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**PROGRAM DESIGN GUIDE:**

# **ENERGY EFFICIENCY PROGRAMS IN MULTIFAMILY AFFORDABLE HOUSING**

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# Executive Summary

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**E**lectric and gas utilities in the U.S. invest billions of dollars annually to help their customers become more energy efficient, often by making repairs and improvements to customers' homes and buildings. These investments are smart—they improve lives by reducing energy expenses, create healthier, more comfortable houses and offices, and improve community building stock. The resulting energy efficiency produces a better utility system with less pollution, creates local jobs, and delivers other public benefits.

Yet studies show vast amounts of cost-effective efficiency potential available in our nation's affordable housing, in multifamily affordable housing (MFAH) in particular. In other words, a lot of the energy delivered to affordable housing is wasted—it simply goes out the windows or up the chimney.



Friendship Court, Charlottesville, Virginia. NHT-Enterprise invested over \$250,000 in high-efficiency HVAC systems, appliances, and lighting, reducing annual operating costs by \$50,000.

This is an alarming outcome because residents of affordable housing can least afford to waste valuable energy—savings from efficiency could materially improve their household budgets, and efficiency repairs such as improving ventilation systems can produce significant health benefits.

Affordable housing is often viewed by efficiency professionals as “hard to reach” because many building

owners have been unresponsive to outreach efforts of efficiency programs even when the program offers valuable incentives to encourage the owner to make efficiency repairs or improvements. There are many reasons why this occurs. One reason is that owners of affordable housing often have very tight budgets for building projects, not just efficiency projects. They also often have complicated financing arrangements that make it difficult to borrow

money to fund a project that is outside of the repairs planned in the original financing. Another reason many owners of subsidized housing do not respond to program incentives is that utility allowances from housing agencies can cloud decisions about reducing energy expenses. Many owners and residents lack information about energy usage in their buildings. To further complicate the matter, if tenants pay the cost of utility services the owner might not realize savings from reduced energy use.

Whatever the reasons that have caused MFAH to escape the reach of efficiency programs, the outcome is plain and problematic: many multifamily affordable buildings need efficiency repairs and improvements. Forgoing needed efficiency work does not “save” money in a real way, it simply shifts the costs. Low income families living in the buildings pay in the form of higher utility bills or rents, and often in the form of unhealthy homes. Taxpayers pay the cost in the form of utility allowances for subsidized housing. All utility customers pay in the form of wasted energy and higher utility rates.

Another problematic outcome is that owners and residents of MFAH have not participated in or benefited from efficiency programs to the degree that owners and residents of other building types have.<sup>1</sup>

The **good** news is that our research—presented in this guide—strongly suggests that well-designed efficiency programs can indeed reach MFAH and can enable utilities to capture cost-effective efficiency potential. Program experience offers many useful and encouraging lessons about how to reach affordable housing in ways that will benefit the utility, the building owner, the residents, and the community at large.

This guide is intended to explain specific best practices to efficiency program professionals: program designers and administrators, utility staff, regulators, and other stakeholders. We provide 12 specific and proven strategies for utilities to help owners invest to improve MFAH in their communities.

## **WHY TARGET MULTIFAMILY AFFORDABLE HOUSING?**

There are several compelling reasons utilities and all efficiency programs should devote attention and resources to reach MFAH. As a foundational matter, helping low-income customers meet their basic energy needs is an

important policy objective. Utilities across the country offer energy assistance and weatherization services through well-established and long-standing programs. Unlike bill assistance programs, efficiency improvements in housing will create lasting capital improvements.

Sustaining the affordable housing stock—that is, maintaining the existence of housing units as affordable—is an important goal at the national level and for many major cities.<sup>2</sup> Improving the energy efficiency of affordable housing directly furthers these policy goals by reducing energy waste, reducing operating expenses, and improving the condition of the housing. Utilities can and must play a central role in this important endeavor.

Capturing cost-effective efficiency in MFAH is also a compelling business opportunity for utilities and their customers. By capturing efficiency potential utilities obtain an energy resource.<sup>3</sup>

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***Existing MFAH buildings are a vast source of efficiency potential for utilities. Several studies estimate cost-effective efficiency gains of 20 to 30 percent are available.***<sup>4</sup>

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Capturing this efficiency potential enables utilities to meet energy savings targets, reduce system costs, defer or avoid distribution system upgrades, and reduce marginal line losses. The cost of obtaining these system benefits delivers value directly back to customers —increasing the value of the building stock, reducing expenses, improving the health and safety of tenants, and more.<sup>5</sup>

Multifamily housing is expected to grow as a source of sales, customer counts, and peak loads for most utilities. Among the many factors driving this trend are a fundamental shift toward urbanization in the United States, an increasing share of renters in the market, and an aging population.<sup>6</sup> Deploying efficiency programs to effectively reach these buildings makes sense.

For these many reasons, utilities should actively explore how best to structure programs to help owners capture all cost-effective efficiency in MFAH.

In this guide, we generally use “affordable housing” to mean both housing that is subsidized through federal and state programs, such as the Low Income Housing Tax Credits, and unsubsidized housing deemed “affordable” because of rent levels. We use the term “multifamily” generally to refer to buildings with more than four units.

## BEST PRACTICES—SUMMARY

It is often difficult for an owner of MFAH to invest in repairs and improvements, even with incentives and even if the project would provide great value to residents and pay back in a reasonable time. MFAH is the building sector perhaps most burdened by challenges that inhibit efficiency investment, yet affordable housing residents are perhaps most in need of efficiency improvements.

We suggest 12 best practices that are actionable for policymakers, regulators and program administrators to better reach these important buildings:

### Policy and Planning

#### 1 Establish a goal to capture all cost-effective efficiency in MFAH.

To reach MFAH, programs will require adequate funding levels sustained over time. It is important for a program to commit to capture all cost-effective efficiency in the sector. An important first step is to assess the energy efficiency potential in the local MFAH building stock, including not only the direct potential energy savings, but also non-energy benefits, and long-life measures. A commitment to capture all cost-effective efficiency will give program teams the needed support and flexibility to implement good programs with a process of continual improvement.

#### 2 Assure coordination and count savings across electricity, gas, and water programs.

Efficiency projects in MFAH often result in savings in electricity, gas, and water. Because these utilities are often supplied by different entities, there is risk that utilities may not encourage projects that aim at comprehensive savings. There are models that help solve these problems, including a cost-effectiveness framework that creates incentives for comprehensive projects by allowing the lead utility to capture the value of savings across all fuels and water, or apportioning the costs and benefits to the appropriate utility. It is important for program administrators to engage with counterparts at other utilities on methods to assure that opportunities for savings in all resources are explored early in efficiency projects.

#### 3 Assure that cost-effectiveness tests work for MFAH.

**a. Account for non-energy benefits.** Non-energy benefits (or non-energy impacts) include many very real values directly resulting from efficiency projects, such as health benefits (for instance,

from reduced mold as a result of better humidity control) and reduced maintenance costs. Because these values are often hard to measure with precision (or costly to do so), they have often been excluded. They should be included; the uncertainty associated with approximate values is better than systematic undervaluation.

**b. Apply cost-effectiveness tests across a portfolio.** Programs targeting MFAH should be treated with some flexibility due to the unique challenges of the building sector. Cost-effectiveness thresholds should be met at the portfolio level. This flexibility allows cost-effectiveness to be achieved without applying a formulaic approach to every project or program.

#### 4 Improve building owners' access to energy usage information.

Access to basic information on the energy performance of their buildings is a problem for many owners of multifamily affordable buildings, especially for those buildings with separately metered units.

Utilities must be partners in the endeavor to remedy information barriers. Utilities should assure they have good processes for delivery of whole-building utility usage information to building owners. First, regulators should assure utilities have express authority to aggregate information from multiple individual customer accounts into a whole-building energy usage summary for building owners. Second, utilities should offer processes that help the owner obtain the information with minimum practical difficulties, such as through an automated download to benchmarking tools.

### Program Design

#### 5 Develop programs specifically targeted to MFAH.

MFAH is a unique, specialized building sector. Regulators and administrators must tailor programs to the MFAH sector. It is not enough to make MFAH eligible for other residential or commercial programs.

In addition, program administrators should tailor outreach and program features to specific building types. Groups to target include subsidized housing, such as buildings that receive assistance from the U.S. Department of Housing and Urban Development (HUD), buildings financed with low-income housing tax credits, and those with central cooling and heating. Master metered buildings should also be a target because owners may be more receptive to efficiency improvements with all energy savings realized directly on the owner's utility bill.



Briarcliff Apartments, Vienna, VA.

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- 6 Structure incentives for whole-building savings.**  
Tying incentives to the amount of efficiency realized in the whole building encourages the owner to implement the combination of measures most likely to produce the highest levels of savings. Prescriptive incentives, such as contributions to lighting projects or appliance replacement, can also be useful, but should not be the only pathway to obtain or determine incentive levels for larger projects.

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  - 7 Assure incentives are reliable at project outset.**  
Building owners should be able to determine the amount of incentive contributions at the time projects are likely to be approved and budgeted. “Pay for savings” incentives can fit this model if they are based on estimates at project design and do not depend on post-project measurements.

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  - 8 Support benchmarking, audits, and other assessments.**  
Incentives for intensive energy audits (e.g., ASHRAE Level II) are a common program feature and a best practice, but it is important to also support owners performing benchmarking and less intensive energy needs assessments to approximate the efficiency potential in their buildings.

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  - 9 Support a “one-stop shop” for building owners to access integrated program services.**  
Program experience shows that building owners benefit from access to people who can help navigate

program offerings and provide project development and technical assistance, such as initial assessments, audits, and project support. The individuals in a “one stop shop” can become trusted advisors to local building owners. The people in this function should be specialists and empowered to build relationships with local partners, such as lenders, contractors, and utility staff. It is important also to preserve flexibility for building owners to use other resources for certain functions—they should not be required to use a “one stop shop” as the exclusive path to all program offerings.

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- 10 Build partnerships with key local market participants.**  
Reaching owners and other key people at properties that can benefit from efficiency measures is often a challenge for efficiency programs, even with very appealing incentive packages. Establishing relationships and partnerships with local market participants is essential and will enable much greater market penetration. One of the key tasks of an efficiency program administrator should be to engage with partners in the local MFAH market, including state housing finance agencies, community development financial institutions (CDFIs), local weatherization assistance program providers, multifamily lenders, and housing development departments.

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**Help building owners finance efficiency projects.**

It is difficult for most owners of MFAH to obtain a new loan for the purpose of funding an efficiency project. Program administrators should consider these strategies to help building owners obtain needed financing:

**a. Target incentives to fit with conventional building financing events.**

Both owners and lenders may be most open to financing an efficiency project when the added funds needed are included with a purchase, refinancing, or rehabilitation loan. This is the time when owners and lenders normally consider and plan for capital improvements. Program administrators should seek to reach owners in preparation for conventional financing events, and incentive offerings should be tailored to owners in the conventional financing process, such as offering to fund a “green” physical needs assessment acceptable to a lender.

**b. Partner with lenders active in the local market.**

Most markets have several lenders that handle a large amount of multifamily affordable financing (purchase, refinance, and rehabilitation loans), often including CDFIs with specialty products. Many multifamily lenders want to be in a position to educate their borrowers—building owners—on opportunities to obtain program incentives for improvements. Program administrators should seek to engage local and regional lenders to find ways to work together to reach owners in the process of planning refinancing, purchasing, or rehabilitating.

**c. Explore on-bill payment arrangements.**

Implementing and operating a financing program can be challenging for any utility, but on-bill payment arrangement can enable certain building owners to undertake improvements they might not otherwise consider. On-bill payment arrangements can solve a problem for MFAH owners because the loan payment is offset by utility savings on the same bill, and therefore might not be treated as additional debt by existing lenders. Program administrators should engage local property owners to understand whether an on-bill program would be valued in the market.

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**Provide robust quality assurance.**

Policymakers, lenders, property owners, and other key stakeholders need assurance that energy savings in MFAH buildings are real and lasting. This requires attention to quality assurance. Best practices include support for an energy analyst throughout the program process, so that energy audits, project specifications, project inspections, and other technical functions are conducted consistently. Training and monitoring of installation professionals and post-installation verification and quality inspections are important as well.

Utilities have many compelling reasons to help make affordable housing more energy efficient—it captures cost-effective efficiency potential, provides residents with meaningful benefits, and helps to sustain affordable housing for the community.

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*The hard question for program administrators has been how to effectively reach owners—what assistance will work to encourage owners to make the needed efficiency related repairs and improvements?*

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With the best practices provided here, program administrators can embrace the challenge of reaching affordable housing to capture efficiency and deliver value to their customers.

These 12 best practices can be incorporated by program designers and administrators into a program framework that includes other conventional elements. It is also important for all programs to maintain a process to explore new interventions with pilots to test new approaches, such as operator training, retrocommissioning, and better energy reports.

# Checklist for Policymakers and Program Administrators

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Utilities have many compelling reasons to operate programs to help make affordable multifamily housing more energy efficient. Program investments deliver valuable benefits directly back to customers in the form of reduced expenses, and improved and healthier housing. Increased efficiency also means a better utility system. The hard question for utilities has been how to effectively reach MFAH.

The 12 best practices below can be used, in combination with other program elements, to implement efficiency programs that effectively reach affordable multifamily housing.

