navigate the permitting process, interact with regulatory agencies, connect owners to financing sources, bid out the work for contractors, and conduct quality assurance on the work upon completion. This leads to greater convenience for building owners and reduces the resources and time required on their end to complete the project. It can also help utilities increase their customer participation rates as customers are more likely to complete work rather than drop out because the process is too burdensome.

Multifamily Market Assessments to Understand Customer Needs



Diversity in multifamily building stock across different markets: Some efficiency programs that reach multifamily buildings aren't specifically designed for the needs of the building owners or buildings in the area they serve, leading to low participation rates, low energy savings rates, and dissatisfied customers.

Understanding the multifamily housing market within a specific geography is an important first step in designing an energy efficiency program targeting multifamily buildings. In order to maximize energy savings with a limited amount of resources, it can be helpful to also look at the savings targets of other exemplary efficiency programs operating under similar market conditions. Certain multifamily efficiency programs are able to reach 26 percent of the total eligible units in their territory per year²⁴. Conducting a thorough analysis of the customer base can identify opportunities to focus efforts and then to implement customized outreach and engagement strategies based on this data. Utilizing multifamily market characterizations, such as the one offered in this report, can inform the efforts to increase customer participation in multifamily efficiency programs.

“Pay-For-Performance” Programs to Incentivize Deeper Retrofits



Lack of capital or accessible financing options: Incentive programs encourage installation of individual measures, but more is often needed to spur deeper retrofits that include multiple, integrated measures.

Often it is challenging for multifamily building owners to source the capital needed to invest in energy efficiency, particularly if it is between capital cycles. Utility program administrators can consider offering a higher rebate for multifamily retrofit projects that meet a high threshold of savings. This provides capital, while also encouraging more robust energy savings projects.

²⁴ Lauren Ross, Michael Jarrett, and Dan York, ACEEE. “Reaching More Residents: Opportunities for Increasing Participation in Multifamily Energy Efficiency Programs” 2016.
<http://aceee.org/sites/default/files/publications/researchreports/u1603.pdf>

These programs typically involve the identification of qualified program partners who can accurately model the potential savings of proposed projects for the building owner. This allows the building owner to decide which work they would like to complete based on the projected savings and incentives available if they are able to achieve those savings. Incentives are typically paid after the work is completed depending on the energy savings achieved.

Low-Income Multifamily Buildings Targeted



Lack of capital or accessible financing options: Low-income multifamily tenants are disproportionately burdened by energy costs and it can be difficult for building owners of low-income multifamily housing to recoup investments in energy efficiency projects without raising rental costs for their tenants.

There are ways to provide extra support within multifamily programs to ensure retrofit projects benefit tenants and building owners of low-income multifamily housing. One strategy is to offer enhanced incentives for projects involving low-income housing. Many states allow for low-income programs to meet a lower cost-effectiveness test than market rate programs. This allows utilities to design programs that increase participation from low-income building owners through higher rebates, technical assistance, and enhanced outreach and marketing. Leveraging relationships with existing organizations that provide services to low-income communities can help drive participation rates because tenants and building owners already have relationships with these organizations and they can conduct valuable outreach.

Streamlined Access to Energy Data



Insufficient or inadequate data on energy consumption: Without building-level energy consumption data, multifamily building owners cannot measure or track energy use or improvements. This data has historically been inaccessible or cumbersome to obtain.

Accurate and easily-accessible building energy data is crucial to measuring, managing, and tracking the energy consumption in an individual building or portfolio of buildings. Since collecting the data and/or obtaining written consent from individual tenants is time-consuming and burdensome for building owners, utilities²⁵ are beginning to offer (or their authorized third parties) access to aggregated whole-building data, which combines the consumption of all tenant and common area spaces and avoids privacy concerns for individual tenants. The best of these programs have:

- Clear, user-friendly instructions for accessing the data online;

²⁵ ENERGY STAR. *Find utilities that provide energy data for benchmarking*. Available at: https://www.energystar.gov/buildings/owners_and_managers/existing_buildings/use_portfolio_manager/find_utilities_provide_data_benchmarking

- An aggregation threshold (such as four units and above) where individual tenant consent is not required, and standard electronic forms to be used when specific tenant authorization is still needed (such as in buildings with three units or fewer);
- A standard data format;
- Automated transfer of whole building data directly into benchmarking tools, such as ENERGY STAR Portfolio Manager, via web services, significantly reducing administrative burdens for both utilities and building owners;
- Continual access (e.g. no need to resubmit forms yearly).

The DOE's "Green Button" has been one successful way of streamlining this process by providing a clickable button on the utility's website for downloading utility data. Portfolio Manager Web Services Data Exchange allows for utility data to automatically be uploaded into a building owner's ENERGY STAR Portfolio Manager account and can provide automated data transfer on an ongoing basis. These allow building owners or operators easier and quicker benchmarking—which can lead to better energy consumption awareness, prioritization of energy conservation measures, and ongoing measurement and tracking without compromising access to private billing information.

Geo-targeted Energy Efficiency Programs as a Means to Defer Grid Investments



Diversity in multifamily building stock across different markets: Energy efficiency incentives offered equally across a utility territory don't always accurately value the benefits of those measures to the local grid in areas with demand constraints.

Many investments in transmission and distribution (T&D) infrastructure are driven by the need to replace aging or failing equipment or to connect new energy generation to the grid. Energy efficiency investments can, in some cases, defer or even eliminate the need for some T&D investments when they are driven by load constraints or to lower peak demand costs²⁶. Utilities can actively target geographical areas with energy efficiency and other demand-side reduction programs in order to delay the construction of new infrastructure at a savings to their customers.

Energy efficiency program administrators can incentivize certain program offerings that reduce peak demand at different times and in different seasons in order to delay the need for building T&D equipment that would be needed without this intervention. The multifamily sector is a particularly important target for these programs in efforts to reduce peak loads during the evening hours when demand tends to be high. In order to get the energy savings needed to

²⁶ Chris Neme and Jim Grevatt. "Energy Efficiency as a T&D Resource: Lessons from Recent Efforts to Use Geographically Targeted Efficiency Programs to Defer T&D Investments" 2015. www.neep.org/sites/default/files/products/EMV-Forum-Geo-Targeting_Final_2015-01-20.pdf

delay the construction of this equipment for a significant amount of time, successful programs have developed protocols to determine which projects have the potential to be deferred by targeted efficiency and other demand-side energy resources.²⁷

Outreach and Customer Engagement Strategies that Leverage Established Community Partners



Marketing and outreach to decision makers: Reaching and engaging the appropriate decision makers for energy efficiency investments can be especially challenging in the multifamily market.

As previously mentioned, the highest concentration of multifamily buildings are found in cities and densely populated urban areas. Utilities and program administrators may consider focusing marketing and outreach activities in cities in order to reach the majority of customers who would benefit from these programs. Establishing relationships with city governments, multifamily building developers, property management companies, housing advocates, and trade associations can be beneficial in identifying new developments or anticipated capital improvements which can provide opportunities for incorporating energy efficiency measures. Additionally, working with local housing finance authorities who provide housing subsidies and nonprofit housing organizations can also provide a valuable partnership in incorporating energy efficiency into multifamily buildings, particularly those that house low-income populations.

Knowledgeable Contractor and Association Networks



Lack of coordination among efficiency programs and contractors: Communicating energy efficiency opportunities to customers can be challenging, especially when there are multiple program offerings with rebates and incentives that change over time.

Generally, the more multifamily programs that exist—whether through utility rebate and incentive programs, local private financing offerings, weatherization programs, or any other means—the better. Every building is different and multiple offerings provide avenues for building owners and managers with varying needs to access energy efficiency upgrades. However, ensuring that the programs are marketed in a coordinated fashion can prove challenging. In particular, coordination of the contractors delivering the programs is necessary to avoid confusion among building owners and inadvertently create roadblocks to participation.

First, program administrators may want to consider the contractor networks that they are employing. Utilities and other program administrators often have a network of qualified contractors (sometimes called “trade ally networks”) who are certified to implement efficiency

²⁷ Ibid.

projects. With multiple program offerings in a single geography there may be multiple contractor networks. Program administrators may want to consider coordination of the contractor networks that they are employing to deliver their programs and ask:

1. Are the contractors across the program offerings the same?

Using the same list of qualified contractors across programs can help coordinate offerings.

2. Are the qualified contractors local businesses or businesses with a history of working within the state or locally?

Using qualified contractors that have relationships with building owners and know the local landscape can improve participation rates.

A marketing working group that brings together the program administrators and their respective implementation contractors across all multifamily energy efficiency offerings within geography is another way to facilitate coordination. In Illinois, a marketing working group has been proposed to help coordinate the utilities' multifamily programs with private financing and local government offerings. This type of working group will help ensure that program administrators and their contractors understand the various program offerings, are aware of changes to these offerings (such as halting or resuming incentives), and provide messages in a way that allows for better communication with building owners.

Barriers and Opportunities for Policymakers and Other Stakeholders

Utility program design considerations and modifications are not the only means by which multifamily energy efficiency can be supported. State and local governments, through policy, regulatory, and educational efforts, can significantly advance building owner and tenant access to energy efficiency. Policies help address market barriers such as incomplete information through energy benchmarking and data transparency efforts within the utility and real estate sectors. An unclear regulatory environment – due to multifamily housing straddling the residential and commercial sectors – can also inhibit efforts to advance energy efficiency. This barrier can be addressed by establishing policies that specifically speak to the nature of multifamily buildings, such as developing a multifamily-specific building energy code. Other barriers that can be addressed through policy changes include workforce development and access to low-cost capital.

