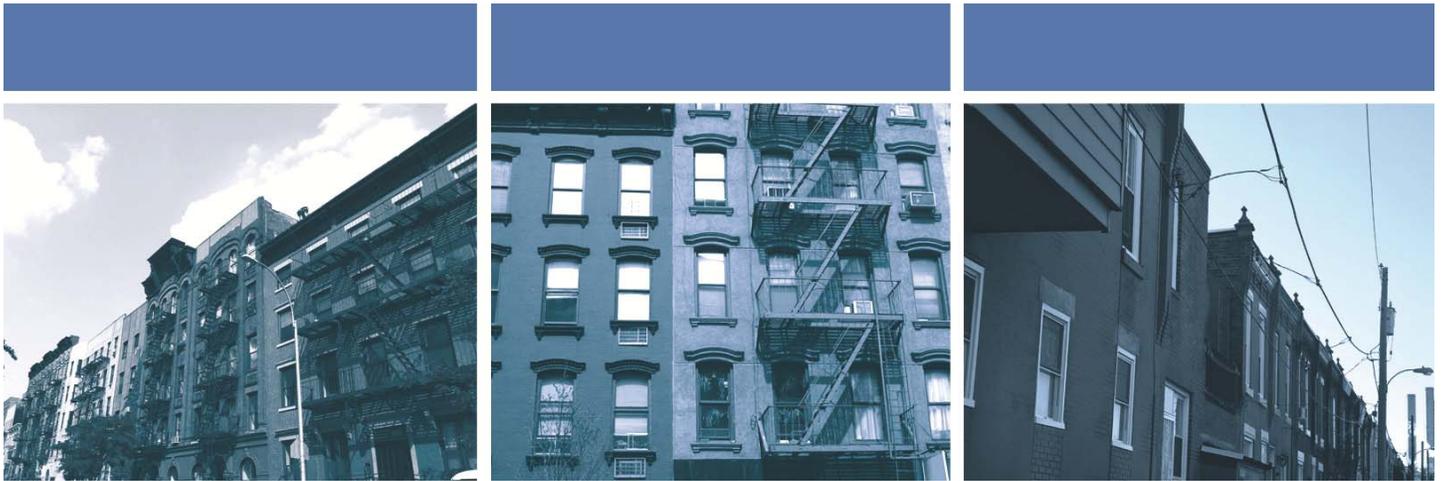


## DOCKETED

<b>Docket Number:</b>	16-OIR-02
<b>Project Title:</b>	SB 350 Barriers Report
<b>TN #:</b>	211065
<b>Document Title:</b>	Multifamily Energy Efficiency: Reported Barriers and Emerging Practices
<b>Description:</b>	From the introduction: "This report identifies: ? Barriers that have been identified to increasing investment in low-income multifamily housing; ? Current efforts to address those barriers and increase building owner investment; and ? Strategies for deploying public- and private-sector resources that can increase the effectiveness of current efforts to address energy efficiency barriers in the low-income multifamily housing sector."
<b>Filer:</b>	Chris Wymer
<b>Organization:</b>	Energy Programs Consortium
<b>Submitter Role:</b>	Public
<b>Submission Date:</b>	4/14/2016 1:03:31 PM
<b>Docketed Date:</b>	4/14/2016



# Multifamily Energy Efficiency: Reported Barriers and Emerging Practices

November 2013



ENERGY PROGRAMS CONSORTIUM

Energy Programs Consortium  
1228 31<sup>st</sup> NW  
Washington, DC 20007  
[www.energyprograms.org](http://www.energyprograms.org)

# TABLE OF CONTENTS

<b>Introduction</b> .....	<b>2</b>
<b>Key Findings</b> .....	<b>3</b>
<b>Section I. Barriers and Emerging Practices: A Review of Existing Studies and Reports</b> .....	<b>8</b>
Introduction .....	8
Methodology .....	8
Barriers and Obstacles.....	9
Responses to Barriers Identified .....	18
Concluding Thoughts .....	22
<b>Section II. Why Multifamily Building Owners Invest in Energy Efficiency Measures</b> .....	<b>25</b>
Time of Owner Purchase or Refinancing of Property .....	25
Replacement of Aging, Obsolete, or Costly HVAC & Water Equipment .....	26
Attractive Utility, Tax, and Government Incentives .....	27
Idealism .....	27
Peer Pressure .....	28
Real Estate Appreciation and Tenant Demand .....	28
The Significance of Understanding Owner Energy Efficiency Investments .....	29
<b>Section III. State Responses to Barriers and Opportunities in Multifamily Housing</b> .....	<b>30</b>
Overview .....	30
Promoting Multifamily Energy Efficiency to Meet Goals and Targets .....	33
Examples of Energy Office and Other State Programs .....	35
State Funding and Financing Strategies .....	37
State Policy Levers, Opportunities, and Considerations .....	39
<b>Section IV. Proven Strategies</b> .....	<b>41</b>
Electric and Gas Utility Incentive Programs (“Pay for Performance”) .....	41
Utility On-Bill Repayment Programs .....	43
“One-Stop Shopping” Organizations .....	44
Commercial Property Assessed Clean Energy Financing (PACE) .....	44
<b>Section V. How Public- and Private-Sector Stakeholders Can Facilitate and Accelerate Multifamily Energy Efficiency</b> .....	<b>46</b>
<b>Bibliography</b> .....	<b>48</b>

## ACKNOWLEDGMENTS

The Energy Programs Consortium (EPC) would like to thank The JPB Foundation for their generous support in funding this report. The report was prepared as part of a larger effort by the EPC and the National Association of State Energy Officials (NASEO) to support the development and implementation of innovative strategies to increase the energy efficiency of low-income housing.

EPC would like to specifically thank Mark Wolfe for serving as the Project Director; Elizabeth Bellis for preparing the review of studies, reports, and papers on barriers and solutions to investing in multifamily housing; Stephen Morgan for developing the sections on why building owners invest in energy efficiency measures, as well as proven strategies; and Program Manager Sandy Fazeli and Executive Director David Terry of NASEO for developing the section on state responses to barriers and opportunities, as well as to the entire team for developing the last section of the report on how public- and private-sector stakeholders and other social change agents can facilitate the engagement of game-changing strategies for multifamily housing.

## ABOUT THE ENERGY PROGRAMS CONSORTIUM

EPC is a 501(c)(3) nonprofit organization that conducts policy research and demonstration programs sponsored by the four main organization representing state energy and regulatory agencies: the National Association of State Energy Officials; National Energy Assistance Directors' Association; National Association of Regulatory Utility Commissioners; and National Association of State and Community Services Programs.

For additional information about the EPC, please contact:

Energy Programs Consortium  
1228 31<sup>st</sup> NW  
Washington, DC 20007  
(202) 333-5915  
[www.energyprograms.org](http://www.energyprograms.org)

# INTRODUCTION

The potential volume of energy efficiency improvements in low-income multifamily housing in the United States could be as much as \$30 to \$50 billion. Energy efficiency improvements on that scale would translate to energy savings of \$4 billion to \$7 billion annually and a significant reduction in energy generation needs. The impact on quality of life and affordability for low-income households could be considerably greater.

Federal, state, and local governments, and the private sector as well, are working to address this challenge. Considerable research into what works and what does not has been done, and programs are being deployed in a number of states to support comprehensive retrofits. Yet much remains to be done to achieve the potential for energy savings in this sector.

This report identifies:

- Barriers that have been identified to increasing investment in low-income multifamily housing;
- Current efforts to address those barriers and increase building owner investment; and
- Strategies for deploying public- and private-sector resources that can increase the effectiveness of current efforts to address energy efficiency barriers in the low-income multifamily housing sector.

The report is divided into five sections:

- Section I identifies barriers as well as conceptual responses to those barriers in more than 40 studies on ways to increase energy efficiency in low-income multifamily housing.
- Section II describes specific state and utility-based programs working to address these barriers.
- Section III provides some insights by focusing on why owners decide to invest in energy efficiency measures.
- Section IV highlights practical, proven strategies that are being deployed in some states and communities to break through the logjam inhibiting significant energy efficiency investments.
- Section V recommends interventions that public- and private-sector stakeholders could undertake to accelerate the number and extent of investments in energy efficiency measures for low-income multifamily households.

## KEY FINDINGS

### Barriers and Solutions: A Review of Existing Studies and Reports

“Multifamily housing has long been identified as a particularly challenging area for energy conservation.” This sentence may sound like the beginning of one of the numerous reports published on the subject in the last few years. Instead, it comes from a 1995 American Council for an Energy-Efficient Economy (ACEEE) report surveying papers from the early 1980s identifying opportunities for and barriers to energy conservation in multifamily housing. Nearly 30 years later, papers continue to report and list many of the same barriers identified in the 1980s.

Overall, the numerous reports agree on many points, including the considerable opportunity to save energy and help reduce energy bills in a cost-effective way in low-income multifamily housing. However, the reports also describe a dizzying array of barriers and roadblocks that have hindered achievement of this potential.

Despite the wide variety of initiatives, pilots, and programs attempting to address many of the barriers identified, none of the reports suggest that any of these barriers have truly been “solved” or “removed.” However, future efforts to address any particular barrier or obstacle need not be undertaken anew, but instead may draw on the experiences and lessons learned from the programs and efforts mentioned above, as well as the numerous others described in the many reports published over the last 30 years that we have been unable to describe within the limited scope of this paper.

Key barriers and obstacles discussed include:

- Split incentives between the building owner and the tenant;
- Dispersed and/or complex building ownership;
- Lack of building owner access to financing;
- Lack of data about multifamily energy use and retrofit performance; and
- Legal and regulatory barriers (including HUD, LIHTC, utility, and tax).

### Solutions to Addressing Barriers

---

Many of the reports and studies identified responses and solutions to some of the barriers identified, such as:

- To address **split incentives**, “green” leases (or energy-efficient leases) realign tenant and owner incentives so that improvements are mutually beneficial for the tenants and

owners.<sup>1</sup> For example, in 2011 New York City created a clause that allows commercial landlords to implement energy efficiency improvements and pass the cost through to tenants based on the projected savings.<sup>2</sup> The clause requires a 20% buffer in projected energy savings versus additional tenant cost, to protect tenants in case the project doesn't perform as expected. These leases are just beginning to be adopted in New York City and could provide valuable lessons for the residential sector.