## BEST PRACTICES

- Establish a goal to capture all cost-effective efficiency in MFAH.
- Assure coordination and count savings across electricity, gas, and water utility programs.
- Assure that cost-effectiveness tests work for MFAH by accounting for non-energy benefits and applying cost-effectiveness tests across portfolio of programs.
- Improve building owners' access to energy usage information.
- Develop programs specifically targeted to MFAH buildings.
- Structure incentives for whole-building savings.
- Assure incentives are reliable at project outset.
- Support benchmarking, audits, and other assessments.
- Support a "one-stop-shop" where building owners can access integrated program services.
- Build partnerships with key local market participants.
- Help building owners finance efficiency projects by tailoring incentives to fit with conventional purchase and refinancing loans, partnering with lenders active in the local market, and exploring on-bill payment arrangements.
- Assure robust quality assurance.

*Program administrators should also have a process to continually explore and test new interventions such as building operator training, retro-commissioning, and better energy reports.*

# I. Introduction & Background

This document describes best practices for energy efficiency programs to reach MFAH. We hope it will serve as a guide for utilities, energy efficiency program administrators, and policymakers. In section I of this guide, we describe the market landscape of MFAH, and the vast energy efficiency potential in this diverse, important housing stock. In section II we outline the policy and the business cases for utilities to invest in capturing efficiency potential in this housing sector. In section III we propose 12 best practices for efficiency program tools to successfully capture cost-effective energy efficiency in local MFAH.

## THE MARKET LANDSCAPE OF MFAH

Most housing programs and mortgage lenders typically define a multifamily building as a building with five or more dwelling units.<sup>7</sup> Buildings with four or fewer units, duplexes, townhomes (2 or more units connected by party walls) are typically categorized as single-family attached housing. Table 1 shows that very few new two- to four-unit buildings are being built. Most construction in recent years is buildings with five or more units.

About one in four dwelling units (25 percent) in the US are in multifamily buildings. Multifamily buildings are heavily dominated by renters (87 percent). Single-family housing, in contrast, is more than 80 percent owner-occupied. About two-thirds of multifamily units are in buildings of 20 units or fewer. (See Table A1)

Private individuals own about two-thirds of all U.S. apartment properties. But more than two-thirds of large properties (50 units or more) are owned by limited liability entities, typically comprising multiple investors of various types, including developers and large investors (see Table A2).

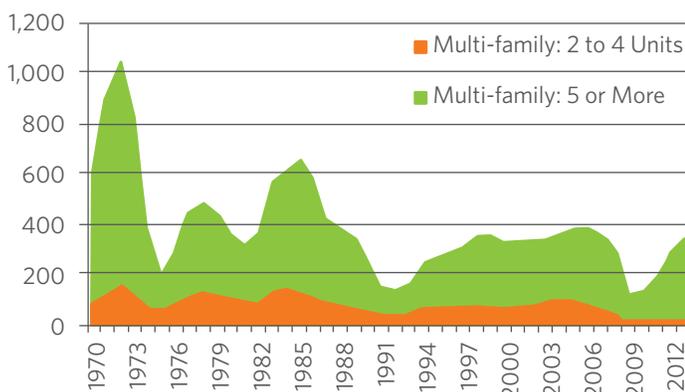
Many housing experts predict long-term growth for the multifamily housing market. This is based on fundamental demographic trends, including a shift in demand away from suburban and exurban locations and toward urban dwellings.<sup>8</sup> Since 2009, multifamily housing has been growing as a share of America's total housing stock.<sup>9</sup> Housing starts for multifamily buildings in 2013 were in line with 1980 to 2007 averages, while single-family construction remains at less than half of the pre-2007 level.<sup>10</sup>

The financial crisis that began in 2008 led to a tightening of eligibility and underwriting for single-family mortgages, generally making it more difficult for households to qualify for purchase loans. A large inventory of single-family homes for sale or rent helped depress new construction in the single-family market. These trends appear to add to the increasing demand for multifamily housing.

### Affordable Housing.

Affordable housing in the United States is a broad category comprised of several distinct groups of buildings, ownership structures, and sources of support. Understanding the local market and key participants is essential to designing any program that will make sense for owners, investors, and residents of a particular locality.

**Table 1. Housing Starts**



Source: US housing start data from the US Census Bureau, US Dept of Commerce

Affordable housing can be generally divided into two types: subsidized housing, which means the building owner or eligible tenants receive financial assistance from a federal, state, or local agency so that residents' housing payments will not exceed a defined portion (often about 30 percent) of a household's income; and "market-rate" affordable housing, where rents are simply at a level that is deemed affordable to low- and moderate-income families but are not subsidized by any government entity.

Subsidized rental housing occurs primarily in multifamily buildings. And affordable housing is almost always rental housing. Three federally subsidized programs account for the bulk of affordable housing:

- Housing developments financed with low income housing tax credits (LIHTC).
- Housing developments sponsored by the U.S. Department of Housing and Urban Development (HUD) and owned by state or local housing authorities, often called "public housing."
- Privately owned multifamily housing that receives HUD assistance payments, or below-market HUD financing are often called "HUD-assisted."

Some buildings financed with LIHTC can also be subsidized by HUD programs. Some states and large cities also have their own unique housing assistance programs.<sup>11</sup> Several factors about the sector offer additional color:

- More HUD-assisted renters live in small buildings (two- to four-units) than in large buildings with 50 or more units (see Table A4).<sup>12</sup>
- HUD reports that about 16.57 million households are eligible for housing assistance based on income, but only about 6.7 million households live in housing that is HUD assisted or LIHTC supported.<sup>13</sup> This leaves about 10 million households eligible but not served by HUD's programs.
- Since 1986, developers using low income housing tax credits have financed about 2.4 million affordable rental units. Annual new units built are estimated at 50,000 to 70,000, with an additional 30,000 to 50,000 units rehabilitated.<sup>14</sup>
- HUD operates an Energy Performance Contracting program to help local housing authorities to finance improvements using future energy savings.<sup>15</sup>

Affordable housing includes an array of actors, financing tools, and property requirements. Moreover, the market tends to vary locally, with unique players, local and state programs, and unique building stock.



Monsenor Romero Apartments, Washington D.C. Residents recently returned to their fully-renovated homes. After the building was destroyed by a fire, NHT-Enterprise led the effort to acquire and restore the building for the residents. With support from the DC Sustainable Energy Utility and other sources, the building was renovated with Energy Star lighting and appliances, motion-activated hallway lighting, and a green roof."

Virtually all states have *housing finance agencies (HFAs)* that operate tax credit, loan and loan guarantee programs, and grants to support affordable housing and have extensive and established relationships with building owners and other financing entities.

The *Weatherization Assistance Program (WAP)* is a federal energy program operated by the U.S. Department of Energy that makes grants to state agencies.<sup>16</sup> States then typically make sub-grants to local organizations to implement and execute weatherization projects. Sub-grantees are often community-action agencies or related social service provider groups. States weatherization outreach typically emphasizes single-family houses and small multifamily buildings with two to four units.<sup>17</sup>

The 2009 American Recovery and Reinvestment Act (ARRA) provided temporary funding for WAP of \$5 billion over three years, whereas typical annual funding is under \$200 million. We note that HUD has made available to WAP providers resources they can use to identify eligible multifamily properties without having to collect and verify income information for tenants in targeted buildings.<sup>18</sup>

A variety of *community development housing organizations and financial institutions* have resources to help expand and sustain affordable housing and may offer partnership

opportunities for program administrators. Each community tends to have its own set of players, funding sources, and operating methods. Generally, community development housing organizations can be private, not-for-profit, or public entities that support affordable housing projects, while community development corporations can be public or private not-for-profit entities that participate in the affordable housing development process.

Community development financial institutions (CDFIs) often operate loan programs to support affordable housing. Loans can be primary-lien purchase or refinance loans, and CDFIs can also make unsecured or subordinate-lien loans suited to making efficiency improvements and repairs in affordable housing. CDFIs are certified by the U.S. Treasury’s CDFI Fund, which provides monetary support to CDFIs through a variety of programs.

### Energy Characteristics of Multifamily Affordable Housing

Residents in MFAH tend to incur higher energy costs than residents of single-family houses on a per square foot basis. Higher energy use can be the result of many factors, including building condition, lack of resident control over central heating and cooling systems, common area usage, greater resident density, metering arrangements, and more.

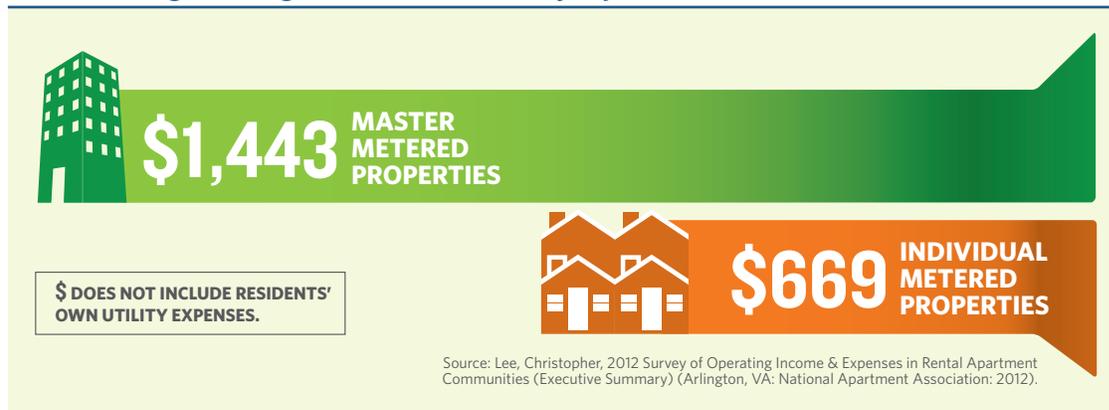
In an important study, Prof. Gary Pivo wrote: “A challenge to sustaining affordable multifamily housing is the cost of energy in rental apartments. Nearly all (93%) very low income households who live in multifamily housing units are renters (AHS 2010). And in rented multifamily units, energy expenditures run 37% higher per square foot than in owner-occupied multifamily units (i.e. condos or co-ops), 41% higher than in renter—occupied single family detached units, and 76% higher than in owner—occupied single family detached units.”<sup>19</sup>

More than half of the nation’s two- to four-unit housing stock was built before 1970 (see table A6), and about two-thirds of multifamily buildings of five or more units were built since 1970. Older buildings are likely to have uninsulated walls, single-pane windows, extensive air filtration issues, and fewer efficiency features, all of which can lead to less energy efficiency. At the same time, some older buildings—generally those built pre-1950—appear in some ways to be more energy efficient than many newer buildings due to design attributes that make them livable without central air-conditioning, such a good ventilation and “free cooling” on temperate days. This is reflected in recent data from New York City’s benchmarking program showing pre-1950’s multifamily buildings with better energy usage metrics than many modern buildings.<sup>20</sup>

**TABLE 2. KEY FEDERAL AFFORDABLE HOUSING PROGRAMS**

Program	Size	Market Gateways	Points of Contact
Low Income Housing Tax Credits (LIHTC)	32,110 properties 1,911,412 units	<ul style="list-style-type: none"> <li>• New construction</li> <li>• Rehabilitation projects (which could include efficiency repairs and improvements)</li> <li>• Mid-cycle funding (for properties undergoing smaller energy- and water-focused improvements)</li> </ul>	<ul style="list-style-type: none"> <li>• New funding: state housing finance agency</li> <li>• Mid-funding cycle: owner and/or manager</li> </ul>
HUD sponsored Public Housing	1.2 million households	<ul style="list-style-type: none"> <li>• Some new construction</li> <li>• Energy/water retrofits</li> </ul>	Local housing authorities
HUD-Subsidized Privately Owned Multifamily Housing (Section 8 and other project-based housing assistance)	Approx. 1.5 million households	<ul style="list-style-type: none"> <li>• Some new construction</li> <li>• energy/water retrofits</li> <li>• Some general rehabilitation</li> </ul>	Owner/manager
US Dept. of Agriculture	Approx. 500,000 units.	<ul style="list-style-type: none"> <li>• Rural Housing Service (RHS), and local and state agencies.</li> </ul>	Local Rural Development offices

**Table 3. Average Building Owner's Per Unit Utility Expenses**



Rigorous analysis of this subject is challenging because of a lack of detail on the heating and cooling systems in multifamily buildings (see table A7). Programs that deliver building-level information to program administrators—such as the data delivered by ordinances that require periodic reporting of benchmarking and energy audits—can provide valuable intelligence about the local building stock. New York’s Local Law 87 is an example of such an ordinance.

Differences in energy use and expenses can be expected between master-metered and unit-metered multifamily buildings. Data suggest that master-metered subsidized buildings have substantially higher average per-unit energy usage and expenses than individually metered buildings. According to a recent Fannie Mae fact sheet: “When owners paid for all energy costs, median annual energy use was 26% higher than when tenants paid for the energy costs.” But the data alone do not present a clear portrait of usage.<sup>21</sup> Table 3 shows owner expenses for master metered and individually metered properties (some buildings with individually metered properties could also have central heat or cooling on an owner’s meter). In addition, 2009 RECS data shows the average annual energy expense for master

metered apartments of \$1,141, without any estimate of the owner-paid portion. One major factor is that residents with in-unit cooling or heating and individual utility meters are likely to have incentives and the ability to economize with schedules and set-points. Large buildings, on the other hand, with central systems are more likely to be master metered. Building age could also be a factor. Market trends and public policies in recent decades have shifted new construction almost exclusively to designs in which individual units are separately metered for electricity, and in some cases for all energy and water usage.