Not every challenge in advancing energy efficiency in the multifamily sector can be addressed through a top down approach, but policies and regulations set the rules by which the market can address the efficiency of these buildings. Local and state governments each have a role in building a supportive policy environment. Again, each of the barriers presented below is followed by a recommendation that stems from proven examples in the field later in this report.

Building Energy Benchmarking and Transparency Policies



Insufficient or Inadequate data on energy consumption: Building energy consumption data is not publicly available to the real estate market. Residents cannot compare the efficiency of their building to others. Building owners who don't benchmark the energy consumption of their building may miss opportunities for improvement.

Municipalities, counties, and states across the country are deciding to make building energy data available to the market by requiring benchmarking in certain buildings and then making that information publicly available. Benchmarking and transparency ordinances have been implemented in 17 municipalities, two states, and one county, with others under active development or consideration. The increased information in the real estate market that results from these policies allows for energy efficiency to be more accurately valued in the decision making process. Building owners are more easily able to identify buildings in need of efficiency improvements and prospective buyers or tenants have a more accurate idea of the potential operating costs of a building. Multifamily housing is a particularly important market for these ordinances because renters typically have very little insight into the energy consumption of a building until they move in and receive their first utility bills. Increasing the transparency of the energy consumption in these buildings allows for building owners to compete for tenants by ensuring that buyers and tenants have access to critical information about a property they are

considering. These policies are most effective when paired with measures for streamlined access to whole-building energy consumption requirements. See the “Streamlined Access to Energy Data” section for more on such measures.

Building Energy Data Transparency in the Real Estate Market



Insufficient or inadequate data on energy consumption: When energy efficiency data is collected, it is not always shared in a way that allows for transparency and disclosure in the real estate market, and therefore the efficiency characteristics are not appropriately valued.

Benchmarking can be an effective way of determining how a multifamily building is being operated compared to similar buildings. It is not as effective at rating the physical characteristics of a building. Building Asset Ratings are the best way to determine the actual efficiency of the physical assets that make up multifamily property. There are a number of building asset rating systems in use today including the U.S. Department of Energy's Building Energy Asset Score, ASHRAE's Building Energy Quotient, ENERGY STAR Target Finder, California's Building Energy Asset Rating System, and the Massachusetts Building Asset Rating System. Policies that include asset ratings as a part of existing energy efficiency programs can be an effective way of increasing the number of energy asset ratings in the market. These can be combined with initiatives that make the ratings available to the real estate market.

Once buildings are rated or certified, there is often disconnect between the building owners who have this information and those that could potentially benefit from having it to use in their decision making process. Efforts to connect building energy data with the real estate market allow potential buyers or renters to more accurately value the energy efficiency of the building as a part of their decision to buy or rent the building and what they are willing to pay for the property. Supporting efforts to organize and connect building energy data sets with the real estate market such as connecting home energy information with Multiple Listing Services (MLS), public-facing real estate listing databases, and trainings for real estate professionals on energy efficiency can ensure energy features are more accurately valued.

Adoption of the Latest and Most Efficient Model Energy Code



Differing versions of building energy codes: Older and less efficient building energy code standards can have long term impacts on a building's efficiency and operating costs.

The building code standards to which buildings are constructed can have an impact on the efficiency of new multifamily construction as well as major retrofits, additions, and renovations. Building energy codes are typically adopted as part of a suite of other building codes meant to ensure the safety, resiliency, and quality of construction for buildings. Building energy codes

also affect the comfort, air quality, and affordability for tenants. The latest model energy code—the 2015 International Energy Conservation Code (IECC)—is 15 percent more efficient on average for multifamily properties than the 2009 version. States or local jurisdictions may consider adopting this newest energy code standard to ensure energy efficiency is incorporated into multifamily building design and construction. The model energy code is updated by the International Code Council (comprised of local and state government officials) every three years.

Building Officials, Plan Reviewers, Code Inspectors, Architects, Builders, and Trades Trained on Multifamily Energy Code Compliance



Differing versions of building energy codes: Once building energy codes are adopted, compliance rates with the new code may decrease as the market adjusts to the changes in standards. Reduced compliance can negatively affect the energy performance of these buildings.

The latest model energy code (the 2015 IECC) has easier-to-understand provisions for retrofits, additions, and renovations to existing and historic buildings. Still, multifamily compliance can be complicated because the building must comply with the residential provisions if it is three stories or less, or the commercial provisions if it is four stories or more. Building officials report that this frequently causes confusion for designers and builders, which can slow down the inspection and approval processes. States and local jurisdictions can increase their training, outreach, tools, and resources for code compliance in the multifamily sector, and communicate that inspecting to the energy code is a priority. Policymakers can enlist utility program administrators in these efforts by setting the framework for them to claim energy savings for code trainings in their energy efficiency programs.

Multifamily-Specific Chapter in the Energy Code



Differing versions of building energy codes: The multifamily provisions in the energy code are split between the residential and commercial chapters, which can sometimes cause confusion as well as inspection and permitting delays.

While multifamily buildings have characteristics that are similar to both residential and commercial structures, they also include unique factors that are neither addressed by the residential nor commercial standards. For instance:

- Multifamily buildings have different occupancy schedules than other commercial buildings;
- Multifamily building owners make decisions on building improvements, not tenants;

- Multifamily tenants are more greatly impacted by their neighbors' actions than single-family detached residential households due to shared central systems, shared floors, ceilings, and walls;
- Multifamily buildings have different needs for achieving air quality.

State and local governments and other entities that help develop building energy codes may consider developing codes that are specific to multifamily buildings. Currently, in the 2015 IECC model energy code, multifamily buildings are split between the residential and commercial provisions. Including these provisions in a separate chapter would reduce confusion and increase accurate compliance.

Affordable, Easily-Accessible Financing



Lack of capital or accessible financing options: Lack of upfront capital or the inability to invest in measures with longer payback periods means fewer retrofit projects are pursued.

The upfront and incremental costs of energy improvements can be a barrier for building owners and managers. Financing can remove that barrier - if financing is readily available, low-hassle, and cost competitive. One of the key features of well-designed financing programs is to provide streamlined access to capital at very low- or no-cost to the borrower.

One way to do this is through an interest rate buy-down. This allows a utility, state or local government, or other entity to leverage third-party financing by paying a portion or all of the interest on a loan in order to improve the economics of energy efficiency projects and drive customer participation. A number of programs offer zero interest loans to their customers through this type of partnership and are able to reach more customers due to the reduced cost of capital.

Another program that continues to expand is the Property Assessed Clean Energy (PACE) financing model, which varies by state and local adoption. PACE programs offer long-term financing for renewable energy and energy efficiency upgrades to homes and business, and offer attractive financing that is repaid via the property tax assessment, thus staying with the property instead of the owner. Commercial PACE financing has gained considerable momentum in recent years in several U.S. states, with PACE-enabling legislation active in 33 states and programs now launched and operating in 19 states plus D.C.

Energy Savings Performance Contracting (ESPC) continues to offer a shared savings approach to reduce energy and water use and increase operational efficiency. By partnering with an energy service company, a facility owner can use an ESPC to pay for facility upgrades with tomorrow's energy savings—without tapping into capital budgets. State and local governments,

public educational institutions, schools and hospitals are often good candidates for performance contracts.

Incentivized energy efficiency financing is growing as well. Freddie Mac offers discounted financing options for eligible properties that target at least 15% energy or water use savings, and the program may be used for acquisition or refinance. Similarly, Fannie Mae offers a number of different energy efficiency financing programs to meet eligible borrower needs. Discounted financing is available for acquisition, refinance, or energy efficiency upgrades that target at least 20% energy or water use savings; and borrowers may use an existing network of common market lenders with the pricing incentive. In addition, the cost of the required ASHRAE level energy audit is reimbursed at closing. These programs offer favorable loan pricing to building owners who make third-party verified energy improvements to their buildings.

Many leading companies with property owners and managers who capture energy and resource efficiency as a competitive advantage often do so by focusing on the right financial metrics. Although simple cash payback (in years) is widely mentioned, leading companies undertaking efficiency and other energy optimizing strategies tend to use more appropriate financial metrics that take into account the time value of money and the likely holding time of the asset. Return-on-investment (ROI), annualized ROI, internal-rate-of-return (IRR), net-present-value (NPV) - all capture financial benefits of projects over time, which is often substantial and thus more meaningful to financial and institutional leaders. These metrics may also be part of the concept of lifecycle cost analysis, which refers to determining the entire cost of a project over its expected useful life, also a better measure of value for some organizations and projects.

Energy Efficiency Requirements in Qualified Allocation Plans (QAPs) for Low-Income Housing Tax Credits



Split incentives between tenant and owner investment in energy efficiency: Owners of affordable housing have few options for incorporating energy efficiency into their buildings without raising rent on their tenants. Incorporation into state QAPs is one method of incentivizing energy efficiency in new construction and renovation projects.

The Low Income Housing Tax Credit (LIHTC) program provides federal funds to developers to construct affordable rental housing projects based on specific qualifying criteria. States are responsible for developing qualified allocation plans (QAPs) which outline specific eligibility requirements, criteria, and the process for distributing LIHTC tax credits.