- Landlords may be reluctant to enter into the maze of complex state and utility-sponsored programs. To address this concern, some state programs provide “expeditors” who can serve a staff-like function for a building owner, pulling together relevant program requirements and benefits and providing tailored information. In other cases, organizations such as CNT (Center for Neighborhood Technology) Energy in Chicago or the Community Preservation Corporation (CPC) in New York attempt to provide this sort of “one-stop shopping” for time-strapped building owners.
- **Difficulty accessing state and utility financing** is another frequently cited barrier that many are attempting to address. The rate of participation of multifamily properties in state energy financing as a whole is significantly low in comparison to the level of investment made for single-family residential or commercial energy efficiency.

Even in programs where multifamily properties are eligible for financing, the size and structure of the financing vehicle and the program design are typically not customized to meet the unique financing challenges and technical needs of multifamily buildings. Especially in lower-value or highly leveraged multifamily properties, the availability of low-cost financing may certainly trigger the interest of the building owner to invest in efficiency.

Barriers to investment persist including (among others) high first costs, lack of owner creditworthiness, and difficult or conflicting investment time frames. Financing is less of a barrier to buildings, however, owned by institutional investors, public housing authorities, and REITS. Creditworthiness is an issue for conventional housing owned by partnerships and sole proprietors. Access to capital is exacerbated by the lack of lender/underwriter/appraiser acknowledgement of energy efficiency, among others.

In recognition of this dynamic, some pioneering states are responding with programs to overcome these barriers and quicken the sluggish pace of energy efficiency improvements in the multifamily sector. Recent examples of state energy financing that is specifically targeted and customized for multifamily properties are addressing specific market barriers and are beginning to show promise. (See Section III.)

Community development financial institutions (CDFIs) are noted as one source of financing for this type of work, with on-bill financing another important piece (particularly for highly leveraged buildings or those subject to restrictive financing rules, which make up a large segment of the multifamily sector). At a local level, organizations

---

<sup>1</sup> ACEEE 2013b, p. 18 (citing IMT 2013).

<sup>2</sup> See ACEEE 2013b, p. 19.

such as the New York City Energy Efficiency Corporation are obtaining funding from a variety of sources, including foundation grants, to finance energy efficiency improvements in multifamily buildings.

- Numerous reports note and respond to the **lack of data about energy use and retrofit performance** in multifamily buildings. In response, Bank of America is working with Bright Power to utilize EnergyScoreCards, an online software-as-a-service benchmarking tool specifically geared toward multifamily and other multi-tenant properties. Stewards for Affordable Housing is also utilizing the software to track retrofits in many of its buildings. Enterprise Community Partners and many others that received a portion of the \$23 million in US Housing and Urban Development (HUD) funds in 2012 for new approaches in older multifamily buildings are similarly including some tracking of retrofit performance in their programs.

## Federal and State Funding

---

Significant resources are at work to improve multifamily energy efficiency. Federal and state funding for state-administered, low-income, residential energy efficiency programs totaled almost \$1.3 billion in 2012, of which \$436 million was from the Low-Income Home Energy Assistance Program (LIHEAP), \$204 million was from US Department of Energy (DOE) Weatherization Assistance Program, and \$670 million was from utility- and state-sourced public benefit funds. All states and the District of Columbia received DOE Weatherization funds, and 42 states and the District of Columbia also provided supplemental LIHEAP funding. In addition, 30 states and the District of Columbia also provided public benefit funding (a charge on energy use by utilities) to support weatherization through utilities and state programs.

The share of the \$1.3 billion in low-income energy efficiency funds that is allocated to multifamily housing has been estimated at 25%, but specific numbers are not available because they are generally only reported by category rather than type of housing. In addition, it is possible that the utility/state numbers understate the true extent of spending on this sector because funds can also be provided through related programs that are not specifically targeted for this purpose.

The many programs and efforts funded with these resources provide lessons about future efforts and utilizing resources to support and expand proven strategies for increasing energy efficiency in multifamily housing.

## Demonstrated Strategies to Increase Energy Efficiency of Multifamily Housing

---

There is no “one size fits all” approach to retrofitting the nation’s low-income multifamily housing stock. There are a range of strategies that have been shown to work (at least in a limited context) and could be used to grow and develop retrofit programs across the country, including:

- Electric and gas utility incentive programs (“Pay for Performance”)

- Utility on-bill repayment programs
- “One-stop shopping” program centers
- Commercial Property Assessed Clean Energy Financing (PACE)

## How Public- and Private-Sector Stakeholders Can Facilitate and Accelerate Multifamily Energy Efficiency

---

Catalytic funders can play a variety of roles to facilitate stakeholder alliances with a focus on multifamily program and strategy opportunities. The following are a number of specific recommendations that address the two overarching areas mentioned above—utility resources and financing—as well as other implementation and analytical issues identified in the report:

- Supporting nonprofit organizations and state and local agencies that serve a convening function or leadership role in coordinating policy, regulatory, and program implementation actions that would establish or increase the level of state-directed utility funding dedicated to the multifamily housing sector.

Additional activities could focus on development and implementation of plans that overcome identified project barriers that cross jurisdictional or agency lines, or market participant roles. These stakeholder efforts would be integrated with state and local energy plans for additional long-term leverage. More than 30 states conduct comprehensive energy policy planning (governor or legislature driven), and to date, there is limited emphasis in the existing plans on multifamily energy efficiency.

- Developing pilot programs in partnership with state energy and housing finance agencies that require cost-share commitments to leverage stakeholder resources aimed at advancing multifamily demonstration (e.g., financing models combined with utility programs) and policy actions (e.g., convening stakeholder processes). Cost-share commitments leverage resources and aid in ensuring longer-term sustainability of the program. For example, they could support equity or debt co-funding (e.g., foundation, local, state, utility funds) of innovative financing concepts integrated with additional program and policy actions to create a more complete approach.
- Funding of best practices research to determine that mix of strategies, developments, and attributes worthy of replication in other locales. These might include more intensive evaluations of existing initiatives.
- Environmental scans and feasibility studies to determine which array of programs, strategies, technologies, and other market-promoting factors are most promising in particular geographies.
- Competitions among states or direct awards to organizations and partnerships with compelling strategy concepts (including legislative initiatives) and stakeholder commitments to meet and overcome the barriers that prevent multifamily owners from undertaking comprehensive energy efficiency and renewable investments.

- Evaluations of the mandatory benchmarking, audits, and disclosure ordinances in New York, San Francisco, Washington DC, and Austin to determine how well the “deep” leveraging strategies are working for multifamily buildings.
- Equity or debt funding of innovative financing concepts, such as the Pay for Success model.
- An in-depth analysis of the technical and economic feasibility of combined heat and power in multifamily buildings, a technology with larger emphasis at the DOE, EPA, and HUD in the wake of Hurricane Sandy and the need for distributed generation.
- Grants to outstanding nonprofit organizations capable of catalyzing the kinds of multifamily investment results on a regional or national basis.
- Hosting of workshops and conferences to bring together stakeholders and activists in this field on a regular basis.
- Building the capacity of state energy offices and regional energy alliances to maintain a capable and continuous presence in this field.

There may also be other productive options for stakeholders to play that will reveal themselves in this dynamic environment over the next few years. In the interests of income equity, climate change, economic development, infrastructure resilience, and national security, further involvement in this promising, neglected marketplace makes eminent sense.

# SECTION I. BARRIERS AND EMERGING PRACTICES: A REVIEW OF EXISTING STUDIES AND REPORTS

## Introduction

---

“Multifamily housing has long been identified as a particularly challenging area for energy conservation.” This sentence may sound like the beginning of one of the numerous reports published on the subject in the last few years; however, it comes from a 1995 American Council for an Energy-Efficient Economy (ACEEE) report surveying papers from the early 1980s identifying opportunities for and barriers to energy conservation in multifamily housing. Nearly 30 years later, papers continue to report and list many of the same barriers identified in the 1980s.

This section provides a synthesis and analysis of findings from key reports that address the obstacles and solutions to directing utility and state public benefit funds toward affordable housing. Overall, the numerous reports agree on many points, including the considerable opportunity to save energy and help reduce energy bills in a cost-effective way in low-income multifamily housing. However, the reports also describe a dizzying array of barriers and roadblocks that have hindered achievement of this potential.

The importance of most of the barriers addressed varies by subsector (affordable vs. market vs. public housing, for example). In fact, the diversity of building stock, stakeholders, and other relevant factors is itself one of the barriers often cited in achieving the energy efficiency potential in the multifamily sector.

## Methodology

---

We reviewed 40 reports, studies, and publications that addressed energy efficiency in the multifamily housing sector. (See the Bibliography for the complete list, as well as a guide to the abbreviations used in the notes to this paper.) The reports were published between 1995 and 2013, with 29 of the 40 reports published between 2010 and 2013.

Although this section attempts to provide a comprehensive review of the current literature on barriers to multifamily energy efficiency, we have undoubtedly missed some important reports, as there is no common repository or library of documents produced in this area. However, we have attempted to cover the most commonly mentioned barriers at the level of detail needed to understand the context and background for future multifamily energy efficiency endeavors, and we believe that the reports discussed in this section represent an emerging consensus among experts and practitioners in the field about the barriers and obstacles faced in improving the energy efficiency in multifamily buildings.