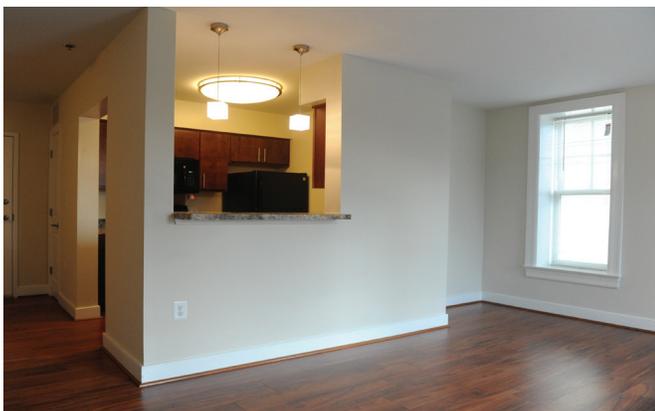
### **Energy Efficiency Potential in Multifamily Affordable Housing**

Multiple studies attest to the vast amount of energy efficiency potential that exists in MFAH, both nationally and in particular local markets.

A recent study by Optimal Energy for NRDC provides a detailed assessment of efficiency potential in affordable multifamily housing in 9 states. The study found economic (or cost-effective) savings levels between 28% and 38%, and achievable savings between 22% and 31% in electricity, and similar levels of savings in natural gas.<sup>22</sup>

The study used a “bottom up” analysis, examining per-housing unit costs of repairs and improvements and savings from those measures, and screened specific measures for cost-effectiveness against figures for state and utility avoided costs. The study also allocated the opportunity by unit counts and fuel share.

Another study, conducted by the “What Works Collaborative” in 2010, focused on buildings supported by HUD subsidies.<sup>23</sup> The study examined multiple initiatives at HUD, at the state level, and at utilities to conclude that 20 percent savings could be achieved using cost-effective measures.



Monsenor Romero Apartments, Washington, D.C.

**TABLE 4. SAVINGS POTENTIAL BY HOUSING TYPE BY 2020**

Housing Type	Projects	Apartments (1000s)	Electricity Savings (GWH)	Natural Gas (Million therms)	GHG Reduction (Million Tons)
<b>HUD-ASSISTED</b>	n.a.	4,761	7,847	432	0.0
<b>LIHTC</b>	31,251	1,843	3,037	167	1.7
<b>REITS</b>	3,625	629	1,037	57	0.6
<b>TOTAL</b>	<b>34,876</b>	<b>7,233</b>	<b>11,921</b>	<b>656</b>	<b>2.2</b>

Note: A large portion of HUD assisted units counted here goes to individual households in market rate apartment buildings, hence 'n.a.' for number of projects. U.S. Multifamily Efficiency Potential by 2020, Benningfield Group, 2010.

A 2010 study funded by the Energy Foundation found 29 percent energy savings from cost-effective measures in a sample of apartments made up of roughly 7.2 million apartments, which included a large sample of HUD-assisted apartments, projects financed by low income housing tax credits (LIHTC), and a portfolio of projects owned by real estate investment trusts (REITs).<sup>24</sup> See table 4. The study

concluded that a targeted program focused on 15 REITs and 59 LIHTC property owners could reach more than 10 percent of all properties in these markets.

Several other potential studies conducted by professional firms for regulated utilities have found comparable results, with economic savings ranging from 15% to 40%.<sup>25</sup>

**Table 5. Estimate of Efficiency Potential by ACEEE and Elevate based on assumed 15% savings for electricity and gas (2012)**

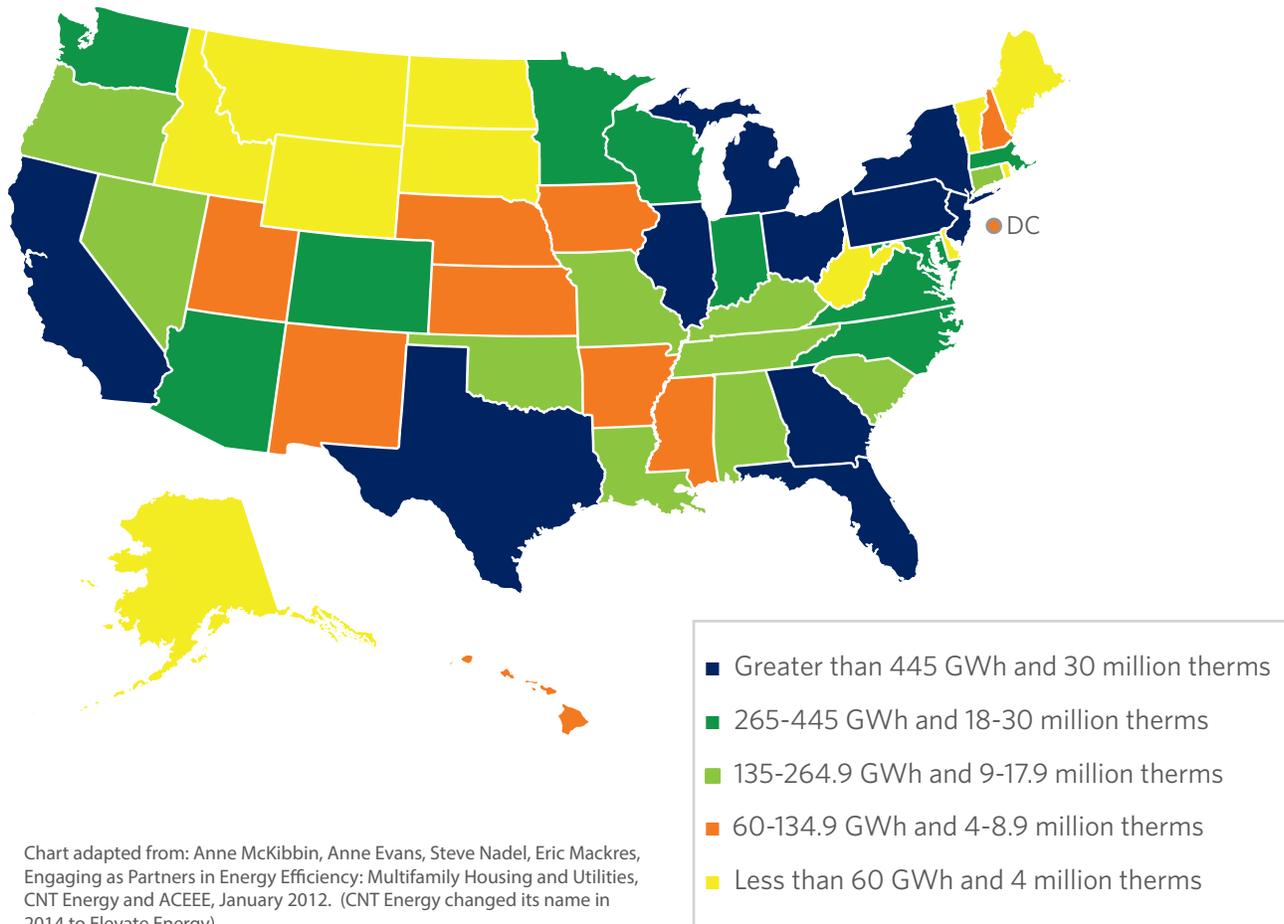


Chart adapted from: Anne McKibbin, Anne Evans, Steve Nadel, Eric Mackres, Engaging as Partners in Energy Efficiency: Multifamily Housing and Utilities, CNT Energy and ACEEE, January 2012. (CNT Energy changed its name in 2014 to Elevate Energy)



Students learning about energy use in the after-school program at Meridian Manor Apartments, Washington, D.C. The building was renovated by NHT-Enterprise with low-flow water devices and energy efficient interior lighting.



Achievable savings based on these numbers can vary even more due to the strong effect of assumptions about owner willingness to invest in repairs and improvements.

The methodology of potential studies typically revolves around installed measures. One recent study provided useful information on low-income customers' consumption patterns to suggest that utility programs to deliver home energy reports with benchmarking and efficiency guidance could be effective. This may be useful to program officials when considering the efficiency potential in affordable multifamily housing.<sup>26</sup>

A 2012 study from CNT Energy and the American Council for an Energy-Efficient Economy (ACEEE) reviewed several programs and assumed efficiency programs targeted at multifamily buildings could realize, on average, 15 percent electricity savings and 30 percent natural gas savings.<sup>27</sup> Table 5 shows the estimates of total electricity and gas savings that would be realized by achieving these savings levels in all multifamily buildings—annual savings of more than \$3 billion.

A 2013 study by the National Housing Trust estimated total electricity savings for 15 states based on an assumption of 15 percent average savings in all utility expenses for each multifamily building.<sup>28</sup> Table A9 shows these savings estimates by state.

In sum, available research findings strongly suggest cost-effective energy savings of 15 percent to 30 percent in MFAH buildings. Even the low end of the estimate represents very large reductions in usage and savings.

The wide range of potential savings also informs our conclusion (discussed below) that program administrators should prioritize gaining a clear understanding of the efficiency potential in MFAH at the local level. An assessment of the local efficiency potential is an important input to the regulatory and programmatic process: it will produce greater confidence in the available potential, will help to quantify the amount of the program budgets needed to capture the efficiency over time, and it will shed light on program design features.

The magnitude of the results of efficiency potential studies, even at the low-end of the range, affirms the conclusion that utilities have a vast efficiency resource available in affordable housing and that residents of affordable housing are burdened with the needless costs of energy waste.

## II. The Case for Multifamily Affordable Housing Efficiency Programs

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Utilities have several compelling reasons to invest in improving the efficiency of affordable housing. The policy case is strong. Energy is an essential service, and lower-income families in multifamily buildings typically are burdened by very high energy expenses.<sup>29</sup> Their utility expenses, as a percentage of income, are on average 10 times greater than for higher-income households.<sup>30</sup> Many of the causes of these high expenses—such as inefficient central heating and cooling equipment, poor air sealing, lack of information about usage—generally must be addressed by the owner or building manager.

Policymakers have long recognized the need to focus on improving housing as the means of helping low-income households reduce high energy expenses. The federal Weatherization Assistance Program (WAP) and the Low Income Home Energy Assistance Program (LIHEAP) date back to milestone legislation of the 1970s. And, many states have operated utility-funded programs in various forms.

There are also very important equity values at stake. In many localities and for many years, energy efficiency programs funded by all utility customers have reached single-family housing and commercial buildings with reasonable effectiveness. And, federal weatherization programs have largely emphasized single family houses.



Solar array installed by NHT-Enterprise at St. Dennis Apartments, Washington, D.C.

Multifamily buildings, and affordable housing in particular, have been challenging and often unresponsive to conventional program outreach. Yet customers in affordable housing have very real need for the assistance.

Market intervention by utilities is also justified by the systemic problems that inhibit building owners from investing to improve the efficiency of affordable housing. Consider these factors:

- **Limited reserves.** Most affordable housing property owners plan to maintain capital reserves to fund only essential maintenance and repairs and typically do not plan for efficiency repairs or improvements, which can be perceived as discretionary. When owners forgo making cost-effective repairs or improvements to affordable housing, this does not “save” money, but simply shifts the costs to the residents in the form of higher utility expenses (or to HUD in the form of utility allowances for HUD-assisted properties) and results in energy waste.
- **Financing barriers.** Affordable housing owners typically have complicated financing arrangements that inhibit them from taking on any new debt except at the time of purchase or refinancing.
- **Utility allowances.** Owners of HUD-assisted housing receive payments based on utility expenses incurred by the owner that might otherwise have been passed through to tenants. As a result, projects to reduce utility expenses might reduce the amount owners recoup from HUD.
- **Lack of information.** In buildings with separately metered units, a portion of the value derived from certain efficiency improvements will accrue to tenants in the form of lower utility bills. Yet the owner in most cases must pay for the improvements. In a theoretical well-functioning market, tenants would pay higher rent for a unit that has lower utility expenses (and lower rent for units with high expenses), allowing owners to recoup investments in efficiency in the form of higher rents. But renters in affordable housing typically do not pay higher rent for a unit with lower expenses—prospective tenants rarely have access to information about expected utility expenses, prospective tenants are usually not in a position to negotiate over rent, and in some cases rent levels are capped.

### Utilities have a compelling business case.

The vast amount of cost-effective efficiency potential in affordable housing is a valuable resource for utilities. Energy efficiency continues to be substantially less costly than new generation, transmission, and distribution, and



it reduces the price of generation in competitive markets. It delivers valuable environmental benefits and job creation. The powerful incentives for utilities to invest in energy efficiency as a resource are well documented and fully described in the NRDC fact sheet “Doing More and Using Less,” located at [www.NRDC.org/Energy/Files/Doingmoreusingless.pdf](http://www.NRDC.org/Energy/Files/Doingmoreusingless.pdf).

For these reasons, many states have set energy efficiency goals for utilities. Utilities and stakeholders regularly explore program concepts to capture cost-effective energy savings. In some places, market maturity and rising baselines created by better codes and standards mean that finding energy savings will require new approaches. Affordable housing is a source of cost-effective efficiency potential.

Utilities should also value the increased customer satisfaction produced by efficiency. The non-energy benefits that accompany energy efficiency repairs and improvements can be substantial for residents of affordable housing, including better health, lower expenses, reduced mold, and greater comfort. In some states, utility regulators include customer satisfaction in performance metrics, which can affect future rate increases and other financial indicators. Because of endemic late and non-payment

issues, customer satisfaction tends to be lower in MFAH markets. Supporting improvements in affordable housing represents an opportunity to improve customer satisfaction.

Finally, utilities should value the potential to reduce arrearages and bad debts. Utility customers living in MFAH account for a disproportionate amount of late, unpaid, or uncollectible bills. The cost of bad debts accrues to all utility customers. Bringing greater energy efficiency to MFAH could improve customers' ability to meet their obligations.