Proposed development projects are scored against the QAP criteria and earn points based on how many criteria they satisfy. Tax credits are granted to projects that score the most points. QAPs serve as a crucial instrument in shaping the design and scope of affordable multifamily rental housing due to this process. Every property development using the LIHTC program must meet a federally established minimum level of energy efficiency. States are then able to award additional points or create additional requirements above these levels. States can award points

for projects that utilize energy-efficient construction materials and practices (e.g. high R-value insulation, air sealing, double-pane windows) and projects that incorporate energy-efficient products (e.g. ENERGY STAR appliances, high efficiency heating and cooling systems). Additionally, incorporating water conservation and efficiency measures such as faucet and shower aerators, low-flow toilets and greywater systems can also help to save energy. By incorporating energy efficiency into QAP criteria, states have the opportunity to realize energy and cost savings in affordable multifamily new construction and renovation projects.

National, Regional, or Statewide Multifamily Energy Challenge for Existing Apartment Portfolios



Diversity in multifamily building stock across different markets: Building owners prefer voluntary energy reductions initiatives which provide resources and support in efforts to compete to meet energy savings targets and receive recognition for successes.

Given the relative success and interest of voluntary energy challenges attracting large owners/operators of buildings throughout the United States, especially in collaboration with the DOE Better Buildings Challenge and EPA's Battle of the Buildings "Boot Camp," a statewide or regional energy challenge is compelling. DOE, EPA, and the REEOs could feasibly incubate or run such a regional challenge, especially by tailoring a multifamily-specific toolkit or offering additional support services. Such a challenge could be explicitly targeted to large portfolios of existing multifamily properties which are owned and operated by companies that hold their properties for longer periods of time.

Portfolio owners are often seeking new ways to attract and retain tenants, and some percentage of older properties are routinely engaged in an upgrade process, thus presenting an opportunity for increasing efficiency in common areas and tenant spaces. Opportunities include benchmarking and tracking of energy conservation measures such as lighting retrofits (including outdoor and parking lot), duct and envelope sealing, Energy Star appliances (especially refrigerators), improved insulation, and higher efficiency HVAC units.

Some larger owners of apartment portfolios have sustainability commitments, and many report to the industry-recognized Global Real Estate Sustainability Benchmark (GRESB) system for rating sustainability in real estate, which is increasingly used by private and institutional investors to screen real estate investments. Proponents say such ratings correlate with improved property financial performance. Such a challenge, then, could also serve as a means of more publicly recognizing these companies and their ongoing commitments. Most importantly, the purpose of an energy challenge is to empower owners/operators themselves to participate in at least a minimal fashion and subject to the rules of the challenge (for instance, achieving at least a 10 percent improvement in energy efficiency across their portfolio), and then to reward top performers for achieving deep energy savings and providing an avenue for sharing best practices with other challenge participants.

Streamlined Access to Energy Analysis and Planning Tools



Inadequate data on energy consumption: Allowing easy, direct access of whole-building energy data (including tenant spaces if separately metered) is essential. Increasingly sophisticated software tools are available specifically for the multifamily industry.

As mentioned earlier in this report, building owners and managers need easy, streamlined access to whole-building energy use data in order to enable benchmarking, prioritization of energy efficiency measures, tracking, and verification of savings. Benchmarking is the first step to identifying opportunities to reduce operating costs, increase asset value, and meet the increasing demands of tenants for environmentally-responsible housing options. Building owners and managers also will benefit from newer tools which aim to assist them in analyzing and prioritizing energy conservation measures relatively quickly, inexpensively, and reliably.

EPA Energy Star's Portfolio Manager is the industry's most recognized online tool available at no cost to measure and track energy and water consumption, as well as greenhouse gas emissions, in commercial buildings. With the launch of the 1-100 Energy Star score for multifamily properties, owners and managers can now earn and advertise the Energy Star certification recognizing the superior energy performance of their apartments.

Recently, other tools have been developed. SAHF developed the EZ Retrofit Tool with contractors ICF International and Bright Power, Inc. under a grant from the U.S. Department of Housing and Urban Development's Energy Innovation Fund. EZ Retrofit is a free audit tool that offers multifamily property owners and managers an easy way to identify cost-effective energy and water efficiency upgrades. After inputting information about current systems, EZ Retrofit recommends improvements to help maximize savings. For each recommendation, users receive detailed costs and savings estimates with graphic visualization of retrofit savings, including a customized audit report for their buildings to share with colleagues and senior management.

Wegowise, a 2012 startup, offers a fee-for-service online platform that automatically imports utility data each month to help benchmark, track and analyze energy and water usage and costs, and includes benchmarking, identification of energy savings measures, and results measurement. Similarly, Bright Power offers its Intelligence-Driven Energy Management system to clients through the management of building information, utilities, and systems. This approach is a comprehensive managed-service offering that claims to give owners and managers the ability to evaluate, prioritize, and monitor the performance of energy investments across an entire portfolio. The EnergyScoreCards' A through D scoring system provides a simple snapshot of overall building performance.

Exemplary Multifamily Energy Efficiency Programs

Through our research and work with stakeholders focused on multifamily energy efficiency retrofits, a number of programs stood out as being particularly effective at overcoming barriers and achieving deep energy savings in the multifamily building stock. The following case studies provide details on how these programs and initiatives were able to address the unique barriers to efficiency facing the multifamily market and achieve deep energy and financial savings.

Michigan Saves' Multifamily Energy Financing Program



Lack of capital or accessible financing options



Marketing and outreach to decision makers



Limited energy efficiency programs and services targeting the multifamily sector

The Basics: Michigan Saves was established in 2009 through a grant from the Michigan Public Service Commission (MPSC) to Public Sector Consultants. The grant was created to research and create an innovative statewide energy efficiency and distributed renewable energy financing system. In September 2011, Michigan Saves became an independent organization. During its first few years of operation, Michigan Saves served only single family homes and commercial buildings. In 2014, it expanded to include multifamily buildings of four or more units. As a nonprofit dedicated to making energy improvements easier for all Michigan energy consumers, expanding to include multifamily financing complemented its mission and was a logical next step.

Often there are upfront financial barriers to making energy efficiency upgrades in multifamily buildings. Building owners do not always have the upfront capital to make improvements, or may not be able to take on new traditional loans due to the existing financing on the building. Michigan Saves' Multifamily Energy Financing Program helps address these barriers throughout the state by providing affordable financing for energy efficient lighting, heating and cooling systems, insulation, appliances, water heaters, and more. Building owners work with Michigan Saves-authorized contractors to estimate the cost of improvements and fill out a loan application form. In 2014, Michigan Saves issued its first multifamily loan of \$15,500 to a non-profit organization

“We cut our energy bill in half by changing the bulbs in the common areas to LED. It’s good for the long run. The light bulbs last, but there is also a nice aesthetic to them. Financing through Michigan Saves was a beautiful way of doing the work without affecting the bottom line of the project. I’m helping my owners understand that I’m going to make them more money.”

— **Leslie Etterbeek, Property Manager of French Quarter Apartments in Southfield, MI**

that offers maternity assistance to homeless young women. The loan was used to upgrade the facility's lighting, HVAC system, and windows.

The Michigan Saves' Multifamily Energy Financing Program offers:

- Equipment finance loans of \$2,000 to \$1,500,000 for multifamily housing properties through Ascentium Capital or Team Financial Group, their authorized lending partners
- Standard terms of 24-60 months, or up to 84 months for good credit
- Rates range from 6-10 percent
- Utility partnerships to buy down interest rates to 0% APR

What Makes it Notable? Michigan Saves helps lower operating costs and improve cash flow for multifamily building owners. The energy efficiency measures it finances help lower building maintenance costs and make it easier for owners to recruit new tenants. "Turnover in multifamily properties is expensive and a hassle," says Todd O'Grady, commercial contractor coordinator for Michigan Saves. "The improved comfort and safety means higher tenant retention for property owners while improving their financial bottom line."

Michigan Saves' uses a list of approved contractors whose high-quality work drives additional uptake of the loan offering. "Our contractors are able to develop a portfolio of successful projects so they can approach other property owners," says O'Grady.

Additionally, in 2015 and 2016 Michigan Saves' partnered with DTE Energy, Consumers Energy, and Lansing Board of Water and Light to buy down interest rates to as low as 0%APR for qualifying loans. No upfront capital investment by the owner is needed and the 0% APR the owner begins to see their bottom line improve immediately from savings on their energy bills, even as they pay off the loan. Once the loan is paid off, of course, the energy savings continue to save the owner money.



The French Quarter Apartments in Detroit, Michigan benefitted from energy efficiency improvements financed by the Michigan Saves program.

Program Impacts and Results: While only a handful of multifamily projects have been completed using the Michigan Saves’ program, the impact on these properties is significant. On average, these property owners save over \$13,000 a year on their energy bills and the energy efficiency improvements pay for themselves in less than six years.²⁸

Table 5. Michigan Saves Program Data

Number of Completed Projects	Average Total Project Costs	Average Annual kWh Savings	Average Annual Therm Savings	Average Annual bill savings	Average Payback (Years)
20	\$56,884	126,387	12,457	\$13,056	6

Keys to Success: The Michigan Saves’ team has pinpointed two major keys to success:

- **Tailored Marketing:** “We recognize that this market is really unique,” O’Grady says. “We’re being diverse in our messaging—tailoring it to senior and assisted-living facilities or high-rise apartment building owners. By recognizing the unique needs of multifamily property owners, we’re building awareness about this program.”
- **Interest Rate Buy-Downs:** Buying down the interest rate to zero was critical in increasing participation in the program and continues to drive participation. “The utilities’ willingness to continue offering buy-downs is a testament to how effective these programs are,” said O’Grady. “And it is really exciting to see the kind of work that gets done when customers see the great financing opportunities available.”