## Barriers and Obstacles

---

The reports and studies surveyed mention a large variety of barriers to improving energy efficiency in multifamily buildings, some of which overlap or are interrelated. These barriers and obstacles include:

### Diverse Building Stock and Markets

Multifamily buildings vary widely in terms of heating, ventilation, and air-conditioning (HVAC) and other relevant systems; building age; building size; tenant incomes; financing structures; ownership structures; and other important factors that may affect energy efficiency and related decision-making.<sup>3</sup> The multifamily sector is “fragmented and resists a one-size-fits-all approach. . . . Policies must accommodate and reflect the diversity . . . of both the building stock and its stakeholders.”<sup>4</sup>

On a related note, the market for multifamily housing itself varies significantly from property to property. It is fragmented into submarkets,<sup>5</sup> and it can be difficult to find solutions that can be replicated in diverse markets.<sup>6</sup> Prescriptive rules may hinder efficiency if they fail to pay adequate attention to differences among local real estate markets.<sup>7</sup>

Building type and metering configuration overlap in terms of barriers and opportunities for energy efficiency investments. For example, garden-style and motel-style apartment buildings are newer and more likely to be resident-metered for all fuels. They are also more likely to be found in the Sun Belt, where heating loads and utility costs are both lower, thus presenting more barriers to energy efficiency investments by owners because paybacks are longer.<sup>8</sup>

Heating fuel is also an important variable: in some parts of the East Coast, electric heat costs 4 to 6 times more per British thermal unit than natural gas, creating an incentive for electric-to-gas conversions.<sup>9</sup> Natural gas tracked the price of heating oil for decades, but today is one-third to one-half the cost or less in most markets where both are available, creating incentives for fuel conversion. Fuel conversion work in turn is often accompanied by investments in more efficient heating and hot water equipment.

Geographic location of multifamily buildings is also important for two reasons alluded to above: heating load and utility prices. Except in California, there is a strong correlation between cold climates and high “per kilowatt-hour” costs that result in high utility bills, particularly in (most of) the Northeast and upper Midwest. Multifamily buildings in those regions have greater incentives for energy investments because paybacks are shorter. These buildings also tend to be

---

<sup>3</sup> See ACEEE 2013a for use of fuels provided by various utilities (p. 11), age of building (p. 12), and condos/coops (p. 13).

<sup>4</sup> IMT 2012, p. 1.

<sup>5</sup> See ACNEEP 2013 for discussion of the market being fragmented into submarkets (p. 13).

<sup>6</sup> See ACEEE 2013b, p. 10; ACEEE 2013a for the importance of local multifamily circumstances (p. 10).

<sup>7</sup> BPC 2013, p. 96.

<sup>8</sup> ACEEE 1994.

<sup>9</sup> For points in this and the succeeding three paragraphs, see Morgan 2013, an interview based on his years of experience in the field.

older than those in the Sunbelt. The growing phenomenon of central air-conditioning, even in public and affordable housing, is changing this calculus ever so gradually in the direction of larger capital need.

So building ownership, metering configuration, building type, heating fuel, and geography all pose changes in the opportunities and barriers for energy efficiency investments by building owners. Depending upon the configuration and overlap of these attributes, some program designs, incentives, and market strategies would be more or less effective. Low-income households are widely distributed among all of these multifamily buildings.

### **Dispersed and/or Complex Building Ownership**

Multifamily building ownership is not highly concentrated, which means more decision-makers must undertake the effort and be convinced before the building sector as a whole can reach its efficiency potential at scale.<sup>10</sup> In addition, building owners with fewer properties may have less incentive to undertake the effort to understand the incentives, measures, and other relevant factors, or less staff available to assist them in doing so.

Many multifamily buildings have several owners and multiple decision-makers who must be convinced before energy efficiency improvement work can be undertaken: owners, limited partners, managers, building staff, and sometimes tenants.<sup>11</sup> Multifamily buildings may be owned by public housing agencies, nonprofit organizations, and for-profit individuals, partnerships, and housing management corporations. These owners, in turn, can be partnership syndicates, development companies, or institutions such as pension funds and insurance companies.<sup>12</sup> The public housing authorities and nonprofits serve predominantly low-income households, but a great many low-income households live in conventional housing, rendering this category important to describe as well.

Among multifamily conventional owners, institutional owners hold the properties the longest (six years or more) and can make capital decisions in a relatively streamlined fashion.<sup>13</sup> Syndicates and partnerships hold their properties for shorter periods, have more complex decision-making processes, and are therefore less likely to invest in comprehensive energy efficiency measures.

### **Split Incentives**

The costs and benefits of energy efficiency improvements are divided between tenants and owners in ways that may cause neither to be fully incentivized to undertake or pay for the work.<sup>14</sup> The division of incentives is dependent on the metering structure for the building. Older cities along the East Coast and upper Midwest contain the largest concentrations of master-

<sup>10</sup> For its effect on scalability, see ACNEEP 2013, p. 13. See also IMT 2012, p. 13.

<sup>11</sup> NREL 2011 refers to developers/limited partnerships, citing the ACEEE 2006 Summer Study generally.

<sup>12</sup> ACEEE 1994.

<sup>13</sup> ACEEE 1994.

<sup>14</sup> See ACEEE 1995, p. 3; EPC 2007, p. 11; BG 2009, pp. 17–18; NHC/CHP 2009, p. 21; BI 2010, p. 4; EPA 2011; IMT 2012, p. 13; ACNEEP 2013, p. 13; ACEEE 2013a, pp. 8, 15. HUD encourages performance contracting, but split incentives are a problem (Abromowitz 2008, p. 15).

metered gas and oil heating and hot water systems—again, systems most likely found in buildings built before 1980.<sup>15</sup> In most of these buildings, however, electricity is resident-metered. Because older buildings are also better candidates for more significant energy savings, this distinction is important.

### **Lack of Information about Energy Efficiency Improvements and Incentives**

Building owners and even contractors may lack information about what can be done to improve energy efficiency in multifamily buildings and what the best retrofits might be.<sup>16</sup> As early as 1995, however, reports suggest this had become less of a barrier than it had been previously.<sup>17</sup> In addition, building owners and managers may lack information about the utility and governmental incentives available to them for improving the energy efficiency of their buildings.<sup>18</sup>

### **Lack of Data about Multifamily Energy Use**

Building owners and managers lack the data about building energy use needed to make decisions about energy efficiency improvements, in part because utilities often do not provide aggregated tenant data to building owners.<sup>19</sup> In many cases, this may be due to privacy rules restricting the use and sharing of customer energy-use data.<sup>20</sup> Lenders similarly have little information to guide underwriting and lending decisions.<sup>21</sup> Even state and governmental decision-makers often have little information.<sup>22</sup> There is no neutral data aggregator that can combine data from multiple sources and data-sharing agreements to facilitate the provision of whole-building data.<sup>23</sup>

Some data are available, but existing tracking efforts are not comprehensive or sufficient. For example, the US Department of Energy (DOE)'s Residential Energy Consumption Survey historically did not include current and robust data on multifamily housing. Existing documentation requirements for the Weatherization Assistance Program (WAP) and for state programs such as the New York State Energy Research and Development Authority (NYSERDA)'s Multifamily Performance Program do not provide sufficient information for these stakeholders' needs.<sup>24</sup> WAP reporting requirements may vary from state to state.<sup>25</sup> Paula Cino of the National Multi Housing Council commented, "The data that do exist . . . do not reflect the diversity of the multifamily market and therefore are not broadly applicable."<sup>26</sup>

---

<sup>15</sup> ACEEE 1994.

<sup>16</sup> See EPC 2007, p. 11; NHC/CHP 2009, p. 20.

<sup>17</sup> See ACEEE 1995, p. 5; IMT 2012, p. 25.

<sup>18</sup> See ACEEE 1995, which refers to a lack of information for building owners and managers (p. 3).

<sup>19</sup> See ACEEE 1995, p. 3; NHC/CHP 2009, p. 20; BI 2010 for poor-quality or nonexistent information on energy use (p. 4); ACEEE 2012b for lack of whole building data in a usable format (pp. 15–16); HUD 2011 for the difficulty in getting whole building data (p. 5); and LC 2011.

<sup>20</sup> ACEEE 2012b, p. 13.

<sup>21</sup> See LC 2012 for lack of information about retrofit effectiveness from lenders (p. 2) and lack of access to utility datasets (p. 14); and ACEEE 1995 regarding the DOE survey (p. 16).

<sup>22</sup> IMT 2012, p. 28.

<sup>23</sup> ACEEE 2012b, p. 25.

<sup>24</sup> See LC 2012 for the Multifamily Performance Program, NYSERDA's Multifamily Performance Program, and WAP (p. 15).

<sup>25</sup> LC 2012, p. 84.

<sup>26</sup> HUD 2011, p. 4.

A related problem is information asymmetries in which either building owners or building tenants have better information than the other in respect to various factors relevant to energy efficiency improvement decisions,<sup>27</sup> which is also connected with split incentives and lack of data about multifamily retrofit performance.

### **Lack of Data about Multifamily Retrofit Performance**

Building owners, lenders, and regulators lack information about savings generated by retrofits.<sup>28</sup> Evaluation of savings can be difficult, and performance may be building- and region-specific.<sup>29</sup> This lack of information can affect perceptions of risk and create a “confidence barrier” to undertaking improvements.<sup>30</sup>

### **Lack of Predictability of Savings over Time**

Even where there is some information about retrofit performance, the information may be that results are unpredictable.<sup>31</sup> For example, Deutsche Bank’s study of New York City multifamily retrofits found that electric savings varied widely and unpredictably, and fuel savings are often under-realized due to over-projection.<sup>32</sup> The lack of predictability of retrofit performance is particularly worrisome to lenders considering whether to underwrite loans against expected retrofit savings.<sup>33</sup> The reports surveyed indicate a number of reasons for the unpredictability:

- *Poor audit quality/reliability and over-projection of savings:* Deutsche Bank and Living Cities note that the problem for some types of measures may lie in the consistent overestimation by auditors or contractors when contemplating the work (lack of audit quality/reliability).<sup>34</sup> Some lenders cannot trust borrower energy audits, although third-party verification may satisfy them.<sup>35</sup> Similarly, HUD points to a dearth of knowledgeable multifamily auditors.<sup>36</sup>
- *Improper maintenance or operation:* In other cases, lack of predictability may be due to maintenance or operation problems. For example, savings often don’t persist in public housing due to improper operation of equipment and lack of maintenance.<sup>37</sup> Similarly, installation and administration of the same improvements may cost more in lower-income buildings than they would elsewhere.<sup>38</sup>

---

<sup>27</sup> HUD 2011, p. 5.

<sup>28</sup> See BI 2010 for poor-quality or nonexistent information on energy savings potential (p. 4); IMT 2012, p. 13; ACEEE 2013a, p. 8; and LC 2011.

<sup>29</sup> ACEEE 1995, p. 14.

<sup>30</sup> See ACEEE 1995 for a discussion of the “confidence barrier”—the skepticism of building owners and managers about energy savings and the value of the investments involved (p. 13); and ACNEEP 2013 for the uncertainty of savings and perceptions of risk (p. 13).