## **A NOTE ON PROGRAM ADMINISTRATION MODELS**

Efficiency programs are typically operated through the local utility, a public agency, or a third-party administrator. Programs to reach MFAH can succeed in any of these models. In planning MFAH programs, policymakers and program administrators should consider structures that provide appropriate flexibility and funding.

One of the fundamental issues to address is the respective roles of public benefit funds versus resource acquisition funding. About 20 states have established public benefit funds (PBFs). Because PBFs are collected from all distribution customers and administered via a public fund, the uses of PBF dollars can be more flexible than is the case with resource acquisition (RA) funding, where utility monies are used for program costs and are recovered through regulated mechanisms. RA-funded programs tend to be less nimble due to scrutiny designed

to assure that programs will be cost-effective. One option is to use both models. In Wisconsin, for example, Focus on Energy program (a statewide public benefit fund) provides incentives for multifamily buildings with more than four units, and individual utilities may also work to reach smaller, two- to four-unit buildings.

Program administrators may also consider whether MFAH programs should be grouped with existing limited-income programs or to treat them as part of a broader customer program portfolio. This decision is affected by several factors, including regulatory precedent, historical program practices, and program eligibility definitions. In some states, a program aimed at MFAH is likely to be viewed in terms of social equity and treated somewhat differently with respect to funding, cost-effectiveness, and policy priority. In others, limited-income programs are integrated into overall program portfolios, under the same resource acquisition policies that drive programs aimed at market-rate building sectors. Such considerations must be taken into account in finding the appropriate place for MFAH programs.

Historical precedent at the utility commission is another key factor: Some states have established histories on how efficiency and other programs are to be administered to special-needs markets. Many utilities also have established precedents regarding limited-income programs that may guide how a multifamily affordable effort is designed and funded.

# III. Best Practices

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It is often difficult for an owner of MFAH to invest in repairs and improvements, even with efficiency incentives, and even if the project would provide great value to residents and pay back in a reasonable time. This is due to many factors, including lack of cash reserves, complicated financing, and more. MFAH is the building sector perhaps most burdened by challenges, yet affordable housing residents are perhaps most in need of efficiency improvements.



St. Dennis Apartments, Washington, D.C. NHT-Enterprise upgraded this property including energy efficient heat pumps, hot water heaters, and Energy Star appliances to meet Enterprise Green Communities Criteria while also maintaining important historic features.

For these reasons, affordable housing is often viewed by efficiency professionals as “hard to reach” because many building owners are unresponsive to marketing and outreach efforts of efficiency programs even when the program offers valuable incentives.<sup>31</sup>

The 12 best practices below are intended to help regulators, program administrators, and policymakers to implement programs that effectively reach the market. The first four

are foundational policy and planning factors. The next eight practices address program design.

These specific practices are intended to be incorporated by program designers and administrators into a program framework that includes other ingredients that are part of the conventional program framework, such as approved partner lists, incentive packages, and direct-install measures.

## POLICY AND PLANNING

### 1. Establish a goal to capture all cost-effective efficiency in MFAH.

Programs tailored to the affordable housing sector should be supported by a commitment to obtain all cost-effective energy efficiency.

The needed amount of funding to reach this goal can be difficult to assess with precision and will depend on how program offerings are adopted by owners and others in the market. It is reasonable to expect program terms and funding levels to be adjusted over time with increased experience and information about market conditions, customer needs, and owner responsiveness to program offerings. The commitment to capture all cost-effective efficiency, however, is a critical starting point and a guiding principle.

Funding levels needed to capture all cost-effective efficiency can be better assessed with good information about the efficiency potential in the local MFAH stock. We recommend that program administrators begin with a study to gather these facts. A study of efficiency potential in local MFAH should proceed in parallel with the work on cost-effectiveness described below, and potential values should include non-energy benefits that would feed into cost-effectiveness screening.

Funding levels should also be informed by historical program funding levels for local affordable housing programs. In most localities, levels of funding for affordable housing have been low relative to the needs and relative to other building sectors. Table 6 provides a six-state snapshot of MF funding as a share of total residential program funding.

### 2. Assure coordination and count savings across electricity, gas, and water programs.

Many efficiency projects in multifamily buildings produce savings in electricity, gas (or fuel oil, if it is used for heat), water, and steam. In some markets with separate utilities for different fuels, regulators often attribute program impacts only for the fuel type provided by that utility—electricity savings for electric utilities, gas savings for gas utilities. This means the electric utility could under value the true savings produced by a project.

It also means that individual utilities may operate programs that narrowly support projects that produce single-fuel results. Programs should be reviewed to assure they take advantage of opportunities to address multiple fuel savings. For example, a project supported by a natural gas utility to repair or improve the hot water boiler in a building may be the best time to also install Water Sense equipment in the building under a program operated by the water utility.

It is important for regulators and stakeholders to plan a framework that will capture the value of all identified and measurable savings that result from a project in order to encourage good project design. Cost-effectiveness tests should pool the streams of benefits across utilities. In program implementation, savings should be combined or coordinated so that the owner (or other market participant) sees the value of bundled incentives. This approach must also be carried over into evaluation methods, so that programs are ultimately evaluated in terms of the full stream of benefits they provide.

**TABLE 6. MULTIFAMILY FUNDING AS A SHARE OF RESIDENTIAL PROGRAM FUNDING**

	Arizona	California	Colorado	Illinois	Massachusetts	New York
<b>% of housing units in MF 5+ units</b>	15.9%	22.5%	19.9%	20.2%	19.9%	32.4%
<b>2010 Multifamily budget (gas and electricity)</b>	\$14,053	\$26,729,513	\$479,073	\$3,228,752	\$31,830,246	\$52,751,515
<b>-as % of total residential budget</b>	0.06%	12.5%	1.8%	5.2%	20.0%	28.3%
<b>- as % of MF and SF combined budget</b>	0.12%	29.2%	5.0%	47.3%	33.0%	34.0%
<b>2010 Funding per unit of MF 5+</b>	\$0.03	\$8.96	\$1.14	\$3.05	\$58.63	\$20.51

Note: A large portion of HUD assistance goes to individual households in market rate apartment buildings, hence 'n.a.' for number of projects. McKibben, et al., Engaging as Partners in Energy Efficiency, ACEE and CNT Energy, 2012.



For example, the New York State Energy Research and Development Authority's (NYSERDA) Multifamily Performance Program lists utility programs also available for participants to use to supplement NYSERDA's own incentives and services. While implementers may still worry about other programs "cannibalizing" savings, this approach can create a policy framework in which programs are approved on a full-benefits basis in the planning and evaluation phases.

### **3. Assure that cost-effectiveness tests work for MFAH.**

#### **a. Account for non-energy benefits.**

Energy efficiency projects in MFAH can deliver substantial value to residents and building owners beyond the direct savings from reduced energy usage. For example, improving air sealing can lead to very real health benefits from better indoor air quality, better humidity control can reduce mold, and better HVAC control can lower maintenance costs. These values are collectively deemed non-energy benefits (NEBs) or non-energy impacts (NEIs).

Cost-effectiveness tests used to screen programs often fail to account for these important values. The fact that NEBs are "hard to measure" is often cited by those who argue the value should be excluded—i.e., it is costly to obtain estimates of value for any particular project with the level of certainty that regulatory officials are accustomed to. But it is certain the value of NEBs is greater than zero. Omitting NEBs introduces substantial bias into program and portfolio decision making.<sup>32</sup>

Several programs have found effective ways to account for these hard-to-measure values. Some states include multipliers (ranging from 7.5 percent to 25 percent) to the benefits side of cost-effectiveness tests to loosely estimate non-energy benefits. Other states incorporate a simple "adder." This approach is most often used to incorporate reductions of pollutant emissions or other environmental effects. Some states have estimated NEBs using quantitative methods, but this practice is still evolving. Some states will use values for "easier to measure" NEBs (e.g., water bill savings from clothes washer programs), and an adder for other NEBs as data and stakeholder consensus permit.

Many states currently include non-energy benefits in regulatory cost-benefit tests in some form, including California, Colorado, Connecticut, the District of Columbia, Iowa, Maine, Massachusetts, New Hampshire, New York, Oregon, Rhode Island, Vermont, and Washington.<sup>33</sup>

Substantial work continues to provide regulatory officials with guidance and substantiation on how to account for NEB's. NYSERDA is reportedly creating a searchable database tool that provides estimates for NEBs for residential measures using a mix of building simulation and secondary research. The agency expects to also develop primary research on selected measures.

Program policymakers and planners should first understand how cost-effectiveness analysis currently treats NEBs. If these benefits are not counted or undervalued, a starting point is to include a general adder to approximate the actual value delivered. Next steps are to assure regulatory officials have the research and materials needed to identify the relevant NEBs in the applicable programs and projects to better approximate values.

#### **b. Increase flexibility of screening.**

Programs that target hard-to-reach markets or populations with special needs, such as affordable housing and limited-income customers, should be subject to more flexible screening for cost-benefit ratios. This recognizes the value of maintaining programs to serve such populations even if the measured outcomes on a strict project or program basis fall slightly short of established minimums. This helps important programs remain in the portfolio.

One option is to apply cost-effectiveness criteria at a broader program portfolio level, so that the cost-effectiveness of the total set of programs can be assessed. In Maryland, for example, the utility commission has permitted residential program portfolios to be assessed at the portfolio level rather than at the individual program level.<sup>34</sup>



#### 4. Improve building owners' access to energy usage information.

Building owners require good information on the energy performance of a building to make decisions about operating the building and investing in energy efficiency repairs and improvements.

Energy usage, expressed in metrics such as usage per square foot (energy usage intensity, or EUI), is an extremely powerful indicator of the efficiency potential available in a building, especially when compared to similar metrics for other similar buildings.

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***The process of comparing the energy use in a building with that of a peer set and top performers is known as energy benchmarking. Benchmarking tools are available to multifamily owners that can provide very valuable information at low cost. Obtaining basic information about the energy usage in their own buildings is remarkably difficult for many building owners.***<sup>38</sup>

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Another option is to create a separate sub-portfolio of programs aimed at MFAH and use a cost-effectiveness test ratio of 0.9 so that the program test implicitly assumes additional benefits are conveyed and unmeasured.<sup>35</sup>

Some planning processes screen at the measure level—measures that fail cost-effectiveness tests are eliminated from further consideration. This approach can be problematic because it works against whole-building solutions. One remedy is to give whole-building treatment to bundled measures with interactive benefits. Bundled-measure projects can be more cost-effective than the sum of the individual components. For example, a package of building envelope improvements might not pass a cost-effectiveness test on a single-measure basis. But when combined with HVAC controls and commissioning, the envelope improvements may reduce HVAC loads and permit improved schedules. The combined savings can make the whole-building work cost-effective.

Several initiatives are underway to advance the state of practice on screening and related cost-effectiveness issues.<sup>36</sup> The Home Performance Coalition commissioned a study on these issues and in 2012 recommended best practices including fully accounting for NEBs, properly estimating avoided costs, using an appropriate discount rate, accounting for spillover, and accounting for the benefits of risk reduction for the utility and the system.<sup>37</sup>

The problem often occurs in multifamily buildings with separately metered, tenant-occupied units. Many utilities may only have processes for sharing usage information with the customer—owner access simply was not addressed in the rules.<sup>39</sup> Utilities often cite questions about the privacy interests of the individual account holders whose information is “rolled up” or aggregated into the whole-building usage figure that would be delivered to the owner.<sup>40</sup> These questions about privacy are addressable, and methods are available to deliver whole-building information to owners without in any way compromising customer privacy interests.

A second problem is that many utilities have cumbersome processes for owners to obtain the information, such as requiring regular paper submissions, requiring paper disclosure forms from all tenants, delivering the energy usage information on paper, and imposing long delays in processing requests.

Utilities are essential partners in the endeavor to help building owners obtain information on energy use—information that allows market transactions to reflect the value of efficiency and thus provides added incentives to invest in improvements. There are several specific measures utilities and their regulators should take.

First, regulators should provide utilities with express regulatory authorization to deliver whole-building usage information to building owners, even if the total building usage information includes multiple, separately metered customer accounts (such as tenants in a multifamily building). Useful guidance may be found in the policies of many state utility commissions that permit the delivery of whole building information so long as there are three or four separate accounts included and the owner agrees to certain terms of use.

Second, utilities should work with policymakers to implement systems and processes to deliver usage information to owners that enable energy management. For instance, utilities could automatically and periodically deliver data directly to the owner's benchmarking tools. And, to the extent customer permission is needed for the owner to obtain information, the utility should have the authority to rely on permission contained in a customer lease agreement (as opposed to obtaining a new signature on a utility form).

Some utilities are leading the way on this front. The ComEd Energy Usage Data System allows building owners and property managers to extract and analyze property-level electricity data online. Owners must only obtain authorization from separately metered customers if there are fewer than four customers (tenants) in the building. With a system like this, utilities can provide aggregated, anonymized whole-building data while protecting tenant privacy. Also, PG&E and Southern California Edison have developed training to help customers carry out their required data-entry tasks in coordination with the utilities' Portfolio Manager Web Services.

Energy usage information and related metrics also offers value to other market participants, such as lenders, affordable housing agencies, prospective tenants, service providers, and more. The Department of Housing and Urban Development is an important stakeholder. HUD has made clear that giving owners of affordable housing access to whole-building usage information is important to the process of setting accurate utility allowances to owners and to encouraging owners to invest in efficiency improvements.<sup>41</sup>

## PROGRAM DESIGN

### 5. Develop programs specifically targeted to MFAH buildings.

In most states there is no energy efficiency program focused on MFAH. Instead, MFAH is simply eligible for a general residential program, or in some cases common-area measures are eligible for general commercial programs and in-unit measures are eligible for residential programs.