Next Steps: Although the Multifamily Energy Financing Program is getting traction, increasing multifamily customer program participation to achieve deeper savings is the next step. Michigan Saves’ recently added a new lender that can offer unsecured financing to multifamily property owners who have HUD financing. This new offering may allow Michigan Saves the opportunity to expand into the affordable housing market more effectively.

Resources for More Information: To learn more about Michigan Saves’ Multifamily Energy Financing Program, see the following:

- [Program Website](#)
- [Eligible Measures List](#)

²⁸ Personal communication with Todd O’Grady, Outreach Coordinator of Michigan Saves, August 2016.

Florida's Multifamily Energy Retrofit Program



Lack of capital or accessible financing options



Marketing and outreach to decision makers

The Basics: Florida's Multifamily Energy Retrofit Program (MERP) began in 2013 with an initial investment of \$6.3 million in unexpended American Recovery and Reinvestment Act Funds from Florida's Office of Energy. The Office of Energy contributed additional funds in 2014 bringing the total to \$8.3 million. These dollars were used to seed a revolving loan fund, managed by the Florida Housing Finance Corporation (FHFC), intended to support the financing of energy retrofits in older affordable housing multifamily properties.

When the FHFC issued an initial Request for Applications (RFA) for the program in October 2014, it received very little interest. As a result, FHFC spent the better part of a year engaging developers, federal agencies and other stakeholders in designing a program that better reflected the needs of the market.

What Makes it Notable? The newly-designed program, launched in 2015, featured a number of modifications designed to simplify and streamline the process, and gain additional developer interest and buy-in. FHFC increased the allowable investment per unit, in addition to making return-on-investment (ROI) criteria less stringent and adding a developer fee. Finally, FHFC conducted extensive outreach within the community of affordable housing developers, helping developers to better understand the impact of these investments on their bottom line. According to program guidelines, loan funds may support the installation of the following measures, upon the completion of an energy audit showing projected energy savings:

- Air infiltration (e.g., envelope sealing, duct sealing, weather stripping);
- Replacement of appliances with Energy Star qualified appliances, lighting, faucets/showerheads, HVAC systems, programmable thermostats, boilers/water heaters, insulation, window film, high efficiency windows; and
- Other building improvements which will result in reduced energy and/or water consumption (Florida Housing Finance Corporation 2015).

Loans may cover up to \$15,000 of retrofit expenses per unit. A portion of the loan is forgivable: 10 percent for profit-oriented applicants and 15 percent for not-for-profit applicants. Loans to for-profit applicants are priced at one percent interest and loans to not-for-profit applicants are priced at zero percent interest, both with a 15-year term.

The new program design attracted significant interest from developers with deferred capital needs and limited cash flow to act upon them.

Program Impacts and Results: As before, projects were selected via a competitive RFA process. When the RFA was again released in late 2015, FHFC received 33 applications. The first round of retrofits funded by the MERP will be installed in 2016, and results will be available soon after.

Keys to Success: One of the most challenging elements of the MERP has been assembling the infrastructure to track utility data for properties that have undergone a MERP retrofit. FHFC has partnered with the Program for Resource Efficient Communities at the University of Florida to do the data tracking; however, getting the buy-in of utility stakeholders to provide the necessary data to the university required several rounds of engagement and trust-building. Ultimately, all of the state's investor-owned electric utilities agreed to provide this information, although some required a demonstration of tenant consent.

Next Steps: Given the limited supply of capital and the 15-year loan term, it may be some time before FHFC is able to offer a similar volume of retrofit financing; however, FHFC hopes that the utility data tracking will serve as a "proof of concept" to illustrate the significant savings available through energy efficiency retrofits in the affordable multifamily housing sector.

Resources for More Information: To learn more about Florida's Multifamily Energy retrofit Program, see the following:

- [Program Website](#)

Set the PACE St. Louis



Lack of capital or accessible financing options



Split incentives between tenant and owner investment in energy efficiency



Marketing and outreach to decision makers

The Basics: Property Assessed Clean Energy (PACE) financing can be used to finance energy efficiency in multifamily buildings, and one example of this is the Set the PACE program in St. Louis, Missouri.²⁹ Energy Equity Funding, the organization that administers the Set the PACE St. Louis program, spent 18 months collaborating with the law firm Armstrong-Teasdale to design the PACE program and ensure that it adhered to Missouri's PACE statute. It is important to note that the authorizing statute is written very broadly to encourage economic development and investment in sustainability and allows for PACE financing on rehabs and new developments. This is important because PACE can be an added capitol source for developers looking to enhance the energy efficiency of older, historic buildings.

Following the design phase, Energy Equity Funding was selected through an RFP process with the City of St. Louis to administer Set the PACE St. Louis. The program launched in August 2013. It has been one of the most successful PACE programs in the Midwest, having supplied more financing per capita than any other Midwestern PACE program. The bulk of the projects have been approved recently, as market awareness for PACE has increased. This is also reflected in the pipeline of developing projects, which is currently in the tens of millions of dollars. The current terms are:

- Minimum loans of \$25,000 and up to 10 percent of the value of the property
- Loans amortized over 10, 15, or 20 years
- Interest rates currently between 3-6 percent

Participation Requirements and Best Practices: The statute authorizing the PACE program includes a number of criteria for project eligibility and participation in the program. Projects must be energy related (energy efficiency and renewable energy) and result in an economic benefit that is greater than the cost of the project. The latter requirement encourages project developers to look at the project holistically and combine improvements that may have a shorter payback, such as LED lights, with improvements that may have a longer payback, such as renewable energy installations. It also provides building owners with the flexibility to include other cost savings, such as maintenance, into the return on investment calculation.

Projects must be within the St. Louis city boundaries and building owners are required to sign-off on the projects. While Set the PACE St. Louis does not mandate any specific post-

²⁹ All data taken from Set the PACE St. Louis's website or personal communications with Tom Appelbaum, President and Chief Operating Officer of Energy Equity Funding, LLC, August 2016.

installation performance testing, administrators encourage project developers and building owners to examine the project impacts.

One of the keys to the success of the Set the PACE St. Louis program is the outreach effort, which includes a long list of activities spanning the breadth of the intersection of real estate and energy efficiency. Outreach is targeted to property managers, developers, and owners as well as the chief financial officers of these respective companies. Set the PACE St. Louis program administrators also engage energy efficiency contractors and project originators like PACE Equity.

What Makes it Notable: As part of the City of St. Louis' Sustainability Plan, the program offers a unique financing mechanism to enable more people to participate in the energy retrofit revolution. Some of the attractive and unique characteristics of PACE financing are:

- Off-balance sheet accounting;
- Low up-front investment;
- Potential for immediate positive cash-flow;
- Long-term financing;
- Ability to pass payments through to tenants;
- Financing that stays with the property upon sale;
- Low interest rates;
- Greater long-term property value;
- Ability to combine with incentives from local utilities Ameren MO and Laclede Gas.

A Set the PACE St. Louis loan will be used to redevelop a former elementary school in the Soulard neighborhood into multifamily loft apartments. The loan, totaling more than \$600,000, will be used to implement energy efficiency upgrades (window replacements, LED lighting, roof replacement, and building envelop improvements) and install solar panels. Over the 20-year lifetime of the loan, the developer plans to reap \$1.6 million in utility savings.

Program Impacts and Results: As Set the PACE St. Louis has only been operating for a few years, completed project numbers are relatively low. As you can see below, however, there are nearly as many dollars committed to projects in the pipeline as there have been spent on completed projects. The scale and size of these projects is also notable – cumulative spending

The City's Set the PACE St. Louis program is a great opportunity. If building owners use this financing tool, it will promote energy efficiency, save money, help the environment and create jobs.

— **Francis G. Slay, Mayor of St Louis. MO**

in the millions. The impacts mirror this large scale as the estimated annual cost savings is \$700,000. The numbers below are not specific to multifamily energy improvements.

Table 6. Program Outcomes

No. of Completed Projects	Total development dollars spent	Development dollars approved but not closed	Estimated annualized cost savings
14	\$4.2 million	\$4.3 million	\$700,000

Keys to Success: There are two key components to the program—relationship management and available capital—that set it up for success. Frequent engagement with property owners is important as PACE offerings and this program's unique financial characteristics are often new to them. Relationship building with funding sources is also critical as it allows for quicker project implementation. Readily available capital provides a strong motivation for property owners to participate.

Next Steps: Set the PACE is contemplating a major expansion and is currently awaiting approval from the Clean Energy Development Board for a proposal that would grant additional resources to develop projects and help raise awareness of PACE in St. Louis communities.

In addition, Set the PACE is also looking to add a targeted funding source that would fund smaller commercial projects (under \$300,000) in a more efficient and lower hassle way with quick turnaround and standardized underwriting criteria.