<sup>31</sup> See LC 2012 with respect to improvements to save electricity in common areas.

<sup>32</sup> LC 2012, pp. 31, 48.

<sup>33</sup> LC 2012.

<sup>34</sup> LC 2012.

<sup>35</sup> LC 2010, p. 6.

<sup>36</sup> HUD 2011, p. 6.

<sup>37</sup> ACEEE 1995, p. 10.

<sup>38</sup> ACEEE 1995, p. 8.

- *Fluctuating energy costs:* Even where measures perform as expected, when energy costs fluctuate over the payback period, it can be difficult to calculate what the payoff will be for investing in energy efficiency and whether improvements will be cost-effective.<sup>39</sup>

## Lack of Financing

Even when building decision-makers have overcome the barriers described above—they have spent the needed time and energy investigating energy efficiency improvement options, found the necessary information, identified a sufficient expected payoff, and convinced the relevant decision-makers to invest in energy efficiency improvements—numerous reports point to a lack of building owner financing as an additional hurdle to be overcome.<sup>40</sup> A variety of reasons for the lack of available building owner financing are identified, including the following:

- *Loan-to-value ratios are too high for additional debt.*<sup>41</sup>
- *Appraisers are not accounting for energy efficiency.*<sup>42</sup>
- *Lenders are failing to associate energy savings with building expenses:* For example, as Living Cities reports, “One interviewee stated that their mission relates to affordable housing and not to sustainability, suggesting that some lenders do not even associate energy savings with building expenses” (LC 2010, p. 6).
- *Underwriters are failing to account for energy efficiency improvements (as opposed to relying on historical trend figures).* For example, as Living Cities notes, “Conventional lenders . . . treat energy savings projections skeptically and virtually never incorporate them in the underwriting models that determine the sizing of loans. Rather, they rely on historic building performance or industry standards, not forward-looking projections. . . . Many lenders explain their reluctance to underwrite against savings by pointing to the lack of data by which to judge the accuracy of energy savings projections. . . . This means that lenders cannot reliably assess the risk associated with lending against energy savings projections” (LC 2010, p. 2).
- *The lack of availability of weatherization<sup>43</sup> and public benefit funds to multifamily owners.*<sup>44</sup>
- *The lack of motivation for lenders and borrowers to consider energy savings projections for a variety of reasons, including energy’s small share of overall revenues/expenses,*

---

<sup>39</sup> HUD 2011, p. 5.

<sup>40</sup> EPC 2007 reports insufficient funding to address the problem with grants only (p. iv); BI 2010 describes the absence of up-front capital coupled with inchoate private financing mechanisms (p. 4); IMT 2012 discusses the availability of capital in affordable housing (p. 13); ACEEE 2013a discusses the difficulty of securing financing for owners of market-rate multifamily buildings with affordable rents (p. 16); and ACEEE 2013b reports that capital is often limited in the affordable multifamily area (p. 22). See also LC 2012, pp. 2, 6; NHC/CHP 2009, pp. 10, 20. However, Steve Morgan notes that financing is less of a barrier to some categories of conventional multifamily properties, particularly those owned by real estate investment trusts and institutional investors such as pension funds and insurance companies.

<sup>41</sup> NREL 2011, citing ACEEE 2006.

<sup>42</sup> LC 2010, p. 4.

<sup>43</sup> NREL 2011.

<sup>44</sup> BI 2010, p. 12.

*economic crisis conservatism, unclear borrower demand for energy efficiency, and lack of equity.*<sup>45</sup>

- *The difficulty in determining creditworthiness of commercial property.*<sup>46</sup>
- *Existing property or financing restrictions (such as existing mortgages and HUD rules).*<sup>47</sup>
- *The small size of the loans.*<sup>48</sup>
- *The multifamily market is more complicated and less liquid, making it seem riskier.*<sup>49</sup>
- *The lack of predictability of energy savings creates uncertainty for lenders.*<sup>50</sup>
- *The failure of tax credit financing to cover 100% of the work and installation costs.*<sup>51</sup>
- *Subordination requirements.*<sup>52</sup>
- *Building owner finance and renovation time frames:* Even if a building owner is able to find financing for energy efficiency improvements, such financing may only be available within very limited time frames. Building owners often must work within the time frames of existing financing, such as building mortgages or limited partner cash-outs.<sup>53</sup>

As ACEEE 2013a notes, “It is significantly easier to integrate energy efficiency into a multifamily building at purchase, refinance, rehabilitation, or near the end of life for a piece of major equipment” (p. 15). These time frames do not sync well with multifamily renovation practices. Renovations are frequent but piecemeal, which may make comprehensive and cost-effective energy efficiency work (which may best be done as part of an integrated, whole-space effort) difficult.<sup>54</sup>

### **Energy Service Company (ESCO)–Related Barriers**

In other sectors, such as the MUSH sector and public housing (\$1.1 billion in investments; HUD, 2012), ESCOs often fill the gap where building owners or operators lack financing for improvements. Ten to fifteen regional and national ESCOs provide a one-stop service, identifying cost-effective energy efficiency measures, securing third-party financing, hiring and

---

<sup>45</sup> LC 2012, p. 62.

<sup>46</sup> ACNEEP 2013, p. 13.

<sup>47</sup> “Existing rules and regulations tend to tightly limit additional affordable housing project debt and discourage lender interest” (Abromowitz 2008, p. 2); HUD has to be in senior, first-lien position and approve anything else below it (p. 13); and HUD’s “traditionally tight controls on any additional project debt . . . [are] designed to discourage owners from overleveraging properties, as well as to prevent owners from evading dividend limitations through increased borrowing” (p. 14). HUD restrictions designed to address “abusive third-party supply arrangements” make Power Purchase Agreement structures difficult, and HUD as a lender also has a general concern about ensuring a project be unencumbered so that, in the event the owner goes into default, HUD can easily foreclose on and dispose of the asset (p. 14). See also ACNEEP 2013, p. 13.

<sup>48</sup> CDFIs are the big lender because loans are often too small, among other reasons (ACEEE 2013a, p. 16).

<sup>49</sup> “Ben Metcalf, senior advisor in HUD’s Office of Multifamily Housing, says that compared with single-family retrofits, the multifamily market is more complicated and less liquid, which makes it seem riskier” (HUD 2011, p. 4).

<sup>50</sup> HUD 2011, p. 5. Government housing regulators . . . are hesitant to accept projected energy savings as a basis for loan repayment. Some lenders felt regulators might write those loans down at a lower grade, requiring lenders to put up greater reserves in support of the project (p. 6).

<sup>51</sup> NHC/CHP 2009, pp. 10, 20.

<sup>52</sup> NREL 2011, citing ACEEE 2006.

<sup>53</sup> ACEEE 2013b, p. 21.

<sup>54</sup> BG 2009, p. 20.

overseeing installation contractors, guaranteeing savings, monitoring long-term utility costs, and providing annual training for maintenance staff to assure the persistence of savings.

Energy performance contracting statutes passed by state governments enable this industry to thrive, and it is now approaching \$8 billion in annual revenues.<sup>55</sup> If the ESCO industry could address the commercial multifamily sector outside public housing, we could see a dramatic spike upward in market penetration and savings impacts.

However, there are a variety of barriers to ESCOs working in the multifamily area to cover the full need. The major two barriers for ESCOs outside the public housing sector (where entire portfolios are addressed) are the small size of each transaction and the creditworthiness of the borrower.<sup>56</sup> In part as a result of these issues, past efforts to work with ESCOs have not always succeeded. For example, the American Recovery and Reinvestment Act (ARRA)–funded Chicago Multifamily Retrofit Program was intended to work with ESCOs but did not end up doing so.<sup>57</sup>

### **Lack of Programs Specifically Targeting Multifamily Buildings and Underfunding of Multifamily Relative to Its Prevalence**

One reason for the lack of building owner financing (and for the lack of uptake generally, which might also be encouraged through nonfinance mechanisms such as grants or rebates) is the lack of targeted multifamily programs. At a federal level, the Brookings Institution notes that only a modest amount of the \$11.3 billion in ARRA energy efficiency funds were considered likely to be targeted to federally assisted multifamily housing buildings.<sup>58</sup>

Many states have no multifamily programs at all, and sometimes it is unclear which category (if any) multifamily falls into: commercial, residential, or low income.<sup>59</sup> When there are three buckets of incentive funds for which the building may be eligible, but no single point of contact to assist in the navigation of the various programs, the “hassle factor” can be overwhelming.

Some have noted a historic lack of investment of State Energy Program or other state funds into multifamily energy efficiency,<sup>60</sup> due to competing priorities and/or limited funds. See Section III for more information about state funding for multifamily energy efficiency.

At the local level, few utility programs are designed specifically to serve multifamily buildings, thus utilities undertarget multifamily.<sup>61</sup> In 1995, however, ACEEE noted the existence of up to 40 targeted multifamily conservation programs that induce \$60 to \$90 million of investments in multifamily energy efficiency a year.<sup>62</sup> ACEEE 2013c reported that in 2011, 30 out of 50 metro

---

<sup>55</sup> LBL 2013.

<sup>56</sup> DeBarros 2013.

<sup>57</sup> NREL 2011.

<sup>58</sup> BI 2010, p. 11.

<sup>59</sup> ACEEE 2012b, pp. 4, 11.

<sup>60</sup> NHC/CHP 2009, p. 20; EPC 2007, p. 12.

<sup>61</sup> ACEEE 2013e, pp. 14, 17; ACEEE 2012b, pp. 4, 17; NHT 2013, pp. 5, 13, 14; ACEEE 2013c, pp. vi, 17.