Affordable housing is complex and specialized, with many buildings that have unique requirements. **A dedicated program focused on MFAH is required to effectively reach the sector.**

In addition to creating a program focused on MFAH, program administrators should consider additional factors for outreach, eligibility, and other program terms based on the local or regional building stock. Discussions with local stakeholders and market participants, who are best positioned to know the opportunities to reach owners, is useful to understand how best to target programs. For example, in an area with a large amount of HUD-subsidized affordable housing, program administrators would be justified in developing a program tailored to serve those buildings. Other types of MFAH could remain eligible for other programs, and additional targeting could occur over time as experience is gained and success is achieved.

Several categories for program targeting include:

**Affordable housing type.** Major categories are: HUD-assisted public housing, LIHTC-supported housing, and naturally-occurring (or "market rate") affordable, which means unsubsidized housing. Each type has a different ownership structure.

Programs may realize advantages by using eligibility for an existing housing program to qualify for the energy efficiency program. Making a separate determination of low-income eligibility can be a challenge, as it can mean checking income for dozens or hundreds of households in a multifamily complex. Program administrators and regulators should accept that buildings deemed eligible for HUD subsidies or LIHTC are eligible for an affordable housing energy efficiency program.<sup>42</sup> In areas with substantial amounts of rural housing, reaching developments that participate in US Dept. of Agriculture housing programs should be considered, as well.

**Building size.** Given the challenges of reaching owners and overcoming transaction barriers, a program may find it most efficient to target larger buildings. Larger buildings are more likely to have owners with cash reserves for repairs and improvement projects. On the other hand, in some localities it may make sense to target smaller buildings. Chicago utilities, for example, expressly aim their programs at smaller market-rate affordable buildings, such as in places with large amounts of smaller market-rate affordable buildings.

**Metering configuration.** Master-metered buildings are important targets for larger efficiency projects that address whole-building savings, central systems, and the building envelope (such as air sealing). The building owner typically has control over the utility account and is likely to directly benefit from energy savings. In addition, it can be easier to justify whole-building treatments in master-metered buildings in which all utilities are included in rent. On the other hand, if local building stock is weighted to buildings that are individually metered (or with only heating and hot water master-metered), measures that work in-unit might be preferred.

Common-area electricity is almost always master-metered. Because hallway and entry lighting is typically on many hours per day, and because access to tenant units is not required, common-area lighting is a favorite target measure for electric utilities.



In sum, program administrators should commit to creating a dedicated program focused on MFAH. Then a detailed assessment of the local MFAH building stock can greatly inform decisions about targeting specific subsets of buildings with program terms designed to reach those sectors.

## 6. Structure incentives for whole-building savings.

Efficiency projects in multifamily buildings are likely to have interactive effects among measures. For example, the level of savings likely to be produced by increasing the insulation in a building will depend on many other factors, such as how the ventilation system works, and the quality of air sealing around windows.

Program administrators, therefore, should offer incentives that are based on the level of savings expected in the whole building. Doing so will encourage more complete projects and the combination of measures likely to have the greatest savings at a given project cost—the most bang for the buck.

It is helpful to understand how commonly used program approaches can discourage maximum whole-building savings. First, some programs make distinctions between savings from common-area measures (such as hallway lighting, central heating, cooling, and hot water systems) and savings from in-unit measures, such as window sealing.<sup>43</sup> This distinction may have made sense for some administrators who sought to reach multifamily housing through existing commercial and residential programs. The commercial program would fund the incentives for common areas, and in-unit measures would be funded through residential programs. This might work for certain prescriptive measures like light bulb replacement, but the results are often unsatisfactory for substantial projects that are likely to have interactive effects.

Second, many programs today offer prescriptive incentives—that is, they reward customers for specified, individual measures such as lighting upgrades or insulation. Doing so can limit projects to the most commonly applicable and lowest-cost measures. It also can encourage measures that work for average buildings even if not well suited to a particular building. The result will be significant missed opportunities to save energy.

Our recommendation is not to dispense with single-measure prescriptive incentives, which can make sense for some buildings or as part of a program package, but rather to provide owners with an alternative path to monetize whole-building savings.

A useful example is the NYSERDA Multifamily Performance Program (MPP). It provides property owners with incentives

to improve total energy performance. The incentive payment is determined by the total kilowatt-hours saved and is available for existing buildings that project at least 20 percent in savings. These payments are in addition to base incentive amounts of up to \$900 per unit. A building that achieves 27 percent savings could receive an additional \$200 per unit in MPP incentives, increasing overall payments by about 25 percent.

Another example is the Ratepayer Integrated On-Bill Payment Program (RIOPP), a new energy efficiency financing program developed by the California Housing Partnership Corporation and the Stewards of Affordable Housing for the Future (SAHF).<sup>44</sup> This program, in pilot phase, offers energy efficiency financing for low-income, multifamily rental properties based on whole-building energy savings.

### **7. Make incentives reliable at project outset.**

Even if an efficiency project is expected to pay for itself from projected savings in utility expenses, many building owners will be required to raise funds from external sources to pay for the project or will have to justify the expenditure from internal sources.

Incentive amounts that are known and reliable at the outset of a project can be used by the owner to make the business case internally or to raise capital from other sources. In contrast, incentives that are determined later—e.g., upon completion of a project, or when actual savings are determined after some period—may be too uncertain to use to make the case, or the contributions may be discounted substantially.

Program administrators can accomplish this outcome by giving owners the option to “lock” incentive levels at project outset based on modeled energy savings as determined by a certified auditor.

### **8. Support benchmarking, audits, and building assessments.**

Offering incentives to support energy audits is a common program feature among efficiency programs. It is important to also directly support owners obtaining less-intensive and less-costly efficiency assessments starting with benchmarking.

Regular benchmarking can provide owners and other stakeholders with indicative information about the condition and operation of buildings, showing building performance over time and in comparison with the market. Several tools are available to MFAH owners, but many owners report that they are dissuaded from benchmarking

#### **EZ RETROFIT TOOL**

“EZRetrofit” is a tool designed to help estimate outcomes related to projects. Because it contains substantial data on multifamily buildings and efficiency measures based on learning from other programs, this tool can use a minimum amount of information about a property to identify efficiency improvements according to decision criteria such as energy savings, water savings, or fastest payback. Users desiring more building-specific data can refine the assumptions for baseline conditions, upgrade measures, and retrofit costs to create more accurate estimates of savings. EZ Retrofit is a free, open-source tool that other parties can further develop or customize. It is publicly available through the SAHF website, [www.sahfnet.org/ezretrofit.html](http://www.sahfnet.org/ezretrofit.html).

by the difficulties of setting-up the building and getting the requisite whole-building information from the utility.<sup>45</sup>

Program administrators should offer incentives to help owners with the cost of setting-up buildings in a benchmarking tool. The results provide the building owner with valuable information, and increasing the number of buildings that are benchmarked will lead to better intelligence about the market. A useful example is the Low Income Multifamily Energy Retrofit Program (LIMF) in Massachusetts, part of Mass Saves, which pays the first-year cost of a building owner’s use of a monthly benchmarking tool. Many Massachusetts utilities also assure that the requisite building usage data is available to owners and may be automatically downloaded to the tool. In cities and states where benchmarking is required by law,

program administrators may consider limiting any such incentives to affordable housing.

Whole-building assessments—whether a rigorous ASHRAE Level II energy audit or a lighter-touch assessment—can help owners understand the many interrelated aspects of their building that contribute to total energy use. The results can help owners assess multi-measure projects to achieve higher savings, but audits of large multifamily buildings can be a material expense for the owner. Owners frequently report unwillingness to invest in an audit without certainty about project savings. For this reason, incentives to reduce the initial out-of-pocket expenses for the owner to obtain an audit make sense. Programs should support various levels of audits, including the required efficiency-related modules for Physical Needs Assessments used by lenders.<sup>46</sup>

Program administrators should also explore how to deliver audit incentives in connection with refinancing or other planned construction work in the building. These are the times when owners are most likely to be able to act on the audit results. As we describe in the financing section below, lenders may be able to use the audit to justify providing additional funding repairs and improvements identified in

the audit.

Program administrators might also consider providing audit tools for the local market. Several tools are becoming available for use. For instance, SAHF has developed such a tool with funding from HUD’s Energy Innovation Fund. Called EZ Retrofit, it is designed to help multifamily property owners and managers identify and prioritize energy and water efficiency retrofit opportunities. The tool can be used as an alternative to third-party energy audits, which can both reduce program costs and help develop energy-analysis capacity among owners and managers.

**9. Support a “one-stop shop” where building owners can access integrated program services.**

Program experience shows that building owners benefit from access to people who can demystify incentive programs, find needed resources, and help navigate eligibility processes. These people can also serve as trusted resources to help with efficiency considerations in project development.

The “one-stop-shop” model addresses a known problem in

**Table 7. Challenges and Solutions in the Elevate Energy One-Stop Shop Model**

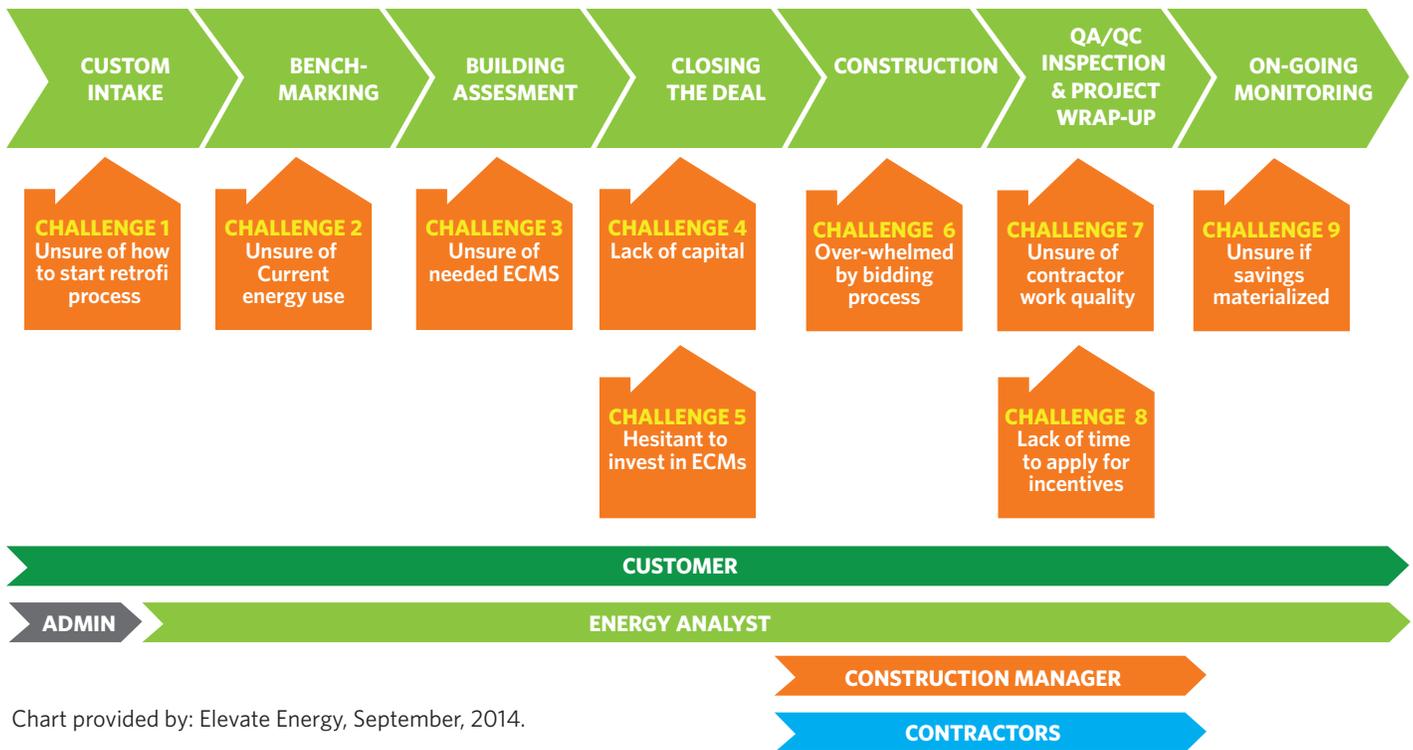


Chart provided by: Elevate Energy, September, 2014.

the market: Building owners often express confusion about program offerings and how to make use of them. Moreover, simply making use of programs can impose high costs on owners in the form of time spent navigating the process. Experience shows providing assistance can increase conversion rate of participants to completed projects and improves the quality of projects.

The purpose of a one-stop-shop model is to simplify the process for owners and developers so they can participate with the least administrative burden. To do this, a one-stop shop requires personnel positioned to help owners navigate the eligibility process, to bring available resources in support of comprehensive projects, and to provide trusted technical assistance, including initial assessments, onsite audits, and project support.

The one-stop shop has been used successfully in Chicago by Elevate Energy in its multifamily building program. Table 7 illustrates challenges Elevate identified and the program’s one-stop-shop process for addressing these barriers.

Program designers should consider the following lessons learned:

- This function can be delivered through utility personnel or through an external vendor, which appears to offer flexibility that adds value.
- The people staffing a one-stop shop must be empowered and encouraged to build relationships with local partners such as lenders, contractors, and utility staff so that they can serve as connectors and advisors.
- Owners should not be *required* to use a one-stop shop in order to access program resources. Some owners may wish to develop a project through other vendors. There also may be other intermediaries in the market who can offer more favorable packages of incentives and services for efficiency measures.