Resources for More Information: To learn more about Set the PACE St. Louis, see the following:

- [Program website](#)

City of Chicago Energy Benchmarking



Limited policies to advance energy efficiency in the multifamily sector



Inadequate data on energy consumption

The Basics: Building energy benchmarking is the act of measuring a building's current energy use and water consumption and comparing it to buildings of comparable size, use, and vintage. By making building energy consumption data more transparent, building energy managers and others can more easily identify opportunities for efficiency improvements and implement energy

efficiency upgrades. In Chicago, there is a great need for improving building energy efficiency as property owners spend \$3 billion annually on energy costs, which accounts for up to 30% of building operating costs.

The City of Chicago adopted a building energy benchmarking ordinance in September 2013 that requires existing commercial, institutional, and residential buildings of more than 50,000 square feet to track whole building energy use. In total, the ordinance covers less than 1% of the buildings in Chicago, but the energy use in these buildings accounts for approximately 20% of all energy consumed within the building sector. ENERGYSTAR Portfolio Manager is the free, online benchmarking tool from the U.S. Environmental Protection Agency that building owners and city officials are using to implement the ordinance.

The data must be reported on an annual basis to City government. Of note, it is the only city benchmarking ordinance to include data verification. Data verification is required by a qualified third party every three years, beginning with the first year of reporting.

Participation Requirements: Implementation of the ordinance began in 2014 and uses a phased approach to benchmarking buildings of various types and sizes according to the following schedule:

- 2014: Commercial and institutional buildings greater than or equal to 250,000 square feet
- 2015: Commercial and institutional buildings 50,000 – 249,999 square feet, residential buildings greater than or equal to 250,000 square feet
- 2015: Residential buildings 50,000 – 249,999 square feet

In 2015, more than 1,800 properties, covering 614 million square feet, tracked and reported energy information, median Energy Star score of 58. It was also the first year in which multifamily buildings greater than 250,000 square feet were required to report their benchmarking results. A total of 294 multifamily buildings – more than 145 million square feet of property floor area benchmarked their energy usage. The median ENERGYSTAR score of the benchmarked multifamily buildings was 43, an energy performance slightly lower than the national median for multifamily buildings of 50.

Beginning with the second year of a building reporting data, the city is authorized to share building specific data with the public. Making this information public will allow the real estate industry to better value a building's energy performance and building owners and energy stakeholders to take action to reduce building energy consumption.

Program Impacts and Results: By the end of the second year of the implementation of the benchmarking ordinance, 1,840 properties reported their data, including 242 properties that were not required to comply with the ordinance and were benchmarked on a voluntary basis. More than half a billion square feet of the built environment of the city has been benchmarked. At least one property was benchmarked in each of Chicago's 77 neighborhoods with the highest

concentration of benchmarking efforts clustered around the downtown area. Of the 1,451 properties with data submitted for analysis by September 24, 2015, multifamily buildings constituted 29% of the total floor area and 25% of all site energy use.

The city is also seeing very high compliance rates at 84% of all required properties reporting in 2015. Within the multifamily and commercial buildings larger than 250,000 square feet, compliance is greater than 90%.

The results from 2014 and 2015 benchmarked properties indicate that there is the potential for reducing building energy consumption by 13 – 24% if all properties were brought up to the median or above median levels for energy intensity relative to the particular building sector. That would mean cost savings on the order of \$100 – 184 million for building owners citywide. Implementing these upgrades could create more than 2,000 jobs.

Energy benchmarking engaged the real estate and energy communities to increase transparency of building energy use and has uncovered tens of millions of dollars in potential savings. Delivering those savings will increase competitiveness as we work toward a brighter economic and environmental future for our city.

— Chicago Mayor Rahm Emanuel

Keys to Success: The City offered a full-time help center, free training, and pro-bono assistance to facilitate implementation of the benchmarking ordinance and data verification. Outreach targets included trade associations in the residential and commercial sectors, energy service providers, labor unions, and Neighborhood Business Development Centers (like local chambers of commerce). In 2014 and 2015, volunteers provided 35 free trainings on the ordinance requirements and use of the ENRGYSTAR Portfolio Manager tool to nearly 600 building owners, managers, operations engineers, and energy service providers. The Chicago Housing Authority took advantage of the pro-bono volunteer technical assistance and benchmarked 51 properties in 2015.

The electric and natural gas providers serving Chicago – Commonwealth Edison (ComEd) and Peoples Gas – were also key partners. Both utilities made whole building energy data available to property owners at no cost. Aggregated data allowed building owners with sub-metered tenants to still evaluate their whole building’s energy performance. ComEd provides whole building energy data through the Energy Usage Data System (EUDS), a tool that has been in use since 2008 and allows property managers to access energy data on a recurring basis. ComEd saw a 127% increase in EUDS usage since the benchmarking ordinance passed. In 2014, Peoples Gas developed the Large Building Energy Use Natural Gas Data Aggregation offering so that property managers can access whole building data. They received more than 500 data requests in 2015.

Next Steps: The City of Chicago released the building-specific information for the 250 properties that were required to report in both 2014 and 2015 as Chicago is only authorized to release this information after the second year of a property being required to comply with the ordinance. Efforts to increase public access to building energy performance will continue. The

city will also deliver Energy Profiles – with suggested energy efficiency improvements – to all properties that reported in 2014.

Resources for More Information: For more information on the City of Chicago’s Benchmarking Program, see these resources:

- [2015 Chicago Benchmarking Report](#)
- [City of Chicago Benchmarking Website](#)

Energy Outreach Colorado



Lack of capital or accessible financing options



Diversity in multifamily building stock across different **markets**



Limited energy efficiency programs and services targeting the multifamily sector

The Basics: Energy Outreach Colorado was set up nearly 30 years ago by the State of Colorado as a non-profit dedicated to meeting the energy needs of low-income Coloradans. With funding from federal, state, local, utility, and private sources, it serves as a centralized resource that simplifies and streamlines energy assistance including energy efficiency upgrades, energy efficiency rebate facilitation, energy bill payment support, crisis HVAC repair or replacement, behavioral change, low-income advocacy, and more for low-income single-family households, affordable multifamily properties, and low-income-serving non-profit facilities. With 40 percent of low-income Coloradans living in multifamily housing, Energy Outreach Colorado is instrumental in upgrading the efficiency of the housing stock for low-income residents across the state.³⁰ It has also had a significant impact on developing the resources, increasing the investment, and strengthening the processes for multi-family energy efficiency programs in Colorado.

Energy Outreach Colorado runs two multifamily programs:

- A weatherization program, funded through federal and state weatherization dollars with applications once a year, that serves affordable multifamily housing properties across the state that have five or more units, are centrally heated, and where 66 percent of the residents are at or below 200 percent of the federal poverty level.

³⁰ “Energy Outreach Colorado: a nonprofit hub for energy assistance,” U.S. Environmental Protection Agency, 2016, www.epa.gov/statelocalclimate/energy-outreach-colorado-nonprofit-hub-energy-assistance

- A utility rebate program, funded through utility demand-side management funds, which provides grants for prescriptive measures or comprehensive custom measures for multifamily buildings with two or more units where at least 66 percent of the tenant population falls below 80 percent of the area median income (AMI). Additional funding from the city and county of Denver and other local jurisdictions, private donations, and landlord contributions round out the capital to make each project feasible.

Buildings and projects are prioritized according to income qualification, age of the heating system, cost per square foot of heating the building, and potential for energy savings. Each project starts with a site walk-through and then an energy audit to determine potential energy-saving measures, their cost-effectiveness, and their feasibility. From there, Energy Outreach Colorado oversees a competitive bidding process and local subcontractor selection, manages the project through completion, performs quality assurance, follows the ongoing performance, and engages tenants for behavioral change. Measures can include wall and floor insulation, efficient lighting, appliances (mainly refrigerators), heating system improvements, air sealing, aerators and showerheads, and others as determined by each funding source. Looking at the total package of measures, Energy Outreach Colorado aims to have the payback of each project be 10 years or less.

What Makes it Notable? Energy Outreach Colorado is exceptional at leveraging, maximizing, and managing funding from many different sources—utility efficiency programs, federal weatherization funds, state agencies, local governments, housing agencies, and private donors. “Some efforts in other states can get into the trap of aligning to just one program or funding source. Our model allows us to spread our funding further so we reach more properties and have a deeper impact,” said Luke Ilderton, Director of Energy Efficiency Programs. Of course, that means Energy Outreach Colorado has to skillfully balance the funding requirements and goals of each source and meet the variety of needs of the affordable housing sector, while staying laser-focused on its own mission: energy affordability for low-income Coloradans. Since each funding source and program has different eligibility requirements, geographical constraints, cost-effectiveness tests, priority areas, and time limitations, you can guess that Energy Outreach Colorado excels at process mapping—and you’d be right.

Energy Outreach Colorado also delivers a robust resident engagement and behavioral change program that not only provides building managers with information about improving the building’s daily operations, but also provides tenants with information about their energy use and how to save energy. “We’ve created a custom approach where we can encourage tenants to understand their community and speak up about what they value in their community, and show how that’s tied back to energy and water,” said Ilderton.

Third, Energy Outreach Colorado is very invested in the ongoing energy performance of the buildings they retrofit. They track actual results and act on underperforming projects for at least several years after project completion. Projects are tracked in EnergyCAP, energy management software for portfolios of buildings. “In our case,” says Ilderton, “our portfolio is every building we’ve worked on. We send out quarterly reports to multifamily recipients on how their building is doing in comparison to how we predicted, we find out if there were any building changes, we look into any significant increases or decreases in load, and we stay in touch long after the project is complete.”