<sup>62</sup> ACEEE 1995, p. 13.

areas studied were served by one or more targeted multifamily programs specifically designed for and marketed to the multifamily sector.<sup>63</sup>

### **Lack of Communication and Collaboration between Sectors, Agencies, and Stakeholders**

Even where federal, state, and local funding for multifamily energy efficiency does exist, many of the reports surveyed note a lack of communication, collaboration, and coordination among governmental and nongovernmental stakeholders alike. Energy retrofit program authority, policies, and programs are fragmented and siloed at the federal and state levels and between HUD, DOE, and Treasury.<sup>64</sup> As noted in the Brookings Institution report, “Fragmented leadership at the federal level . . . arises from shared and decentralized responsibility among HUD, DOE, Treasury, state housing finance and state energy agencies, and local utilities.”<sup>65</sup>

At the utility level, public benefit funds are often disconnected from the multifamily housing sector.<sup>66</sup> According to the ACEEE in a recent report, multifamily utility incentive funding on a per capita basis is generally one-half that of single-family budgets or less.<sup>67</sup> The relationship between local governments and investor-owned utilities is governed by a patchwork of informal relationships and formal contractual agreements.<sup>68</sup>

The problem extends to the private-sector stakeholders as well. NHT 2013a notes: “Advancing effective utility-sponsored multifamily energy efficiency programs can be challenging. It requires active engagement and dialogue between a range of stakeholders from both sectors who operate in complex regulatory environments. While their goals may overlap, each sector faces unique constraints” (p. 8).

### **Regulatory Barriers**

Regulatory barriers to multifamily energy efficiency are cited for HUD, low-income housing tax credit (LIHTC), utility, and various tax-based programs.

#### *HUD Rules*

These barriers include:

- a utility allowance structure that makes it difficult to achieve long-term savings-based repayment mechanisms.<sup>69</sup>

---

<sup>63</sup> ACEEE 2013e, p. 15.

<sup>64</sup> IMT 2012, pp. 1, 13; ACNEEP 2013, p. 33.

<sup>65</sup> BI 2010, pp. 4, 17.

<sup>66</sup> EPC 2007, p. 12. HUD 2011 provides a list of programs, each with its own rules and contact information, demonstrating the issue.

<sup>67</sup> ACEEE 2013e.

<sup>68</sup> ACEEE 2012b, p. 11.

<sup>69</sup> Assisted housing developments can now, in lieu of freezing allowances, calculate them based on consumption, but although authorized in 2008 at the time of the report, many state housing finance agencies were just beginning to implement this, as it often results in larger rent contributions (BI 2010, pp. 22–23). “HUD programs generally limit distributions of net cash flow from affordable housing operations to an amount that is not more than 10 percent of

- barriers to use of existing project capital for retrofits.<sup>70</sup>
- lack of programs or structures to actively encourage energy efficiency investments.<sup>71</sup>

One report noted a focus on inspections and similar measures rather than actual outcomes.<sup>72</sup> HUD encourages performance contracting, but split incentives are a problem and performance contracting has not achieved any significant adoption in the multifamily sector outside public housing.<sup>73</sup>

### *Low-Income Housing Tax Credit Rules*

States allocate LIHTC funds based on Qualified Allocation Plans (QAPs), which do not necessarily incorporate energy efficiency targets.<sup>74</sup> US Internal Revenue Service (IRS) rules historically have resulted in adverse tax consequences for LIHTC property owners who utilized WAP funds, and rules prohibited “double-dipping” LIHTCs with private activity bonds.<sup>75</sup> In addition, loans may cause adverse tax consequences for owners and LIHTC investors.<sup>76</sup> Finally, as in HUD housing, utility allowance calculations can be problematic: maximum total rent is based on the sum of rent and a utility allowance.<sup>77</sup>

LIHTC allowance historically is based on average use, not building use. Utility cost computation rules were changed in 2008 but have been difficult to implement.<sup>78</sup> Unlike in public housing, there are no provisions to adjust utility allowances based on projected reductions due to equipment retrofits, and there are no provisions for commensurate increases in rents, matched to debt service requirements. On a related note, some point to the lack of an energy efficiency requirement for Federal Housing Administration (FHA) funding.<sup>79</sup>

---

the private owner’s initial equity investment—a percentage fixed decades ago—and are even more restrictive for non-profit organizations,” which provides no economic incentive to reduce energy costs (Abromowitz 2008, pp. 11–12). Abromowitz 2008 also discusses affordability regulations and limited return on investment to “protect taxpayers against undue profits accruing to the owners in the HUD affordable housing system” (p. 10). See also EPC 2007, pp. v, 11; LC 2010, p. 6; and BI 2010, p. 4.

<sup>70</sup> “Federal policy arbitrarily separates energy improvements from capital improvements in both public and assisted housing, resulting in a short-sighted or at best incomplete renovation plan for a building that is not required to include energy renovations” (BI 2010, pp. 4, 14). LC 2012 covers regulator discretion over capital improvements and reserve releases (p. 63). Abromowitz 2008 discusses barriers to use of Reserves for Replacement and Residual Receipts to fund energy efficiency work, and notes that “while HUD does not appear to impose overt statutory or regulatory restrictions on the use of normal project reserves for green retrofits, in practice the department does not yet appear to particularly encourage the use of reserves for these purposes where it might temporarily depress reserves” (p. 13).

<sup>71</sup> “Other than the Green Initiative for a limited set of properties subject to HUD’s MTM [mark-to-market] program, there are no HUD energy efficiency programs that incentivize private owners of affordable housing to engage in energy saving measures” (Abromowitz 2008, p. 14).

<sup>72</sup> BPC 2013, p. 97.

<sup>73</sup> Abromowitz 2008, p. 15.

<sup>74</sup> EPC 2007, p. 12; IMT 2012, p. 6. See I.R.C. Sec. 42(m)(1)(C)(ix) requiring energy efficiency to be considered among numerous other factors but providing no required weight.

<sup>75</sup> EPC 2007, p. 6.

<sup>76</sup> BI 2010, p. 17.

<sup>77</sup> EPC 2007, p. 12; USGBC 2012, p. 19.

<sup>78</sup> Abromowitz 2008, p. 19.

<sup>79</sup> USGBC 2012, p. 56.

### *Utility Rules and Regulations*

The reports surveyed identified many and various barriers to energy efficiency in the utility rules and regulatory structures. For example, utility franchise agreements do not recognize energy efficiency.<sup>80</sup> Energy efficiency programs may have trouble passing the Total Resource Cost test for utilities—for example, total costs are not worth it because certain benefits are not accounted for.<sup>81</sup>

If utilities have to meet energy efficiency benchmarks each year, exceeding a benchmark one year makes it harder for the utility to meet it the next year.<sup>82</sup> Or utilities may be disincentivized to work with other utilities when rules regarding attribution of savings to both of the utilities involved are not sufficiently generous.<sup>83</sup> As ACEEE notes, “The details of these laws have a profound effect on utilities’ willingness to collaborate on robust energy efficiency programs. . . . Utilities may see non-utility efficiency programs as exhausting the efficiency resource and making it more difficult for them to meet efficiency mandates. . . . Creating comprehensive programs, however, often requires linking utility programs with other public sector resources.”

### *Tax Rules*

In addition to the IRS rules noted under the LIHTC barriers above, other federal, state, and local tax rules may interact in problematic ways with incentives for multifamily energy efficiency improvements. For example, passive loss rules in the IRS Code may constitute a barrier. These rules limit investment in small rental properties<sup>84</sup> and may limit energy efficiency investment as a subset of such investments.

## Responses to Barriers Identified

---

In addition to identifying numerous barriers, many of the reports and studies suggest or identify responses to some of the barriers. (See Table 1 for a summary of selected responses identified by the reports. Some of these solutions are discussed at greater length in Section III.) This subsection discusses some of the responses identified. For evaluation of some of the solutions and the significance and success thereof, see Section IV.

Responses to **split incentives** include “green” leases and submetering/master metering:

- A *green lease* (or energy-efficient lease) is a lease that has been amended to realign tenant and owner incentives so that improvements are mutually beneficial for the tenants and owners.<sup>85</sup> For example, in 2011 New York City created a clause that allows a

<sup>80</sup> ACEEE 2012b, pp. 11–12.

<sup>81</sup> ACEEE 2012b, p. 23.

<sup>82</sup> ACEEE 2012b, pp. 21–22.

<sup>83</sup> ACEEE 2012b, pp. 13, 21–22.

<sup>84</sup> BPC 2013, p. 77.

<sup>85</sup> ACEEE 2013b, p. 18 (citing IMT 2013).

landlord to implement energy efficiency improvements and pass the cost through to tenants based on the projected savings.<sup>86</sup> The clause requires a 20% buffer in projected energy savings versus additional tenant cost, to protect tenants in case the project does not perform as expected.

- *Submeters* in tenant spaces can improve the accuracy of savings estimations and pass-through costs.<sup>87</sup> In addition, long-term tenants in submetered buildings may be more motivated to make improvements on their own or to participate in standalone programs.
- On the flip side, *master-metered buildings* may avoid many split incentive concerns by concentrating costs and benefits with building owners. Larger, mid-rise, and high-rise buildings—often HUD-assisted buildings and public housing for the elderly—are more frequently master-metered.

Some building owners are reluctant to enter the maze of government and utility-sponsored programs. To address this concern, some state programs provide “expeditors” who can serve this staff-like function for a building owner, pulling together customized, relevant program requirements and benefits and providing tailored information. In other cases, organizations such as CNT (Center for Neighborhood Technology) Energy in Chicago or the Community Preservation Corporation (CPC) in New York attempt to provide this sort of “one-stop shopping” (see Section IV) for time-strapped building owners.

Numerous reports note and respond to the **lack of data about energy use** in multifamily buildings. The extensive 2011 Living Cities report provides details about what information is available (including proprietary databases), and how software such as Wegowise is facilitating building data collection. In addition, a number of efforts are currently under way to increase the information available. For example, a number of jurisdictions have passed benchmarking and disclosure ordinances, such as New York City’s Local Law 84, requiring buildings to track and/or disclose certain building energy use information.<sup>88</sup> Fannie Mae and the US Environmental Protection Agency (EPA) are working together to expand the existing portfolio manager tool to include a multifamily building rating component.<sup>89</sup> The MacArthur Foundation and Living Cities are developing national standards for the collection of building data, so that the data collected might be more useful and easier to compare.<sup>90</sup>

A number of efforts are under way to address **lack of data about retrofit performance** as well. For example, Bank of America is working with Bright Power to utilize EnergyScoreCards, an online software-as-a-service benchmarking tool specifically geared toward multifamily and other multi-tenant properties, to track savings in post-retrofit buildings funded through the \$55 million Bank of America energy efficiency finance program.<sup>91</sup> Stewards for Affordable Housing is also utilizing the software to track retrofits in many of its buildings. Enterprise Community Partners and many others that received a portion of the \$23 million in HUD funds in 2012 for new approaches in older multifamily buildings are similarly including some tracking of retrofit

---

<sup>86</sup> See ACEEE 2013b, p. 19.