Elevate offers building owners a free, utility-funded building energy audit. The audit can be a powerful introduction to the potential savings available from projects, but without the support of knowledgeable people to lead the owner through the steps, it might not lead to action. Moreover, the Elevate staff are available to help the owner understand the results. More than 40 percent of the energy audits provided by the program have resulted in installed projects, an exemplary conversion rate for such programs.

The one-stop-shop model also helps provide owners with information on available funding for energy efficiency projects through a partnership with the Community Investment Corporation (CIC), a local Chicago-area CDFI.

**TABLE 8. RESULTS OF ELEVATE’S MULTIFAMILY PROGRAM, 2008 TO SEPTEMBER 2014**

Program Statistics	Building	Units
Applications	1,279	49,952
Audits	1,047	42,885
Retrofits	458	18,693
Gas Therms Saved	4,486,320	
KWh Saved	12,150,450	
Metric Tons CO <sub>2</sub> e from Gas & Electricity	34,945	
CIC Loans	\$13,854,244.96	

Data provided by: Elevate Energy, September, 2014.

This relationship allows CIC to rely on the expertise of the Elevate team to validate projects, including building assessment, financial guidance, construction oversight, and an annual savings report, thus gaining confidence in the integrity of project proposals.

Administrative staff and energy analysts in the one-stop shop serve to integrate services across the project life cycle. This helps to drive participation and projection completion. Elevate’s program results are summarized in Table 8.

### 10. Build partnerships with key local market participants.

One of the primary tasks of a program administrator is to engage key local partners to reach MFAH owners and other market participants. If done well, local partners can help identify useful program design features, the best market opportunities, and delivery channels. Once a program is implemented, these stakeholders can also serve as important sources of feedback and input for course corrections and future program directions.

Housing finance agencies are important potential partners for program administrators. These agencies are likely to have good relationships with target building owners, and they can usually identify developers with projects in the pipeline for approval and properties planning to refinance or recapitalize in the near term.



Hazel Hill Apartments, Fredericksburg, Virginia.

Many HFAs have energy efficiency and efficiency-related initiatives that can be harnessed by utility programs.<sup>47</sup>

For example:

- The Minnesota HFA requires all funded developers to meet certain green building standards. It has also completed a large energy and water benchmarking pilot covering 560 multifamily properties.<sup>48</sup>
- The Pennsylvania HFA has assembled \$25 million in financing for energy efficiency improvements from several capital sources.
- The Michigan HFA is conducting an energy performance benchmarking pilot for its multifamily portfolio.

- The Georgia HFA has hired sustainable development professionals to advise the agency on appropriate green building policies and to work with developers to incorporate green building components in their property construction and rehabilitation plans.

Program administrators should also consider the following as a means to reach other potential partners:

- Providers to the local or regional Weatherization Assistance Program will offer good opportunities to leverage an established program structure. By working directly with WAP providers, programs may avoid the cost of setting up separate administrative systems to reach affordable housing already served by WAP providers. One possibility is to add funding to WAP programs for the provision of additional services and to educate WAP providers to present program offerings to owners.
- In some markets, housing organizations serve as conduits to reach developers, property managers, and advocates on policy related to affordable housing.
- Outreach to real estate brokers, especially those who specialize in multifamily buildings, can help programs connect with owners interested in making improvements at the time of purchase/sale or and rehabilitating properties.
- Reaching property managers can be an effective way to generate program participation among large buildings.
- Electrical, heating, cooling, and plumbing contractors are in the market daily, and their business depends on selling projects to property owners. Program experience shows that they can be among the best marketers—but they must be held to quality standards through program participation agreements, training, certification, and the like.

### **11. Help building owners finance efficiency projects.**

Financing must be an essential consideration for any efficiency program aimed at affordable housing. Many affordable housing owners simply do not have cash reserves to fund any substantial efficiency projects. For these properties, an efficiency project may be feasible only with external funding.

Helping owners to secure financing for efficiency projects does not necessarily mean extending a loan through an efficiency program. Programs can play a valuable role by helping owners obtain needed financing from conventional lenders.

### **A Note on the Refinancing Opportunity**

Once financing of a building or development is arranged and in place, it is unusual and difficult for an owner of affordable housing to obtain a new loan to fund any building projects because doing so would probably require the owner to renegotiate the entire financing package. One reason for this is that many owners make commitments to existing lenders and investors to not obtain new debt without approval from the lender, and the approval process is difficult. Another reason is that the property value might not support any more debt. Also, properties financed with tax credits have complicated arrangements related to options at expiration that can cloud owners' decisions about adding new debt.

These complications actually point to an important opportunity: It is likely that many owners will be most open to considering an efficiency project, and borrowing funds to pay for it, at the time of purchase or refinancing. At these times, the owner and lenders can add funds to the conventional loan to make needed repairs and improvements.

A critical element is property value. The lender typically will want assurance that the improvements will add to the value of the property in an amount to support the added debt.

But adding funds for efficiency improvements as part of a purchase or refinancing can require substantial attention and early intervention so that all the key participants (owner, lender, appraiser, etc.) consider the improvements as part of the package.

#### **a. Target incentive programs to fit with conventional financing events: purchase, rehabilitation, and refinancing.**

Program administrators should deliberately market program offerings to owners of properties at the time these owners are planning purchases or refinancing. This could be done by working through local designers, contractors, brokers, housing agency officials, lenders, and other owners. For example, state housing finance agencies typically track when tax credits expire, which is a time many owners will recapitalize, and could assist programs with reaching owners early in the planning process. Program administrators may find substantial value in partnering with housing finance agencies or CDFIs, which work with local owners.

One option for program administrators is to work with a local lender to identify a package of easily accessible incentives that a lender can offer to building owners early in the loan process.

Program administrators should review all program offerings, such as incentives for various types of equipment or

services, to assure that they can be accessed in concert with the financing transactions. For example, if lenders require a needs assessment conducted by an inspector or appraiser to substantiate that the repairs or improvements will add value to the property, the efficiency program should consider accepting this assessment instead of a conventional energy audit. Also, to the extent possible, the timing and sequencing of program application and approval processes should be reviewed for consistency with an owner going through the refinancing process.

Program administrators should also seek to work with local and regional lenders on marketing materials that explain the value proposition to owners and loan officers—that is, why they should consider efficiency improvements in the context of the loan transaction. Fannie Mae's Green Preservation Plus loan product is a great starting point.<sup>49</sup> The loan product allows additional funds at the time of refinancing to pay for energy and water efficiency improvements, with emphasis on the added property value likely to occur as a result. This loan may be an accessible option for local lenders with a relationship with Fannie Mae. Local or regional lenders could also potentially follow the model with loans they originate and retain or with other investors.

Fortunately, program managers need not figure out these complex issues on their own. We strongly suggest that they engage housing finance experts from local housing finance agencies, local CDFIs and regional lenders to identify the most effective market interventions.

#### **b. Partner with local lenders active in the market.**

In this section we emphasized the difficulty many affordable housing owners will face trying to finance a project outside of purchase or refinancing. Yet there are some owners of affordable housing in a position to obtain new loans (e.g., a subordinate-lien or unsecured loan) to fund an efficiency project. These owners are likely to be in the market-rate sector. To reach these properties, program administrators should build relationships with lenders that are active in the local multifamily affordable sector.

A good starting point is to identify CDFIs and regional lenders that have existing loan products to fund improvement projects in affordable housing. These institutions can provide valuable program design guidance and can also serve as a marketing channel to reach building owners.

Some building owners may start with local lenders to fund a general improvement project, and the lender may connect the owner with the efficiency program to understand how incentives can add value to a project. Others may start with the efficiency program, then find local lenders as a means to fund a project.

Elevate Energy's multifamily program is instructive in this regard. Elevate works closely with the Community Investment Corporation (CIC), a Chicago-area CDFI. Frequently, an owner is working with the lender to secure funds for refinancing or general improvements and the lender's staff suggests the owner work with Elevate to understand whether utility incentives are available and for efficiency expertise. Approximately 30 percent of participants finance their efficiency projects, often through CIC.

**c. Explore on-bill financing for affordable housing.**

PSE&G, a utility in New Jersey, operates an on-bill financing program for multifamily owners that provides useful guidance. In the PSE&G program, the utility pays the up-front costs of an efficiency project and the building owner (a utility customer) agrees to repay the utility in monthly installments added to the utility bill.

On-bill financing is interesting because the arrangement can solve a problem for owners who might be unable or disinclined to obtain a conventional loan to fund an improvement project. An on-bill arrangement through the trusted utility might be acceptable to existing lenders if the amount added to the utility bill (the repayment amount) is expected to be offset by the expected energy savings and the property is made more valuable by the project.

This type of on-bill arrangement appears to work best in multifamily buildings that are master metered (or with an owner's meter for a large portion of the building's energy usage) where savings and repayment installments occur on the same utility customer's bill.

Offering an on-bill program can raise many questions for a utility. We do not attempt to address all such concerns here,



### **PSE&G RESIDENTIAL MULTIFAMILY HOUSING PROGRAM**

Public Service Electric & Gas (PSE&G) in New Jersey offers an on-bill program to multifamily building owners, both affordable and market-rate. Participation begins with an energy audit that is fully paid for by PSE&G. Measures identified by the audit as having a simple payback of 15 years or less are eligible and may include in-unit, common area, and central system measures.

The program includes substantial incentives. PSE&G will "buy down" the total cost of eligible efficiency projects. The amount of PSE&G's contribution is calculated to be seven years of the payback, provided that the customer portion of the cost is at least two years of the payback amount. For example, assume a project would cost \$100,000 and is projected to save \$10,000 per year in utility expenses—a 10-year payback. PSE&G would contribute \$70,000 of the cost (seven years of the annual payback amount). The remaining 30 percent of the project cost (\$30,000) would be the customer portion of the project expense.

PSE&G will pay the full cost of the efficiency project up front and collect the customer portion through monthly installments billed on the utility bill—this is the "on-bill" aspect of the program. PSE&G charges the customer no interest or fees on the advance. There is no prepayment penalty. The balance is due upon sale of the property.

For buildings that are funded by mortgages held by the New Jersey Housing and Mortgage Finance Agency (NJHMFA), the customer has ten years to repay the customer portion through the on-bill arrangement. For non-NJHMFA-funded projects, the on-bill repayment term is five years.

Projects commonly include lighting, HVAC systems and controls, ventilation improvements, insulation and air sealing, appliance upgrades, and installation of water-saving devices. All measures and services must be delivered through qualified engineering professionals approved by PSE&G.

PSE&G has funded 44 projects, a total of about \$37 million in direct investment by PSE&G. PSE&G expenses are recovered in rates.

The program is documented by ACEEE in Nowak, et al., *Leaders of the Pack: ACEEE's Third National Review of Exemplary Energy Efficiency Programs*, June, 2013. at [www.aceee.org/research-report/u132](http://www.aceee.org/research-report/u132).

but note that program design options can help to confine the scope of the program, such as: i) Limiting eligibility to MFAH buildings of a certain size; ii) limiting eligibility to projects that meet certain efficiency targets, such as reducing whole-building energy usage by 20 percent or more; and iii) working a financing entity, such as a state housing finance agency or a lender with a multifamily loan product, to provide the capital and hold the credit risk, with the utility serving to collect and pass through the on-bill repayment amounts.

## 12. Provide robust quality assurance.

It is particularly important in affordable housing to assure that projected energy savings are real and lasting and that project work is of good quality.

Program designers should specifically note the technical quality of assessments and savings predictions, pre-installation site visits to establish baseline conditions, post-installation verification and inspections, the creation

of robust assessment protocols, certification of field service providers, and implementation of protocols for reporting.

It is common for efficiency programs to allow trade allies to manage technical analysis, design, and specification work. This approach can be effective, but program administrators may consider additional measures, such as service providers signing detailed participation agreements with technical protocols and commitments, and performing quality assurance through audits and inspecting project sites for baseline and post-installation purposes.

For example, the Elevate multifamily program described above provides an energy analyst throughout a project so that energy audits, project specifications, inspections, and other technical functions are conducted, specified, or reviewed in a consistent fashion. Similarly, the Association for Energy Affordability in New York provides program staff provide technical guidance and oversight in ConEd and NYSERDA efficiency programs.<sup>50</sup>

## THE ROLE OF PILOTS

The 12 best practices described above give program administrators tools to effectively reach MFAH sector. It is also important to continually explore new program interventions, practices, and measures. Each locality is different—what works in one place might not work in another, and what did not work in one place might prove effective in another city. **Program administrators should continually test new practices for effectiveness.** Several practices that appear worthy of pilots are:

**Testimonials and Case studies.** Building owners report being bombarded with offerings for products and services related to efficiency. The best way to reach owners may, at times, be through testimonials of other property owners in the locality—trusted sources. Programs can provide market participants with very useful validation for efficiency projects and specific efficiency measures through meetings and materials where property owners hear from other owners.

**Operations, Training and Retrocommissioning.** Many larger multifamily buildings, particularly in urban areas, have central cooling and heating systems operated by building staff or automatic controls. There is strong reason to believe that substantial efficiency gains are possible from better operations. Program interventions could include: incentives for better controls, operator training, periodic inspections by experts, and retrocommissioning. Retrocommissioning generally refers to the process of validating settings and controls related to major equipment and repairing any broken equipment or controls.