Program Impacts and Results: Since 2009, the weatherization program has upgraded 44 multifamily properties (4000 units, 2.9 million square feet) using \$12.1 million in funding from DOE, ARRA (American Recovery and Reinvestment Act), and state LEAP (Low-income Energy Assistance Program), and the utility multifamily program has upgraded 95 multifamily projects (8000 units, 5.4 million square feet) with \$5 million in funding. Because of the variety in funding sources, the projects are found in every corner of the state.

Energy Outreach Colorado also deserves credit for the very existence of robust utility DSM funding for the low-income sector. “We argued in front of the commission that if low-income customers pay into utility DSM they need to have increased access to those programs—because they weren’t sufficiently accessing them before. They needed more and better opportunities to access them.” Energy Outreach Colorado has also trained low-income advocates on how to get their voices heard at the commission, and advised other states and utilities on how to best meet the needs of low-income ratepayers.

Next Steps: Lower natural gas prices and higher construction and retrofit costs in the area may mean that multifamily efficiency projects will have a tougher time passing utility cost-effectiveness tests in the future. Gas measures specifically may be tougher to justify and implement—“But gas measures, like replacing aging heating and hot water systems, are what



Energy Outreach Colorado’s robust resident engagement program helps tenants understand their energy use.

affordable multifamily properties would most like addressed,” says Ilderton. “We’ll have to continue looking for opportunities for expanded programs and delivery mechanisms. We are always willing to change up our approach to meet the needs of everybody’s programs.”

Resources for More Information: To read more on Energy Outreach’s programs and approaches, visit these sites:

- [Energy Outreach Colorado](#)
- [Energy Outreach Colorado U.S. EPA Case Study](#)

Massachusetts Low-Income Multifamily Energy Retrofit Program



Lack of capital or accessible financing options



Diversity in multifamily building stock across different **markets**



Limited energy efficiency programs and services targeting the multifamily sector



Inadequate data on energy consumption

The Basics: The Low-Income Multi-Family Energy Retrofit Program (LIMF) is one of several programs delivered by the Low-Income Energy Affordability Network (LEAN) agencies in Massachusetts. Founded in 1998 pursuant to the Electric Utility Restructuring Act of 1997, LEAN is composed of 24 community action agencies and other community-based organizations working together to provide state, federal and utility-funded fuel assistance and energy efficiency programs, such as the U.S. DOE Weatherization Assistance Program, to low-income households statewide. LEAN is co-chaired by two agencies, Action for Boston Community Development (ABCD), Inc. and Action, Inc.

LIMF arose under the Green Communities Act of 2008 (GCA) as part of the Mass Save® package of energy efficiency programs. The GCA expanded and formalized the energy efficiency services offered under the restructuring act, and LEAN was again designated to co-administer the low-income programs with the utilities, dubbed Energy Efficiency Program Administrators (PAs). Under LIMF, existing low-income multifamily projects owned by public housing authorities, non-profit and for-profit organizations can receive installation of cost-effective energy efficiency measures to improve the energy usage in their buildings. The program pays 100% of the cost of installation.

Program Design: LEAN runs the program in conjunction with the PAs and an advisory committee that includes government agencies and affordable housing stakeholders. While

certain tasks are centralized, such as application intake, the actual project work is decentralized among the PAs and individual LEAN agencies.

Funding for the program is set by statute. The GCA requires that at least 10 percent of total electric utility energy efficiency program funds and 20 percent of total gas utility energy efficiency program funds be utilized for the low-income sector, covering single-family and multifamily buildings. The PAs and LEAN decide each year how much to allocate between single-family and multifamily, primarily based on demand and subject to regulatory oversight.

After conducting a comprehensive gas and electrical energy audit of Museum Park, a low-income senior living community owned by WinnCompanies, LEAN identified the opportunity to install over \$240,000 worth of energy conservation measures including LED lighting, variable frequency drives, condensing boilers, water heaters, storage tanks, and air sealing and pipe insulation at no cost to the owner. The project is expected to save 194,465 kWh and 10,459 therms annually.

“Thanks to the support of the LIMF Program and Eversource, new energy saving LED lighting at Museum Park is reducing electricity usage and expenses for residents and ownership alike.”

— Christina McPike, WinnCompanies



Museum Park, Springfield, MA

Two types of multifamily energy audits are offered—an Appliance Audit that looks at electrical equipment and a Comprehensive Building Assessment that includes the heating system, building envelope, mechanical systems, and ventilation among other details. Using modeling software, cost-effective upgrades are identified, and upon client and PA approval, they are installed by one of the program’s contractors.

Project Criteria: Potential efficiency projects must be in buildings with five or more units, and at least 50 percent of the units must have household income at or below 60 percent of area median income. The program follows the U.S. DOE Weatherization Assistance Program standards. The GCA allows for the low-income programs to include non-energy impacts on participants in the cost-effectiveness calculation, including health and safety benefits. This allows for more energy conservation measures than might otherwise be possible and makes the program both comprehensive and flexible.

Program Impacts and Results: The program is currently in its seventh year. The following table shows statewide investment and savings achievements through the first six years of the program.

Table 7. Cumulative Goals and Achievements 2010 through 2015

	Budget/Goal 2010-2015	Actual 2010-2015
Total \$ ³¹	\$187,155,570	\$210,426,327
Electric \$	\$117,971,591	\$118,776,335
Gas \$	\$69,183,978	\$91,649,991
Annual MWh Savings	89,582	119,943
Annual Therms Savings	3,495,796	6,885,964
Participants (Dwelling Units)	110,513	138,278

Keys to Success: LEAN credits the following programmatic aspects to its success:

- Complete Implementation and 100% Coverage of Costs:** The program’s “turnkey” approach to handling all aspects of implementation plus its coverage of the full cost of the approved measures means clients are highly motivated to participate and are freed to use their own potentially scarce resources for other needs. Implementation includes identification of potential energy efficiency measures, evaluation for savings, procurement of contractors, guiding the approval process, oversight of installation, and insistence on quality control. These aspects have allowed LEAN to consistently exceed goals, achieve high standards for installations and outcomes, involve clients who might not otherwise participate, install measures that might not otherwise be done, and achieve a high level of client satisfaction.
- Whole Building Evaluation:** By coordinating energy efficiency services from both the gas and electric PAs, LEAN takes a holistic approach to providing every upgrade possible. The program rigorously uses data from building audits and utility consumption to evaluate the cost-effectiveness of proposed measures and is able to install all measures that meet the cost-effectiveness threshold. This approach allows LEAN to be flexible in considering potential measures and comprehensive in what it installs.
- Strong Community Partnerships:** The community action agencies that deliver the program have long, successful track records of supporting low-income communities across Massachusetts through many other programs. By delivering the program through this network, the PAs are able to more effectively serve their customers through utilization of an existing relationship, minimize the marketing and outreach needed to serve more buildings, implement the program in an effective and successful manner with

³¹ Expenditures are higher than budgets because deviation is allowed under certain rules.

a minimum of overhead, provide clients with easily accessible low-income energy services, and leverage additional energy savings.

Next Steps: 2016 marked both program enhancements and expansion. The program opened up services for properties with oil heat and is making a concerted effort to find opportunities for installation of air source heat pumps. This expands the potential pool of participants and will translate into additional electric savings.

LEAN also began a targeted marketing effort to reach buildings and clients that have not yet participated and are not easily identified, such as naturally occurring low-income apartments that are not on any list and eligible properties that are owned or managed by organizations outside the traditional affordable housing community. LEAN's strategy includes legwork to reach these organizations and mining and cross-referencing utility, property and project databases.

LEAN took another important step in 2016 to work extensively with stakeholders to design and implement a standardized process for multifamily projects that are at the point of refinance. While LEAN has served clients going through refinance for some time, all of the stakeholders worked on codifying the process to identify and coordinate efficiency incentives to better align with the timing of refinance and other potential construction projects.