<sup>87</sup> See ACEEE 2013b, p. 19.

<sup>88</sup> See IMT 2012, LC 2012, and NHT 2013a for more detailed discussion of these efforts.

<sup>89</sup> LC 2012, p. 10.

<sup>90</sup> LC 2012, p. 10.

<sup>91</sup> HUD 2011, p. 8.

performance in their programs.<sup>92</sup> Other efforts, such as the demonstration program for multifamily proposed in HR 2454 (the American Clean Energy and Security Act), have failed to get off the ground.

The reports offer some possible strategies to improve the **predictability of retrofit results**. Some reports suggest that good staff training programs and maintenance procedures are key. Improper installation can also play a part, causing some to point to the importance of third-party verification of work.<sup>93</sup> Others note that the problem for some types of measures may be consistent overestimation by auditors or contractors when contemplating the work, and that existing data allow for more accurate estimates than are often provided.<sup>94</sup> Programs such as NYSERDA's, which require use of a list of trained and certified auditors, may help to address this issue.

**Difficulty of financing** is another frequently cited barrier that many are attempting to address. The extensive 2012 Living Cities paper is one effort to examine these issues by improving the data that lenders need to underwrite against energy savings. The June 2011 Memorandum of Understanding (MOU) between the DOE and the Appraisal Foundation to work toward recognition of energy efficiency in appraisal values also holds promise.<sup>95</sup>

Community development financial institutions (CDFIs) are noted as one source of financing for this type of work, with on-bill financing another important piece (particularly for highly leveraged buildings or those subject to restrictive financing rules). At the federal level, the 2012 HUD Energy Innovation Fund, for example, is providing funding through grantees for this type of work. Fannie Mae is funding a Green Refinance Plus program<sup>96</sup> to finance energy efficiency improvements to affordable multifamily buildings.<sup>97</sup> At a local level, organizations such as the New York City Energy Efficiency Corporation are obtaining funding from a variety of sources, including foundation grants, to finance energy efficiency improvements in multifamily buildings.

Another oft-cited barrier is **HUD rules**, particularly relating to utility allowances and financing restrictions on HUD-assisted buildings. The HUD Mark to Market Green Initiative attempts to incentivize private owners of HUD affordable housing to make energy efficiency improvements, but it is not universal for all HUD-assisted properties. Similarly, HUD has authorized consumption-based utility allowances to be utilized, but implementation has been slow, despite both local and national efforts such as Enterprise Community Partners' work with the Hescong

---

<sup>92</sup> For a description of the grantees and their projects, see US Department of Housing and Urban Development. HUD Awards \$23 Million to Test New Energy-Saving Approaches in Older Multi-Family Housing Developments. Press Release HUD No. 12-051. March 8, 2012.

[http://portal.hud.gov/hudportal/HUD?src=/press/press\\_releases\\_media\\_advisories/2012/HUDNo.12-051](http://portal.hud.gov/hudportal/HUD?src=/press/press_releases_media_advisories/2012/HUDNo.12-051).

<sup>93</sup> EPA 2011, p. 22.

<sup>94</sup> LC 2012.

<sup>95</sup> US Department of Energy, Energy Efficiency & Renewable Energy. DOE and The Appraisal Foundation Announce New Partnership to Focus on Energy Performance and Building Appraisals. Progress Alert. June 13, 2011. [http://apps1.eere.energy.gov/news/progress\\_alerts.cfm/pa\\_id=548](http://apps1.eere.energy.gov/news/progress_alerts.cfm/pa_id=548).

<sup>96</sup> HUD 2011, p. 8.

<sup>97</sup> US Department of Housing and Urban Development. FHA and Fannie Mae Announce Green Refinance Plus to Pay for Energy-Efficient Upgrades in Affordable Apartment Buildings. Press Release HUD No. 11-106. May 31, 2011. [http://portal.hud.gov/hudportal/HUD?src=/press/press\\_releases\\_media\\_advisories/2011/HUDNo.11-106](http://portal.hud.gov/hudportal/HUD?src=/press/press_releases_media_advisories/2011/HUDNo.11-106).

Mahone Group,<sup>98</sup> and the agency has not authorized adjustments (unlike its behavior for public housing authority utility allowances).

LIHTC rules are often cited as a barrier to achieving energy efficiency in the multifamily sector, especially given the importance of LIHTCs in financing this sector nationwide. States allocate LIHTC funds based on QAPs that require that they consider the relative level of energy efficiency of the proposed use of the funds; however, the rules do not require that the project meet specific efficiency goals or higher ranking as a result of reaching a higher level of efficiency. Similarly, IRS rules historically have resulted in adverse tax consequences for LIHTC property owners who utilized WAP funds. The DOE and IRS are currently working to mitigate this.<sup>99</sup> Finally, as in HUD housing, utility allowance calculations can be problematic, but efforts are under way to facilitate an engineering-based energy consumption model for LIHTCs as well.<sup>100</sup>

Historical lack of focus on multifamily in the federal weatherization program and **unavailability of WAP funds to multifamily** is also frequently cited. The WAP itself is beginning to address these concerns with statements such as WAP Program Notice (WPN) 10-15A (April 8, 2010) and WPN 11-4 Guidance (December 22, 2010).<sup>101</sup> In addition, state WAPs are creating programs to address the issue, such as the North Carolina Energy Office Weatherization Pilot Program for multifamily (see Section III).

**Utility rules** have, like HUD and LIHTC rules, been identified as problematic for multifamily energy efficiency. Changes to attribution rules and the implementation of “banking programs” allowing utilities to carry forward excess savings to successive years have addressed these issues in some utility areas. In general, energy efficiency portfolio standards and public benefit fund targets also encourage utilities to invest in such work, but the programs are not designed or marketed effectively to address the barriers and achieve the energy savings potential in multifamily.<sup>102</sup>

Finally, many efforts to address the **lack of communication and collaboration** among stakeholders and programs are noted. State and local programs that evidence collaboration include the New York City Energy Efficiency Corporation (NYCEEC)’s efforts to work with both NYSERDA and housing authorities, Maryland’s Multifamily Energy Efficiency and Housing Affordability Program discussed in Section III, a Pennsylvania Housing Finance Agency (HFA) project discussed in the 2010 Brookings Institution report, the Maine Public Utility Commission (PUC)/HFA collaboration, and the California PUC/HEEA collaboration. In addition, organizations such as CNT Energy, CIC Energy, Stewards for Affordable Housing for the Future (SAHF), CPC, Enterprise Community Partners, green CDFIs, National Housing Trust, ACEEE, and National Consumer Law Center (NCLC) do extensive work bridging stakeholders in this area. Still, much must be done to harmonize the many overlapping energy, low-income,

---

<sup>98</sup> Abromowitz 2008, p. 19.

<sup>99</sup> USGBC 2012, p. 31.

<sup>100</sup> USGBC 2012, p. 19.

<sup>101</sup> See NREL 2011.

<sup>102</sup> ACEEE 2013a, p. 12.

and housing programs into the coherent and well-coordinated machinery needed to achieve the energy efficiency potential in multifamily housing.

## Concluding Thoughts

---

Despite the wide variety of initiatives, pilots, and programs attempting to address many of the barriers discussed above, none of the reports suggest that any of these barriers have truly been “solved” or “removed.” There is still much to be done.

However, future efforts to address any particular barrier or obstacle need not be undertaken anew, but instead may draw on the experiences and lessons learned from the programs and efforts mentioned above as well as the numerous others described in the many reports published over the last 30 years that we have been unable to describe within the limited scope of this paper. Section IV of this report suggests strategies that have the capacity to overcome these barriers for thousands of building owners.

**TABLE 1. Reported Barriers and Emerging Practices**

Category	Reported Barriers	Emerging Practice	Comments/Examples
<p><b>Financing Challenges</b></p>	<p>Financing is less of a barrier to buildings owned by institutional investors, public housing authorities, and REITS. Creditworthiness is an issue for conventional housing owned by partnerships and sole proprietors. Access to capital is exacerbated by the lack of lender/underwriter/appraiser acknowledgement of energy efficiency, among others.</p> <p>Lenders have little information about long-term energy savings to guide underwriting and lending decisions.</p>	<p>On-bill financing and repayment models can finance retrofits regardless of the building owner’s financial capacity to borrow additional funds.</p> <p>Property Assessed Clean Energy Financing (PACE) provides an opportunity to place the cost of the retrofit on the building’s local real estate property tax bill.</p> <p>State Energy Resource Standards (ERS) can be used to support increased utility investment in multifamily housing retrofits.</p> <p>Qualified Energy Conservation Bonds (QECCBs), tax credit bonds with an associated federal interest subsidy, can be used to provide loans to multifamily building owners to make energy improvements.</p>	<p>Residential Multifamily Housing Program (Public Service Electric and Gas NJ) offers owners free investment-grade audits and subsidies for cost-effective measures, allowing remaining costs to be financed on the utility bill over a 10-year period. (California, New York, and many New England states plan to implement similar programs.)</p> <p>In June 2013, Washington DC’s Department of the Environment became the first in the nation to offer PACE financing for an affordable multifamily energy efficiency project.</p> <p>California is supporting multifamily pilots to meet ERS requirements.</p> <p>Pathway Lending, a Tennessee-based CDFI, partnered with the state energy office to provide targeted retrofit loans.</p> <p>Boulder, Colorado, issued QECCBs to retrofit local multifamily project.</p>
<p><b>Split Incentives between the Building Owner and the Tenant</b></p>	<p>The division of incentives is dependent on the metering structure for the building. The owner is responsible for all costs in master buildings, but the tenant’s behavior can undermine the savings.</p>	<p>A “green” lease, or energy-efficient lease, allows landlords to pass the cost of energy efficiency improvements to tenants based on projected savings. These have been successfully implemented in commercial spaces and could provide a model for the residential sector.</p> <p>Installation of submeters in tenant spaces can improve the accuracy of savings estimates and pass-through costs.</p>	<p>In 2011 New York City created a clause that allows a landlord to implement energy efficiency improvements for commercial tenants and pass the cost through to tenants based on projected savings.</p> <p>The NYSERDA Multifamily Performance Program pays 50% of the cost of installing submeters in residential buildings.</p>