**Customer energy reports.** Many utilities have found value in delivering reports to residential customers explaining utility usage in a way that provides useful benchmarks and advice on efficiency.<sup>51</sup> Utility customers in multifamily affordable buildings will have unique attributes that could require specialized reports, and configuration of building heating and cooling metering is likely important to the information in the reports. For example, residents in a building with separately metered units and in-unit heating and cooling will require different messages than customers in a building with central heat and cooling. In addition, some utilities might find value in reports designed for the owner-operator of buildings with central systems.

# Conclusion

We describe in this guide 12 specific practices that program administrators should assure are part of any program to reach affordable housing, multifamily buildings in particular.

Utilities have many compelling reasons to help make affordable housing more energy efficient —it captures cost-effective efficiency potential, provides customers with meaningful benefits, and helps to sustain affordable housing for the community. The hard question has been how to effectively reach these buildings. That is, what assistance will work to encourage owners to make the needed efficiency related repairs and improvements?

With the best practices provided here, program administrators can embrace the challenge of reaching affordable housing to capture efficiency and deliver value to its customers.

# Appendix

**TABLE A1. DISTRIBUTION OF U.S. HOUSING STOCK BY TYPE**

Type of Housing Unit	Number of Units	Percent of Total
Total Housing Stock	132,419,000	100%
Single-family	90,742,000	68.5%
Single-family detached	82,974,000	62.7%
Single-family attached	7,768,000	5.9%
Multifamily	32,630,000	24.6%
2 to 4 units	10,678,000	8.1%
5 to 9 units	6,354,000	4.8%
10 to 19 units	6,028,000	4.6%
20 to 49 units	4,474,000	3.4%
50 or more units	5,096,000	3.8%
Manufactured/mobile home or trailer	9,049,000	6.8%

Source: ICF tabulation of 2011 American Housing Survey.

**TABLE A2**

Ownership Types for U.S. Apartments				
Type of Ownership	All Properties	2—4 Unit Properties	5—49 Unit Properties	50+ Unit Properties
Individual Investor	67%	83%	49%	7%
Limited Liability Partnership/ General Partnership	7%	3%	10%	30%
Limited Liability Company	13%	6%	22%	42%
Real Estate Investment Trust (REIT)	1%	1%	1%	4%
Real Estate Corporation	1%	0%	2%	3%
Other Corporations	1%	0%	2%	3%
Nonprofit Organization/ Housing Cooperative	2%	1%	4%	9%
Other	7%	7%	11%	3%
Total	100%	100%	100%	100%

Source: NMHC tabulations of 2012 Rental Housing Finance Survey microdata, U.S. Census Bureau. Updated March 2013.

**TABLE A3. OWNER- VS. RENTER-OCCUPIED HOUSING UNITS**

Type of Housing Unit	Owner-Occupied & Renter-Occupied				
	Total	Owner-occupied	Renter-occupied	% Owner-occupied	% Renter-occupied
Total Housing Stock	114,908,000	76,092,000	38,815,000	66%	34%
Single-family	80,505,000	66,752,000	13,753,000	83%	17%
Single-family detached	73,761,000	62,662,000	11,099,000	85%	15%
Single-family attached	6,744,000	4,090,000	2,654,000	61%	39%
Multifamily	27,213,000	3,662,000	23,550,000	13%	87%
2 to 4 units	8,956,000	1,419,000	7,537,000	16%	84%
5 to 9 units	5,410,000	583,000	4,827,000	11%	89%
10 to 19 units	5,032,000	518,000	4,514,000	10%	90%
20 to 49 units	3,665,000	408,000	3,257,000	11%	89%
50 or more units	4,150,000	734,000	3,415,000	18%	82%
Manufactured/mobile home or trailer	7,190,000	5,678,000	1,512,000	79%	21%

Source: ICF tabulation of 2011 American Housing Survey.

**TABLE A4. DISTRIBUTION OF HUD-ASSISTED RENTERS IN MULTIFAMILY VS. SINGLE-FAMILY UNITS**

Type of Housing Unit (Occupied Units)	HUD-Assisted Renters			All Income-Eligible Renters*
	Tenants in Public Housing (%)	Voucher Recipients (%)	Tenants in Privately Owned Housing (%)	
Total Housing Stock	100%	100%	100%	100.0%
Single-family	12%	34%	4%	28%
Single-family detached	4%	26%	1%	20%
Single-family attached	8%	8%	3%	7%
Multifamily	88%	66%	96%	68%
2 to 4 units	23%	24%	9%	22%
5 to 9 units	13%	15%	18%	15%
10 to 49 units	19%	19%	22%	20%
50 or more units	33%	7%	47%	11%

Source: Characteristics of HUD-Assisted Renters and Their Units in 2003 (published 2008).

\* "Income-eligible renters are those households that would qualify for admission to assisted housing because their income is within the HUD-determined income limit of 50 percent or less of median family income for their area, adjusted for family size. In HUD terminology, these households are "very-low-income renters" and are eligible for assisted housing based on income alone"

**TABLE A5. HOUSING ASSISTANCE ELIGIBILITY AND RECIPIENTS**

<b>Renter Eligibility for Housing Assistance and Recipients by Type</b>		
Total Renter Households	33,604,000	100%
Income-Eligible Households	16,577,000	49%
All Assisted Renter Households	4,280,000	13%
Tenants in Public Housing	1,064,000	3%
Voucher Recipients	1,800,000	5%
Tenants in Privately Owned Housing	1,385,000	4%
Eligible Unassisted Renter Households	12,297,000	37%
Worst-Case Needs Households	5,116,000	15%
Other Rented Households	17,027,000	51%

Source: ICF tabulation of Characteristics of HUD-Assisted Renters and Their Units in 2003.

**TABLE A6. DISTRIBUTION OF MULTIFAMILY BUILDINGS BY AGE**

<b>Multifamily Building Age Distribution</b>			
Year of Construction	All	2 to 4 Units	5 or More Units
Before 1940	15%	26%	10%
1940 to 1949	5%	7%	4%
1950 to 1959	9%	13%	7%
1960 to 1969	14%	13%	14%
1970 to 1979	20%	17%	21%
1980 to 1989	16%	12%	18%
1990 to 1999	12%	9%	13%
2000 to 2009	10%	4%	13%

Source: ICF tabulations of data in U.S. Census, American Housing Survey.

**TABLE A7. DISTRIBUTION OF HEATING AND COOLING ENERGY AND SYSTEM TYPES**

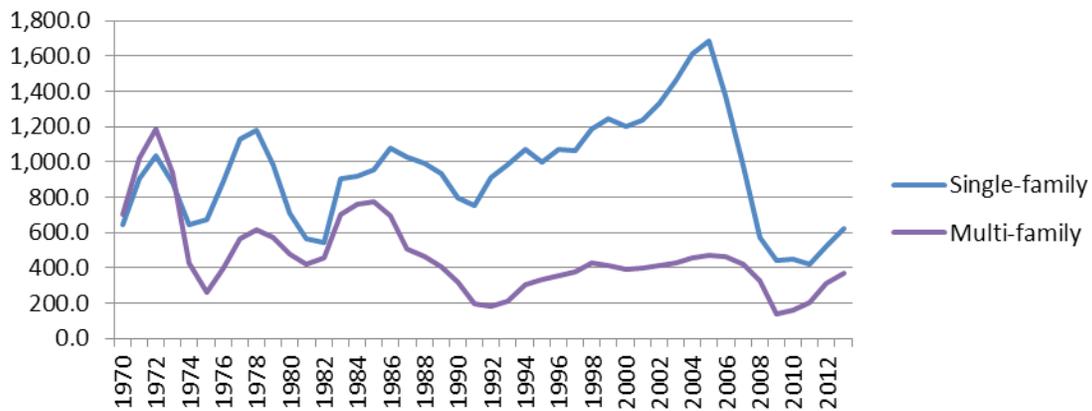
Main Heating Fuel and System Type in Multifamily Buildings (million)		
	2 to 4 Units	5 or More Units
<b>Natural Gas</b>	<b>5.4</b>	<b>8.1</b>
Central Warm-Air Furnace	2.9	4.6
Steam or Hot Water System	1.9	2.7
Built-In Room Heater	0.3	0.4
Floor or Wall Pipeless Furnace	0.2	0.3
<b>Electricity</b>	<b>3.8</b>	<b>10.0</b>
Central Warm-Air Furnace	1.7	5.5
Heat Pump	0.2	1.0
Built-In Electric Unit	1.3	2.6
Portable Electric Heater	0.3	0.4
Other Equipment	0.1	0.4
<b>Fuel Oil</b>	<b>0.7</b>	<b>1.3</b>
Steam or Hot Water System	0.6	1.0
Central Warm-Air Furnace	0.1	0.2
<b>Do Not Have or Use Heating Equipment</b>	<b>0.3</b>	<b>1.6</b>

Source: ICF estimation based on 2011 American Housing Survey and 2009 Residential Energy Consumption Survey.

Type of Air Conditioning Equipment (million)		
	2 to 4 Units	5 or More Units
Central Air-Conditioner	3.0	9.4
Heat Pump	0.3	1.6
Window/Wall Air-Conditioning Unit	4.0	6.1
Have But Do Not Use Central Air-Conditioning Equipment	0.2	0.3
Have But Do Not Use Window/Wall Air-Conditioning Unit	0.6	0.7
<b>Do Not Have Air-Conditioning Equipment</b>	<b>2.4</b>	<b>3.4</b>

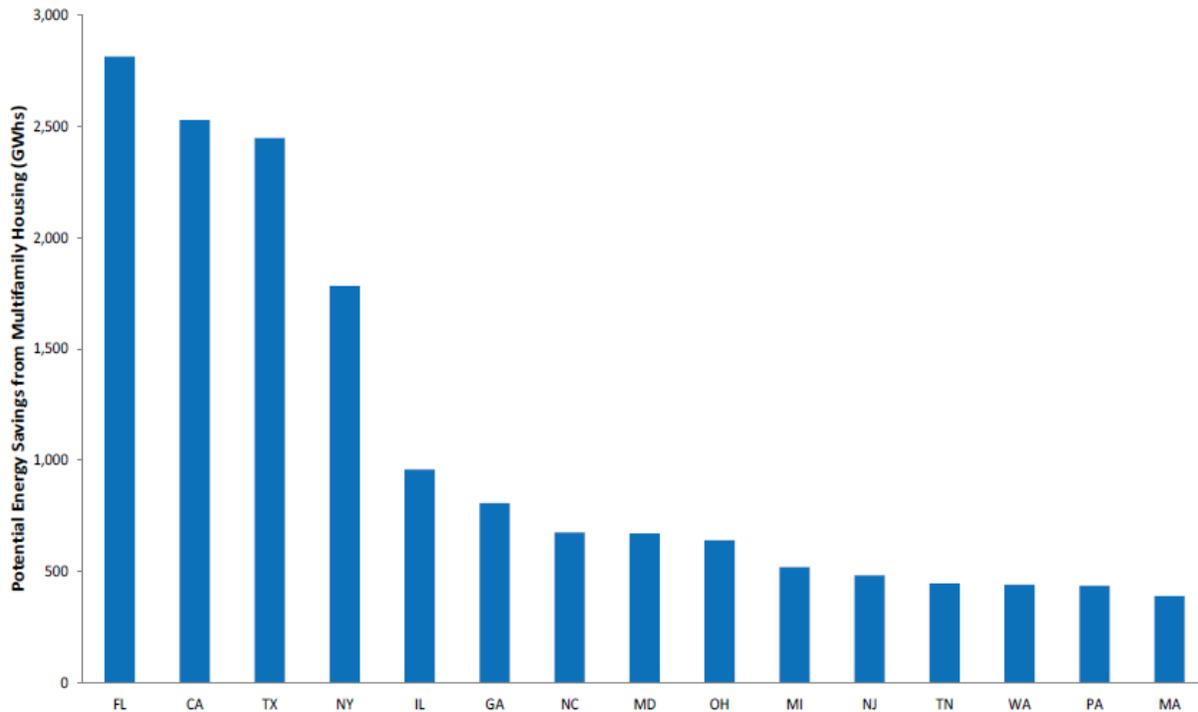
Source: ICF estimation based on 2011 American Housing Survey and 2009 Residential Energy Consumption Survey.

**TABLE A8. TRENDS IN MULTIFAMILY VS. SINGLE-FAMILY CONSTRUCTION**



Source: U.S. Department of Commerce.  
 Note: Y axis is housing starts in thousands.

**TABLE A9. TOP 15 STATES RANKED BY TOTAL MF ELECTRICITY SAVINGS POTENTIAL**



Source: NHT, Partnering for Success. Potential estimates based on an assumed 15% savings in electricity usage.