Resources for More Information: To learn more about the Massachusetts Low-Income Multifamily Energy Retrofit program, visit:

- [LEAN Multifamily Website](#)
- [Mass Save Program Data Website](#)
- [Massachusetts Energy Efficiency Advisory Council Website](#)

ConEdison's Brooklyn Queens Demand Management Program



Lack of capital or accessible financing options



Diversity in multifamily building stock across different **markets**



Limited energy efficiency programs and services targeting the multifamily sector



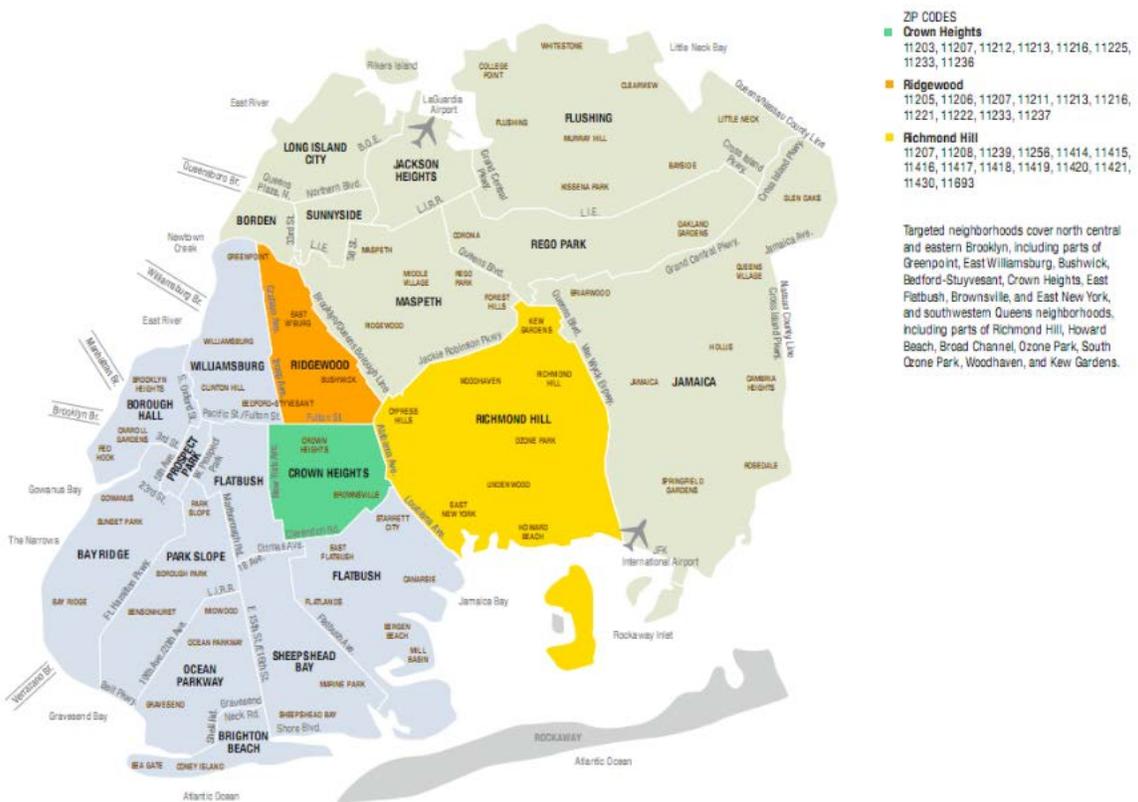
Split incentives between tenant and owner investment in energy efficiency

The Basics: In 2008, the State of New York established the Energy Efficiency Portfolio Standard which required that the state's utilities file energy efficiency program plans as a part of a goal to reduce energy usage across the state by 15 percent of forecasted levels by 2015. The Reforming the Energy Vision (REV) plan established by Governor Cuomo in 2015 is an effort to transform the energy system in New York state through regulatory reform and the activation of

private markets and aims for a 23 percent reduction in building energy consumption from 2012 levels by 2030.

Consolidated Edison (Con Ed) is New York’s largest utility providing about 41 percent of the state’s total electricity sales across all of their subsidiaries.³² In 2014, the New York Public Service Commission issued an order establishing the Brooklyn/Queens Demand Management Program in response to a Con Ed request to invest around \$200 million in “non-wires alternatives” to meet grid capacity constraints in areas of Brooklyn and Queens which consist largely of commercial and multifamily buildings and are densely populated. The proposal included energy efficiency, distributed generation, and a wide range of other demand-side resources. These alternatives aim to delay the need for more costly traditional “poles and wires” upgrades to meet the increased demands on the electrical grid.

Brooklyn and Queens Zone Map



Areas Eligible under the “Neighborhood Program” Source: ConEdison

Program Design: Con Ed’s Multifamily Energy Efficiency program offers energy surveys aimed at identifying potential energy savings measures for multifamily buildings with five or more units. These surveys include direct-install energy savings measures in tenant spaces at no cost and

³² “Con Edison Facts: For the periods ended December 31, 2015 and 2014.” Con Edison. Visited 10/13/2016. <http://www.coned.com/documents/Facts-2015.pdf>

common area measures with incentives that cover a portion of the costs for the building owner. These measures include LED lighting, lighting controls, low-flow showerheads, and faucet aerators. In order to reduce electricity demand in Brooklyn and Queens, Con Ed launched an adder program for buildings in eligible areas as part of their “Neighborhood Program.” This program features additional incentives, customer outreach, and engagement strategies which have led to significant reductions in energy use across multifamily buildings in the affected area.

What Makes it Notable? Con Ed’s Multifamily Energy Efficiency program stands out for several key reasons:

- **Program Participation:** This program has been particularly effective in driving multifamily customer program participation through targeted customer engagement through the several different channels. First, virtual energy audits are provided by energy intelligence provider Ecova, for buildings with 100 kW of peak demand and above. They evaluate areas of potential energy improvements using a combination of publicly available data and building consumption data.³³ Second, Con Ed hosts community engagement meetings including members from environmental advocacy groups, local development corporations, community housing associations, tenant associations, and business improvement districts. Third, the program conducts outreach to local elected officials. Finally, a partnership with the New York City Housing Authority identifies publicly administered housing with opportunities for efficiency upgrades.
- **Overcoming Split Incentives:** Many owners of multifamily buildings prioritize common area energy retrofits. Energy consumption in common areas is typically paid for by the owner but makes up a small portion of the total building's energy usage. For tenant spaces, there is little incentive to invest in efficiency because the owner usually doesn't pay the utility bills in these spaces. This program removes the cost-share to the building owner for direct-install measures in tenant spaces. This allows all in-unit and common area direct-install measures to be no cost and removes the split incentive for these measures.
- **Additional Incentives:** The multifamily adder program also offers enhanced incentives to achieve deeper savings. Incentives for prescriptive and custom upgrades are increased in the targeted neighborhoods for certain measures including HVAC replacement, insulation, air sealing, energy management systems, lighting controls, and equipment tune-ups. These enhanced incentives are made possible by the added value that the measures in this area can contribute to the grid. The added cost of increasing the incentives for customers is offset by the savings benefits of deferring the investments in traditional “poles and wires” grid infrastructure.

³³ ConEdison. "BQDM Quarterly Expenditures and Program Report Q4 – 2014" *New York State Department of Public Service*. <http://coned.com/energyefficiency/pdf/BQDM-rreport-Q4-2014.pdf>

Program Impacts and Results: The plan calls for 41 MW of “customer-side” load reduction and another 11 MW of “non-traditional utility side” reductions by 2018.³⁴ Through Q2 of 2016, multifamily efficiency program measures have been contracted in 1,400 buildings which will provide 2 MW of peak hour load reduction³⁵ once operational. ConEd has identified the measures installed in this program as being particularly important in achieving the goals of this project because they typically provide load relief into the late evening. This timing is coincident with the peak demand periods on the electrical grid in the constrained locations.

Resources for More Information: For more information on ConEd’s program, see the following:

- [ConEdison's Neighborhood Program](#)
- [New York's Reforming the Energy Vision \(REV\) Plan](#)
- [Northeast Energy Efficiency Partnerships Geotargeting Report](#)

Foundation Communities: Utilizing the Energy Consumption Model for Utility Allowances



Lack of capital or accessible financing options



Limited policies to **advance energy efficiency** in the multifamily sector



Limited energy efficiency programs and services targeting the multifamily sector



Split incentives between tenant and owner investment in energy efficiency

The Basics: Founded in 1990, Foundation Communities is a non-profit organization that uses low-income housing tax credits to develop high-quality affordable apartments. In Texas, the Foundation owns and operates 19 properties, providing homes to 5,000 residents. As a low-income housing provider, it is required to use utility allowances (UA) to set the maximum allowable rent, ensuring that total housing cost (rent + utilities) is limited to 30 percent of a tenant’s income as legally required. UA only applies in low-income housing where the tenant pays all or some of the utility costs.

³⁴ Chris Neme and Jim Grevatt. “Energy Efficiency as a T&D Resource: Lessons from Recent Efforts to Use Geographically Targeted Efficiency Programs to Defer T&D Investments” 2015. www.neep.org/sites/default/files/products/EMV-Forum-Geo-Targeting_Final_2015-01-20.pdf

³⁵ ConEd. “BQDM Quarterly Expenditures & Program Report, Q2 2016” <http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={DAF05260-E387-49FF-ABFB-F706B64029C5}>

The UA is most often established by the Federal Housing and Urban Development (HUD) or the Public Housing Authority (PHA) estimations based on average use information. However, there are two other methods that are available that offer some advantages to the building owner, while still limiting total housing cost to 30 percent of income. These allowances are approved annually by the state housing authority.

- **Actual Use Method:** In properties that are master-metered, rather than unit-metered, the Actual Use methodology is used to calculate UAs for water and wastewater, and for energy. IRS rules require they submit 12 months of utility data for 20 percent of the units in each floor plan, as long as the residents have been living there for at least one year. To the limited extent that building owners use this method, it is most often used for energy. However, it is administratively burdensome to access energy data for tenant units due to privacy concerns.
- **Energy Consumption Model:** Foundation Communities is using the Energy Consumption Model (ECM) methodology at one property, which uses building characteristics, systems installed, and weather. This does not include any behavioral components. At this property, which had a major energy efficiency retrofit in 2011, they expected that tenant consumption was well below the standard PHA UA. The project included metal roofs, R38 insulation, solar screens, Energy Star appliances and SEER 15 HVAC for 200 all-electric units. They hired a third-party consultant to develop an energy model and produce a report to submit to the Texas Department of Housing and Community Affairs (TDHCA). This agency requested actual use data to back up the model, as they had never accepted this methodology to establish a UA.