Multifamily Energy Efficiency: Reported Barriers and Emerging Practices

<p><b>The “Maze” of Government and Utility-Service Providers</b></p>	<p>Some building owners are reluctant to enter the maze of government and utility-sponsored programs.</p>	<p>A number of nonprofit organizations have developed partnerships with relevant state/utility programs to create “one-stop shopping” programs providing owners access to all relevant programs to simplify the retrofit process.</p>	<p>CNT Energy in Chicago and the Community Preservation Corporation (CPC) in New York attempt to provide this sort of “one-stop shopping” for time-strapped building owners.</p>
<p><b>Lack of Communication and Collaboration between Sectors, Agencies, and Stakeholders</b></p>	<p>Many energy retrofit programs are fragmented and siloed at the federal and state levels, reflecting decentralized responsibilities, including state housing finance and state energy agencies, and local utilities.</p>	<p>A number of state and utility programs have been working to increase collaboration across sectors to reduce administrative burdens and increase program effectiveness.</p>	<p>Maryland’s Multifamily Energy Efficiency and Housing Affordability Program, Maine’s PUC/HFA collaboration, NYC’s Energy Efficiency Corporation’s work with NYSERDA, and others.</p>

## SECTION II. WHY MULTIFAMILY BUILDING OWNERS INVEST IN ENERGY EFFICIENCY MEASURES

The market barriers to multifamily energy efficiency investments are formidable (see Section I), rendering this market subsector perhaps the most neglected by energy efficiency retrofit providers. With the exception of public housing—the most regulated and grant-funded of the subsectors—the track record of low-income multifamily building owners for investing in energy efficiency measures is abysmal (considerably less than 1% per year), reinforced by relatively limited federal, state, and utility incentive dollars available and accessible to building owners and bill-paying tenants.

This difficult situation leads the reader to pose the question, “What are the circumstances prompting low-income multifamily building owners to invest in energy efficiency measures?” By understanding these motivators, policymakers and marketers can more readily create strategies and program designs to enhance and accelerate the adoption of energy efficiency measures, particularly on a comprehensive basis. “Comprehensive” means the achievement of energy savings of 20% or more of total utility expenditures (including water).

There are five conditions or triggers motivating owner investments, with varying degrees of impact:

- Time of owner purchase or refinancing of property (6% to 7% of low-income multifamily per year)
- Replacement of aging, obsolete, or costly HVAC equipment (5% of the HVAC market per year) and water-using appliances
- Attractive utility, tax, and government incentives
- Idealism
- Peer pressure

A sixth trigger—real estate appreciation and tenant demand—should emerge over the next decade.

### Time of Owner Purchase or Refinancing of Property

Owners are most likely to do a major rehabilitation or upgrade to their property for the benefit of new tenants, changed building function, or improving market position when the property is purchased or refinanced. Typically, energy-related capital improvements represent 25% to 30% of the cost of these upgrades.<sup>103</sup> Windows and other shell measures, controls, lighting, and

<sup>103</sup> Kamalay 2013.

HVAC systems may all be changed out. This occasion does *not* mean that owners will adopt the most energy-efficient measures—lowest first cost will always be a competing priority—but it is an occasion when energy efficiency measures *can* be substituted for existing equipment.

To the extent that equipment providers, utility incentive program managers, and progressive lenders recognizing the value of energy savings can reach owners and their architects/engineers during the design phase, energy efficiency investments can prevail, and do so on a comprehensive basis.

If a building is bought or refinanced and simultaneously undergoes a major renovation every 15 years on average, then this opportunity would affect 6% to 7% of low-income multifamily building owners every year.

## Replacement of Aging, Obsolete, or Costly HVAC & Water Equipment

---

Owners of HVAC equipment, whether building- or unit-based, must replace existing systems with new measures every 15 to 20 years. After that point, maintenance costs become too excessive, too many components fail, or the systems fail to perform efficiently or at all. Many owners whose equipment replacement can be scheduled on a nonemergency basis (it has not failed completely) will consider accompanying measures to improve system efficiencies.

New HVAC equipment can be downsized if shell characteristics are improved by adding insulation and/or better controls. This enables owners to obtain new HVAC systems at lower cost, or can permit the purchase of more expensive, higher-efficiency equipment at the same cost as that required for lower-efficiency equipment carrying larger space-conditioning loads. If the replacement cycle is 20 years on average, then 5% of the HVAC market is open to an energy efficiency intervention each year.<sup>104</sup> Though we must subtract from that total the emergency replacements responding to equipment failures, it still represents a significant opportunity.

Another significant conservation opportunity beckons for multifamily buildings in selected areas—usually large metropolitan areas—of the United States: water conservation, particularly toilet replacements. Water rates are increasing faster than any other utility rate in most of the nation. In some metropolitan areas, water prices have increased by 8% to 10% per year for the past decade and are now approaching \$6 or more per thousand gallons in some locations. This significant trend is not confined to any geographic region: it is happening all over the United States, and is particularly associated with the need to replace aging water pipelines and sewer systems.

For many, if not most, multifamily building owners, water is the largest master-metered expense. Because state laws discourage or disallow individual metering of water in multifamily buildings generally, water is still on the master meter. Paradoxically, this situation has been a very

---

<sup>104</sup> Dettlaff 2013.

significant contributor to larger project sizes for energy services companies and their clients in public housing.

Because low-flow toilets and faucet aerators can generate two-year paybacks and 30% to 40% savings, water is considered “low-hanging fruit” that enables more expensive window and boiler replacements to be carried in performance contracts over terms shorter than the payback periods for those measures alone. Without the considerable dollar savings provided by the water conservation measures, the amount financed by these performance contracts would be 25% to 40% smaller (Interview, John Clune).

## Attractive Utility, Tax, and Government Incentives

---

Over the past decade, most low-income multifamily owners have replaced corridor and hallway fluorescent lighting with more efficient fluorescent technologies. They did so because electric utilities in most of the country offered incentives ranging from 25% to 75% of the new measure costs, and access to those incentives has been fairly straightforward. In the Northeast, West, and Pacific Northwest, HVAC equipment, controls, and water measures have received incentives of 15% to 30%, or higher, from utilities with large-system benefit charges because public utility commissions have mandated such incentives. The response from building owners to these incentives has been largely impressive, although limited program budgets may explain owner participation of 1% to 3% per year.<sup>105</sup>

Similarly, federal tax incentives for renewables have been supplemented by state tax credits to create attractive incentives and paybacks in as few as three to five years for distributed electricity systems on rooftops. California and New Jersey have particularly benefited from these incentives. Though not tailored for low-income multifamily buildings, these incentives, accompanied by quality improvements and cost declines, have benefited thousands of multifamily owners. Even nonprofit owners of these buildings can take advantage of the tax credits by “leasing” the systems from for-profit developers/owners of the solar equipment.

State and federal grant incentives and low-cost financing programs have primarily been available through LIHEAP, WAP, and state and utility public benefit funds. This issue is discussed in greater detail in Section III.

## Idealism

---

Some building owners, including owners of multiple properties, are philosophically committed to “greening” their real estate. Alleviating global climate change is a major motivation in their perspective and drives their thinking. Many have hired energy efficiency or sustainability managers to harvest utility incentives and tax credits and have made commitments to replace aging equipment with high-efficiency alternatives. This idealism is particularly evident in the

---

<sup>105</sup> ICF 2009.

affordable housing sector, especially among nonprofit owners, such as the members of the SAHF (100,000 units among eight nonprofit ownerships).

Although some low-income multifamily building owners are aware of, and underscore, the long-term cost-effectiveness and environmental stewardship advantages of energy efficiency investments, the overriding motivations for most are the improvements to the environment and resident comfort and well-being.

Green/sustainable new construction helps showcase the impact of greater efficiency and may help increase adoption of improvements in existing buildings as well.

## Peer Pressure

---

In a few markets with a particularly strong environmental ethic—usually accompanied by rich public benefit funds, utility incentives, and government goals, and populated by many idealist owners—there is local pressure to “keep up with the Joneses.” Portland, Oregon; Davis and San Francisco, California; Austin, Texas; and New York City (primarily Manhattan) are prominent examples. Enough building owners have erected photovoltaic panels, replaced their lighting, and installed energy management systems so that their competitors have taken note and perceive that tenants may soon prefer such appurtenances in their buildings. Although this phenomenon is growing, it affects less than 1% of the market today.<sup>106</sup>

## Real Estate Appreciation and Tenant Demand

---

Though anecdotal evidence indicates that the mutually reinforcing attributes of real estate appreciation or tenant demand (or both) are present in some specific situations (see the previous section above), very little statistical evidence of either trend has been documented. As scores of case studies from ESCO, state energy office, and utility websites attest, the impact on net operating revenues from cost-effective energy efficiency investments should translate itself into higher property values. So, too, the added resident comfort and reduced tenant utility costs should be evident in the wake of most energy efficiency investments of a comprehensive nature.

But two major problems have inhibited the realization of either outcome: (1) too few building owners make comprehensive energy improvements to their existing buildings (less than 1% per year); and (2) the costs and savings associated with such retrofits are not well documented. Consequently, we have not seen any significant tenant demand for energy-efficient buildings, and real estate transactions have not been generally rewarded by higher values for energy efficiency investments.<sup>107</sup>

There is little question that these two related changes can happen, and that either or both would be game changers in dramatically accelerating the adoption of comprehensive energy efficiency

---

<sup>106</sup> LBL 2013.

<sup>107</sup> CCR 2012.

retrofits. This is the 10-year objective that persistent and patient advocates of multifamily energy efficiency strive for.

## The Significance of Understanding Owner Energy Efficiency Investments

---

These motivators provide us with clues for improving the performance of program designs, marketing strategies, and legislative remedies for accelerating market penetration of energy efficiency among multifamily buildings. As stated earlier, any such initiatives must take into account the varying barriers and characteristics of the multifamily building subsectors: what works in public housing is not typically relevant for conventional multifamily housing, and vice versa. But some mix of requirements and incentives placed on building owners planning to finance a major upgrade that renders energy efficiency equipment more feasible and attractive makes eminent sense. So, too, does providing a combination of equipment standards, financial incentives, and contractor education make it more likely that replacement HVAC systems will be more energy efficient and will extend to shell measures and controls.