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- 1 See Pivo, *Unequal Access*.
- 2 The U.S. Dept. of Housing and Urban Development's 2013 agency priority goals include: "Increase the energy efficiency and health of the nation's housing stock." See [archive-goals.performance.gov/agencies](http://archive-goals.performance.gov/agencies).
- 3 For a complete description of how efficiency functions as an energy resource, see [www.nrdc.org/energy/files/doingmoreusingless.pdf](http://www.nrdc.org/energy/files/doingmoreusingless.pdf). And, see Dave Lamont and John Gerhard, "The Treatment of Energy Efficiency in Integrated Resource Plans: A Review of Six State Practices," Regulatory Assistance Project, January, 2013 (Vermont).
- 4 See Potential Studies listed in References.
- 5 Of the approximately 33 million U.S. households that are renters, more than 16 million are eligible for housing assistance of some form. About 25 percent of those, about 4 million households, currently receive federal housing assistance, and many others reside in other forms of affordable housing. See Table A5.
- 6 U.S. Census Bureau, *Growth in Urban Population Outpaces Rest of Nation*, U.S. Dept. of Commerce, Census Bureau Reports, 2012.
- 7 Fannie Mae, "An Overview of Fannie Mae's Multifamily Mortgage Business," May, 2012 (Washington DC).
- 8 A greater emphasis on density in planning is occurring in many cities. Transit-oriented development is increasing as cities realize multiple benefits from it. There are also demographic shifts toward an aging population. See Jordan Rappaport, Kansas City Federal Reserve Bank Economic Review, 4th Q., p. 30, *The Demographic Shift from Single-Family to Multifamily Housing*, 2013. Report located at [www.kansascityfed.org/publicat/econrev/pdf/13q4Rappaport](http://www.kansascityfed.org/publicat/econrev/pdf/13q4Rappaport).
- 9 Demand Institute, *The Shifting Nature of U.S. Housing Demand*, May 2012 (Washington D.C.).
- 10 Single-family housing starts numbered 618,000 in 2013, down from more than 1.2 million in 2007. Multifamily starts were 307,000 units in 2013, only slightly lower than in 2007. See Joint Center for Housing Studies of Harvard University, *State of the Nation's Housing*, 2014 (Cambridge, MA) (citing US Census Bureau data).
- 11 For example, New York City operates the Mitchell-Lama program, which provides affordable rental and cooperative housing to moderate- and middle-income families, with more than 45,310 units participating. The New York Dept of Housing Preservation Development supervises most developments, with some shared supervision by HPD and the US Department of Housing and Urban Development. See Rule of the City of New York, Title 28, Chapter 3.
- 12 This is due in part to large portion of "voucher" based residents in smaller buildings, rather than project based assistance. One can approximate the number and percentage of multifamily housing units occupied by participants in housing assistance programs, but comprehensive data are not available for all facets of the market. (See Tables 3, 4, and A5 for available data).
- 13 See data cited in Benningfield, *U.S. Multifamily Efficiency Potential by 2020*.
- 14 HUD datasets show 44,992 LIHTC units built in 2012. (See tables located on the HUD website at [www.huduser.org/Datasets/lihtc/tables9512.pdf](http://www.huduser.org/Datasets/lihtc/tables9512.pdf)). For an interesting perspective on future trends of LIHTC, see Ross Clark, *The Low Income Housing Tax Credit (LIHTC): Challenges Presented by the Onset of Year 15 in the St. Louis Region*, St. Louis Federal Reserve, *Community Development Journal*, 2013 (St. Louis, MO). [www.stlouisfed.org/community\\_development/assets/pdf/lihtc\\_report.pdf](http://www.stlouisfed.org/community_development/assets/pdf/lihtc_report.pdf).
- 15 Regulations describing the HUD program are located at 24 CFR 990.185. The program allows a state housing authority to enter a performance contract so that reductions in utility expenses are captured to repay the cost of the improvements and associated financing.
- 16 For more information see the Weatherization Assistance Program website, multifamily page, [energy.gov/eere/wipo/multifamily-retrofit-tools-and-workforce-resources](http://energy.gov/eere/wipo/multifamily-retrofit-tools-and-workforce-resources).
- 17 See Glatter and Engel, *Use of Weatherization Program Funds to Benefit Residents of Multifamily Housing*, Report of Stewards of Affordable Housing, located at: [http://www.sahfnet.org/files/index\\_56\\_2536597366.pdf](http://www.sahfnet.org/files/index_56_2536597366.pdf). Note that the Low Income Household Energy Assistance Program (LIHEAP), in contrast with WAP, provides bill payment assistance, though part of LIHEAP funds can be used for upgrades.
- 18 These resources can be found at the Dept. of Energy website ([energy.gov/eere/wipo/housing-and-urban-development-multifamily-properties-eligible-weatherization-assistance](http://energy.gov/eere/wipo/housing-and-urban-development-multifamily-properties-eligible-weatherization-assistance)).
- 19 Pivo, *Energy Efficiency and Its Relationship to Household Income in Multifamily Rental Housing*, (at p. 1). See also Kontokosta, *Housing Affordability* (at p. 40).
- 20 New York City Local Law 84, Benchmarking Report, August 2012, available on the New York City website [www.nyc.gov](http://www.nyc.gov).
- 21 One complicating factor is the assumptions required to apportion owner expenses to residents in buildings with central heat or hot water if the building also has separately metered in-unit electricity.
- 22 See "Economic" potential refers to measures that are cost effective, and "achievable" potential refers to the attainable portion of cost-effective measures in light of assumptions about market adoption and program limitations.
- 23 Bamberger, *Scaling the Nationwide Energy Retrofit of Affordable Multifamily Housing*.

- 24 Benningfield Group, *U.S. Multifamily Efficiency Potential by 2020*.
- 25 See Potential Studies cited in References.
- 26 Serge Berelson, *Myths of Low-Income Energy Efficiency Programs: Implications for Outreach*, paper presented at the ACEEE Summer Study on Energy Efficiency in Buildings, 2014.
- 27 CNT and ACEEE, *Engaging as Partners in Energy Efficiency Multifamily Housing and Utilities*.
- 28 NHT, *Partnering for Success*.
- 29 Carliner, *Reducing Energy Costs in Rental Housing*.
- 30 Pivo, *Unequal Access*.
- 31 See ACEEE, *Apartment Hunters*. The report abstract states: "In the hunt for energy savings, multifamily buildings are widely seen by energy efficiency program administrators as hard to reach. Due to a number of challenges for multifamily building owners in undertaking energy efficiency in their properties, and for program administrators in designing and implementing effective multifamily programs, multifamily households are often underserved by the energy efficiency programs they help to fund."
- 32 Lisa Skumatz (Skumatz Economic Research Associates), *Non-Energy Benefits/Non-Energy Impacts and Their Role & Values in Cost-Effectiveness Tests: State of Maryland*, 2014. [www.energyefficiencyforall.org/non-energy-benefits](http://www.energyefficiencyforall.org/non-energy-benefits)
- 33 See Joy Morgenstern, *California's Experience in Incorporating Non-Energy Benefits into Cost-Effectiveness Tests*, Presentation to the California Public Utility Commission, 2013, located at: [www.iea.org/media/workshops/2013/energyproviders/Session3\\_4\\_Morgenstern\\_IEAOct16presentation.pdf](http://www.iea.org/media/workshops/2013/energyproviders/Session3_4_Morgenstern_IEAOct16presentation.pdf).
- 34 The EmPOWER Maryland Energy Efficiency Act Standard Report of 2014, The Public Service Commission of Maryland, March 2014, (Baltimore, MD).
- 35 A proposal to use a CE threshold of 0.9 was made by the Regulatory Assistance Project. See Tim Woolf (et al.), *Energy Efficiency Cost-Effectiveness Screening: How to Properly Account for 'Other Program Impacts' and Environmental Compliance Costs*, RAP, November, 2012 (Montpelier VT) (discussion at page 35).
- 36 The National Home Performance Council, a non-profit organization of energy services providers, operates the National Efficiency Screening Project with the stated mission of "improving efficiency screening practices throughout the U.S." See documents located on the NHPC website located at: [www.nhpci.org/campaigns.html](http://www.nhpci.org/campaigns.html).
- 37 Tim Woolf, et al., Synapse Energy Economics, *Best Practices in Energy Efficiency Screening*, National Home Performance Council, 2012 (Available on the NHPC website at: [http://www.nhpci.org/images/NHPC\\_Synapse-EE-Screening\\_final.pdf](http://www.nhpci.org/images/NHPC_Synapse-EE-Screening_final.pdf))
- 38 Note that ENERGYSTAR Portfolio Manager has been used to assess operational performance for almost half the nation's commercial floor space. It provides a score of 0 to 100 through a statistical benchmarking method that compares a given building with a peer group of similar building types in a given climate zone. As of September 2014, Portfolio Manager became available to benchmark MF properties with 20 units or more, as long as over 50 percent of the units are located in structures with 5 or more living units per structure. For example, a property that includes 100 townhomes and 200 units in 20 ten-unit buildings would be eligible for certification, but a property of 100 units in 25 four-unit buildings would not. More information can be found on the EnergyStar website. Additional tools such as WegoWise and BrightPower offer owners the ability to benchmark along with tracking the energy usage and expenses.
- 39 See Andrea Krukowski and Cliff Majersik, *Utilities Guide to Data Access for Building Benchmarking*, Institute for Market Transformation, March, 2013; Regulatory Assistance Project, *Driving Building Efficiency with Aggregated Customer Data: A Brief Review of Selected Practices in the U.S.*, 2013 (<http://www.raonline.org/document/download/id/6637>); U.S. Department of Energy, *Better Buildings Challenge Multifamily Partners: Pathways to Meeting Your Energy Data Commitment*, July 2014, ([www4.eere.energy.gov/alliance/sites/default/files/uploaded-files/better-buildings-challenge-multifamily-pathways-to-meeting-your-energy-data-commitment.pdf](http://www4.eere.energy.gov/alliance/sites/default/files/uploaded-files/better-buildings-challenge-multifamily-pathways-to-meeting-your-energy-data-commitment.pdf)); and, See Action Network, *Utility Regulator's Guide to Building Data Access for Commercial Building Energy Performance Benchmarking*, May 2013. (Located at: [www4.eere.energy.gov/seeaction/system/files/documents/commercialbuildings\\_data\\_access\\_guide\\_0.pdf](http://www4.eere.energy.gov/seeaction/system/files/documents/commercialbuildings_data_access_guide_0.pdf).)
- 40 Commonwealth Edison in Chicago reportedly delivers whole building energy usage information to building owners if there are at least 4 separate accounts aggregated into the summary total. In contrast, California utilities, in the absence of any regulatory guidance, have implemented conservative policies to not share whole-building usage information with an owner unless the building has 15 or more separate accounts. See Proposed Decision Adopting Rules to Provide Access to Energy Usage and Usage Related Data While Protecting Privacy of Personal Data, California Public Utility Commission, Rulemaking 08-12-009, March 7, 2014, (discussion at page 57-64).
- 41 U.S. Department of Housing and Urban Development and California Housing Partnership Corporation, *A Case for Aggregate and Anonymized Whole Building Energy Data in the Multifamily Sector*, April 2014. (located at: [www1.eere.energy.gov/buildings/betterbuildings/accelerators/documents/case\\_aggregate\\_anonymized\\_whole\\_building\\_energy\\_data\\_april\\_2014.pdf](http://www1.eere.energy.gov/buildings/betterbuildings/accelerators/documents/case_aggregate_anonymized_whole_building_energy_data_april_2014.pdf)).
- 42 To help WAP providers target ARRA funds to MFAH, HUD provided a list of pre-identified properties deemed eligible for low-income programs. This list can be found at [energy.gov/eere/wipo/housing-and-urban-development-multifamily-properties-eligible-weatherization-assistance](http://energy.gov/eere/wipo/housing-and-urban-development-multifamily-properties-eligible-weatherization-assistance).
- 43 See *Energy and Water Savings*, [www.sahfnet.org/mfretrofitreport\\_11\\_1287596736.pdf](http://www.sahfnet.org/mfretrofitreport_11_1287596736.pdf).
- 44 See program described on the website of the California Housing Partnership Corporation, located at: [http://www.chpc.net/dnld/FedReserveFinancingMF\\_EE\\_RetrofitsMarch2014.pdf](http://www.chpc.net/dnld/FedReserveFinancingMF_EE_RetrofitsMarch2014.pdf).
- 45 See Chris Wood, *Multifamily Energy Benchmarking Reports Reveal Challenges*, Multifamily Executive Magazine, July 28, 2011.
- 46 Requirements for Fannie Mae's Green Preservation Plus refer to a Level II audit, but requirements could change or vary with loan products offered by other lenders. See Fannie Mae, Fact Sheet, Green Preservation Plus, May 2014 (Located at [www.fanniemae.com/content/fact\\_sheet/grnrefiplus.pdf](http://www.fanniemae.com/content/fact_sheet/grnrefiplus.pdf))
- 47 For an excellent overview of how utilities and local organizations can work together to bring effective tools to market, see NHT, *Partnering for Success*.
- 48 2015 Affordable Housing Plan, Minnesota Housing Finance Agency, located on the HFA's website at: [www.mnhousing.gov](http://www.mnhousing.gov).
- 49 See Fannie Mae, Green Preservation Plus Fact Sheet, May 2014 (Located at [www.fanniemae.com/content/fact\\_sheet/grnrefiplus.pdf](http://www.fanniemae.com/content/fact_sheet/grnrefiplus.pdf)). Also see joint announcement of Fannie Mae and U.S. Department of Housing and Urban Development at: [www.fanniemae.com/portal/about-us/media/corporate-news/2014/6117.html](http://www.fanniemae.com/portal/about-us/media/corporate-news/2014/6117.html).
- 50 See the Association for Energy Affordability website located at: <http://aea.us.org/efficiency-programs.html>.
- 51 See Khawaja and Stewart, *Long Run Savings and Cost-Effectiveness of Home Energy Report Programs*, Report of Cadmus Group, Inc., 2014.



**ENERGY  
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Energy Efficiency for All is dedicated to linking the energy and housing sectors together in order to tap the benefits of energy efficiency for millions of low-income families. We work with electric and gas utilities and their regulators interested in innovative energy efficiency program designs. We advise housing finance agencies on best practices in building owner engagement and finance products. We collaborate with owners, managers, businesses and advocates in order to achieve energy savings in multifamily properties. Our project is a partnership of the Energy Foundation, Elevate Energy, National Housing Trust and Natural Resources Defense Council. This project was made possible with funding support from The JPB Foundation.

We invite you to join us. [www.energyefficiencyforall.org](http://www.energyefficiencyforall.org)