Foundation Communities obtained aggregated whole-building use data from Austin Energy, and used that data to establish an Energy Use Intensity (EUI). This EUI allowed them to calculate the actual average energy use for each floorplan. The review required several months to complete, but TDHCA determined this was suitable backup for their model – the first to be approved ECM in Texas. Foundation Communities has since submitted for renewal of the approval and the submission was accepted without issue.

What Makes it Notable? Foundation Communities is avoiding the administrative burden of accessing tenant energy data, but is taking advantage of using the Actual Use Method for water and wastewater UAs. Two of Foundation Communities' properties have water-efficient upgrades and use a third-party water consumption sub-metering and billing service with monthly, unit-level data available to building owners. This data is easily accessible and exceeds the minimum requirements for the Actual Use Method.

By using this method, Foundation Communities has generated an additional \$225,000 in potential recouped revenue annually between these two properties. Given the how conservative the Public Housing Authority UAs are for water and wastewater, other property owners may find that the additional potential revenue may justify the cost of a contract with a third party water sub-metering service at water efficient properties.

By using the ECM methodology for utility allowances on one of our properties, we have taken a step toward resolving the split incentive issue that is so often a barrier to energy efficiency investments in multifamily. This strategy lets us share the benefits of energy efficiency improvements with our residents so we can proactively invest in our assets

— Susan Peterson, Director of Green Initiatives, Foundation Communities

Program Impacts and Results: The cost of using the ECM method was approximately \$5,500 for the third-party modeling, but the savings is expected to produce \$113,000 in annual increased revenue. This will effectively pay back the cost of the investment in less than 10 years (calculated without interest on financing). This method allows the building owner to recoup energy and water efficiency investments while still maintaining total housing costs at 30 percent of tenant income. This effectively eliminates the “split incentive” barrier to multifamily building efficiency upgrades.

Next Steps: Benchmarking and data review is the first step in evaluating which buildings or units to invest in, but also allow the building owner to consider the different UA methodologies which are available as they develop a project.

While the ECM method does not specifically address adding photovoltaic (PV) solar arrays, PV may be included in the modeling as a building characteristic. This allows owners LIHTC properties to install PV and recoup their investments and overcoming the split incentive issues, particularly when combined with utility rebates and the federal tax credit.

Resources for More Information: To learn more about the issues, see the following:

- [Foundation Communities](#)
- [Information on utility allowances](#)
- [Low Income Housing Tax Credit program](#)

Conclusion

As the information in this report details, multifamily housing has historically been underserved in broader efforts to improve building energy efficiency but there are a number of effective strategies for achieving deep energy savings in multifamily building retrofits. The benefits of energy efficiency efforts in these buildings accrues to all stakeholders through energy cost savings, more comfortable and healthy living environments, and reduced environmental impacts. We found that the most successful initiatives have been in areas where a supportive policy landscape is paired with strong energy efficiency programs. The case studies described in this paper are just a few examples of what can result from close partnerships between policymakers, regulators, and energy efficiency program administrators.

The REEOs partner with a broad range of regional stakeholders and work to advance energy efficiency in the built environment through technical assistance, policy development, and program design and implementation and we hope the information presented in this report can be used as a resource in these processes. The project team encourages readers to engage with your local REEO to work regionally at identifying common barriers to energy efficiency efforts and join the collaborative efforts to overcome them.

Appendix A: About the REEOs

This report was compiled by a national network of regional energy efficiency organizations (REEOs). The REEOs work through funded partnerships with the U.S. Department of Energy (DOE), as well as with utilities, third-party program administrators, public officials, businesses and foundations. The REEOs are independent non-profits that serve almost every state in the nation with a mix of policy and program tools to help advance energy efficiency as a first-order resource.



For more information, visit the REEO websites:

- Midwest Energy Efficiency Alliance (MEEA):
<http://www.mwalliance.org/>
- Northeast Energy Efficiency Partnerships (NEEP):
<http://neep.org/>
- Northwest Energy Efficiency Alliance (NEEA):
<http://neea.org/>
- Southeast Energy Efficiency Alliance (SEEA):
<http://seealliance.org/>
- South-central Partnership for Energy Efficiency as a Resource (SPEER):
<https://eepartnership.org/>
- Southwest Energy Efficiency Project (SWEEP):
<http://www.swenergy.org/>

Appendix B: Regional Market Characterizations

The following market characterizations have been completed in selected regions and aim to provide more granular details on the multifamily housing sector to help inform programs and policies affecting this sector:

Northwest Energy Efficiency Alliance (NEEA): The *Multifamily Characteristics and Energy Use Report* is a part of NEEA's *Residential Building Stock Assessment* which seeks to develop an inventory and profile of the existing residential building stock in the Northwest.

<http://neea.org/docs/default-source/reports/residential-building-stock-assessment--multi-family-characteristics-and-energy-use.pdf?sfvrsn=4>

Northeast Energy Efficiency Partnerships (NEEP): NEEP's *Increasing Energy Efficiency in Small Multifamily Properties in the Northeast: Recommendations for Policy Action* report lays out a strategy to reach the small to mid-sized (between 5 and 20 units) multifamily housing market in the northeast region and includes a market characterization of the regional multifamily sector as a whole.

http://www.neep.org/sites/default/files/resources/NEEP%20Multifamily%20Report_April%202014.pdf

South-Central Partnership for Energy Efficiency as a Resource (SPEER): SPEER's *South-Central Regional Multifamily Market Assessment* is a summary of multifamily construction data and efficiency programs currently operating in the region, along with key findings and noted opportunities.

https://eepartnership.org/wp-content/uploads/2015/07/SPEER-Regional-MF-Market-Characterization_9-16-16.pdf

Southeast Energy Efficiency Alliance (SEEA): The *Southeast Multifamily Market Assessment* aims to provide information to help understand the current stock of multifamily units; regional and state multifamily construction trends; utility multifamily energy efficiency programs; and state and local policies and programs focused on the multifamily sector.

<http://seealliance.org/initiatives/built-environment/regional-trends-analysis/multifamily-reports/>

Southwest Energy Efficiency Project (SWEEP): The *Multifamily Market Characterization: Southwest Region* includes data on the region's multifamily housing units as well as state-level construction data.

<http://www.swenergy.org/Data/Sites/1/media/Multifamily-Market-Characterization-SWEEP-May-2016.pdf>

Appendix C: National Multifamily Resources

American Council for an Energy-Efficient Economy (ACEEE): ACEEE's Multifamily Energy Savings Project focuses on creating and expanding comprehensive building upgrade programs for market-rate and affordable multifamily housing through partnerships between utilities and the multifamily housing community. <http://aceee.org/multifamily-project>

Database of State Incentives for Renewables & Efficiency (DSIRE): Searchable database of information on incentives and policies that support renewable energy and energy efficiency in the United States. <http://www.dsireusa.org>

Energy Efficiency for All (EFFA): Collaborative project initiated by the National Housing Trust, Natural Resources Defense Council, Energy Foundation, and Elevate Energy to provide state and local partners with the tools and resources to help increase energy efficiency investments in affordable multifamily housing. <http://energyefficiencyforall.org/>

Fannie Mae Multifamily Green Financing: Fannie Mae offers an array of benefits for borrowers, including preferential pricing and additional loan proceeds for energy and water efficiency retrofits. <https://www.fanniemae.com/multifamily/green-initiative-financing>

Freddie Mac Multifamily Green Advantage: Freddie Mac's Green Advantage program offers better loan pricing and additional funding to make energy or water efficiency improvements for properties that achieve at least 15% savings. <http://www.freddiemac.com/multifamily/product/green-advantage.html>

ICAST Multifamily Green Rehabilitation Resource Guide: ICAST (a 501c3), in partnership with the Oak Hill Fund, developed this guide aimed at helping service providers and owners preserve affordable housing across the country. ICAST shares its 15 years of insight working in the space by highlighting its enhanced one-stop-shop model. <http://www.icastusa.org/ICAST%20Multifamily%20Green%20Rehab%20Resource%20Guide.pdf>

National Housing Trust: The National Housing Trust is the nation's leading expert in preserving and improving affordable housing. <http://www.nhtinc.org/>

National Association of State Energy Officials Multifamily Task Force: NASEO's Multifamily Taskforce convenes State Energy Offices and State Housing Agencies to examine challenges, opportunities, and strategies to advance energy efficiency in the low-income multifamily rental sector. <http://naseo.org/committee-buildings/multifamily-taskforce>

Network for Energy, Water, and Health in Affordable Buildings (NEWHAB): A network of individuals and organizations working together to share best practices, innovations, and successes to address policy and projects related to energy, housing, water, health, and social justice. <http://energyefficiencyforall.org/newhab>

U.S. Department of Energy Better Buildings Challenge: Initiative to drive leadership and commitment to energy efficiency in commercial, public, industrial, and residential buildings to achieve the goal of becoming 20 percent more energy efficient over the next decade.
<http://betterbuildingssolutioncenter.energy.gov/>

U.S. Housing and Urban Development Multifamily Programs: HUD's Federal Housing Administration (FHA) Office of Multifamily Housing Programs is responsible for the overall management, development, direction and administration of HUD's Multifamily Housing Programs. http://portal.hud.gov/hudportal/HUD?src=/program_offices/housing/mfh

JCHS (Joint Center for Housing Studies of Harvard University): Research organization at Harvard University seeking to advance the understanding of housing issues and inform policy.
<http://www.jchs.harvard.edu>