Public benefit fund and utility incentives in particular can be more comprehensive, more accessible, and better tailored to both of the investment decision points described above. Furthermore, government, foundation, and other grant programs can similarly benefit in their program designs and incentive structures.

The idealism and peer pressure motivators are frequently captured in the lexicon of “early adopters” among energy efficiency academics and observers. These buildings should be the first whose costs and savings are documented, not just for the first year, but for five years and longer. All of these strategies contribute to the realization of the sixth motivator, which will effect rapid growth in the multifamily sector and create a permanent marketplace for the energy efficiency industry.

## SECTION III. STATE RESPONSES TO BARRIERS AND OPPORTUNITIES IN MULTIFAMILY HOUSING

A number of state programs are drawing on the building owner motivations discussed in Section II to overcome the numerous barriers to achieving energy efficiency in the multifamily housing sector. This section describes some of these programs and provides data regarding the resources currently being deployed at the state and utility levels to address the challenge.

### Overview

---

Multifamily housing has remained underserved in terms of its share of government- and utility-funded conservation programs. Though multifamily building residents and owners generally qualify for lighting and appliance programs that are offered for single-family homes or commercial buildings, a very limited number of programs specifically target the unique needs of multifamily structures. Where resources for multifamily energy efficiency are made available, the responsibility for financing, upgrading, and managing these buildings falls to entities that may lack the technical and programmatic expertise, partnerships, and resources to fully realize this opportunity.

Increasingly, states—and in particular state energy offices and their partners—are helping to reverse this trend for the multifamily sector. Broadly, state energy offices often serve as liaisons and conveners of various state, federal, local, and private entities in order to fund, finance, and implement projects and actively and effectively inform executive and legislative policy development. They are uniquely positioned to engage investor-owned, municipal, and cooperative utilities, business leaders, and consumer groups in productive dialogue that takes place outside of regulatory proceedings. Many also operate and oversee robust energy efficiency programs, not only in the public buildings market but also for privately owned residential and commercial buildings.

In this convening and coordinating role, state energy offices and their partners (including housing finance agencies, public services commissions, and private companies) are playing a larger role in program, financing, and policy initiatives for multifamily housing. This state-level activity occurs through a variety of funding channels, including utility (ratepayer-funded) programs; the federally assisted WAP, LIHEAP, and State Energy Program; and state-issued bonds.

Federal and state funding for state-administered, low-income,<sup>108</sup> residential energy efficiency programs, as shown in Table 1, totaled almost \$1.3 billion in 2012, of which \$436 million was from LIHEAP, \$204 million was from DOE Weatherization, and \$670 million was from utility- and state-sourced public benefit funds. All states and the District of Columbia received DOE Weatherization funds, and 42 states and the District of Columbia also provided supplemental LIHEAP funding. In addition, 30 states and the District of Columbia also provided public benefit funding (a charge on energy use by utilities) to support weatherization through utilities and state programs.

2012 Sources of Low-Income Energy Efficiency Funds				
State	Federal Assistance		Public Benefit	Total
	Weatherization	LIHEAP	State/Utility	
Alabama	\$3,354,516	\$0	\$0	\$3,354,516
Alaska	360,480	300,000		660,480
Arizona	1,925,272	5,192,077	3,949,200	11,066,549
Arkansas	2,013,498	6,884,376	1,171,731	10,069,605
California	1,649,091	39,879,952	250,600,000	292,129,043
Colorado	8,130,764	4,185,515	6,330,800	18,647,079
Connecticut	1,319,737	0	19,100,000	20,419,737
Delaware	2,268,203	0	400,000	2,668,203
District of Columbia	393,683	200,191	3,200,000	3,793,874
Florida	6,081,202	10,000,000		16,081,202
Georgia	3,642,329	8,334,224	1,750,000	13,726,553
Hawaii	216,041	0		216,041
Idaho	1,388,688	5,464,610	1,804,900	8,658,198
Illinois	10,491,023	16,671,117	13,700,000	40,862,140
Indiana	5,467,613	16,583,474	0	22,051,087
Iowa	8,594,994	7,727,328	5,050,000	21,372,322
Kansas	1,774,148	4,817,750		6,591,898
Kentucky	5,430,388	6,258,035		11,688,423
Louisiana	1,230,585	6,513,284		7,743,869
Maine	2,069,591	1,900,527	930,311	4,900,429
Maryland	6,363,895	1,000,000	15,000,000	22,363,895
Massachusetts	5,194,887	10,000,000	36,600,000	51,794,887
Michigan	12,147,503	0		12,147,503
Minnesota	3,638,346	12,691,774	6,250,000	22,580,120
Mississippi	574,589	4,738,582		5,313,171

<sup>108</sup> Analyses utilize a variety of definitions of “low income” and diverge in their categorization of millions of households on the margins. If “low income” is defined expansively, however, the distribution of low-income families across building types leads to the conclusion that for the purposes of program design and services delivery, “multifamily” and “low-income multifamily” should be interchangeable terms. (note continues on page 33)

<b>Missouri</b>	10,368,001	1,000,000	4,341,016	15,709,017
<b>Montana</b>	2,654,881	4,822,875	1,911,000	9,388,756
<b>Nebraska</b>	657,170	3,624,949		4,282,119
<b>Nevada</b>	604,317	475,700	3,247,500	4,327,517
<b>New Hampshire</b>	1,277,000	500,000	3,900,000	5,677,000
<b>New Jersey</b>	6,287,572	17,909,187	30,000,000	54,196,759
<b>New Mexico</b>	1,688,642	1,800,000	1,793,733	5,282,375
<b>New York</b>	14,130,828	54,209,388	40,000,000	108,340,216
<b>North Carolina</b>	2,276,750	21,729,580		24,006,330
<b>North Dakota</b>	2,948,642	3,083,238		6,031,880
<b>Ohio</b>	14,089,246	24,000,000	58,000,000	96,089,246
<b>Oklahoma</b>	1,564,375	3,450,000	250,000	5,264,375
<b>Oregon</b>	2,214,107	4,896,790	16,600,000	23,710,897
<b>Pennsylvania</b>	16,882,381	27,696,263	44,200,000	88,778,644
<b>Rhode Island</b>	813,840	3,476,315	7,400,000	11,690,155
<b>South Carolina</b>	927,855	11,029,588		11,957,443
<b>South Dakota</b>	1,465,115	0		1,465,115
<b>Tennessee</b>	4,512,390	0		4,512,390
<b>Texas</b>	4,155,146	27,351,458	25,900,000	57,406,604
<b>Utah</b>	3,033,832	5,000,000	975,000	9,008,832
<b>Vermont</b>	447,003	0	9,500,000	9,947,003
<b>Virginia</b>	2,814,009	12,065,449		14,879,458
<b>Washington</b>	3,191,250	11,306,575	6,420,000	20,917,825
<b>West Virginia</b>	3,444,697	4,454,927		7,899,624
<b>Wisconsin</b>	6,017,339	20,824,662	50,000,000	76,842,001
<b>Wyoming</b>	693,657	2,375,445		3,069,102
<b>Total</b>	\$204,881,111	\$436,425,205	\$670,275,191	\$1,311,581,507

Source: Draft compiled by the National Center for Appropriate Technology, September 24, 2013.

Note: In some cases, the amounts listed are budgeted rather than spent; others are estimates based on prior year allocations.

The share of funds allocated to multifamily has been estimated at 25%, but no definite numbers are available. In addition, it is possible that the utility/state numbers understate the true extent of spending on this sector because funds are frequently provided through multiple programs that are not specifically integrated for this purpose.

Though they vary across states in approach and funding level, targeted multifamily programs are becoming more evident in places as diverse as California, New York, Tennessee, Maine, the District of Columbia, and Florida, among others. Common threads across many of these innovative state programs include the following strategies:

- Marketing, education, and convenient program participation to address both owner and tenant reluctance to invest in energy efficiency.
- Comprehensive program offerings providing “one-stop” and expedited solutions for those interested in projects.
- Flexibility in program design and offerings to accommodate different multifamily ownership structures and compliance with subsidized and assisted properties.
- Transition from grant- and incentive-based models to innovative financing.
- Strategic joint ventures across state agencies and lending institutions that allow further leveraging of otherwise scarce resources.
- An important trend accompanying the increase in state-operated multifamily initiatives is a growing recognition of the value of crafting statewide programs, policies, codes, and standards that target and accommodate the unique needs of multifamily buildings. Many of the “pioneering” state programs discussed below provide an important resource and may help to inform the spread and development of other multifamily initiatives and policies across the country.

## Promoting Multifamily Energy Efficiency to Meet Goals and Targets

---

The impetus and motivation for states to take action on multifamily energy efficiency may come from different sources. In many states, governors have used their influence, authority, and executive orders to create or support policies for energy efficiency and renewable energy and/or to establish task forces to study energy technologies and their potential in the states’ buildings market.

In Maryland, Governor Martin O’Malley’s “Smart, Green and Growing” vision, along with his support of the EmPOWER Maryland Energy Efficiency Act of 2008, prompted the development of the Multifamily Energy Efficiency and Housing Affordability (MEEHA) program. MEEHA, a joint venture between the Maryland Department of Housing and Community Development and the Maryland Energy Administration, offered grants for energy audits for multifamily properties and provided nearly \$4.8 million in financing for energy efficiency improvements to 26 properties totaling 3,090 units.<sup>109</sup>

---

<sup>108</sup> First, of 14.5 million multifamily housing units in the United States, approximately 8 million (55%) are occupied by families with incomes of less than 200% of the federal poverty level (2005 Residential Energy Consumption survey). These families are distributed across many building types, including a surprisingly large number (approximately 50%) in conventional market-rate (rather than subsidized or HUD-assisted) multifamily buildings. Second, there are also overlapping definitions of assistance that can complicate the count of families receiving assistance under multiple funding sources.

There are 1.1 million residents of public housing and 2.3 million in HUD-assisted housing (HUD 2012). There are 2 million units of low-income housing tax credit (LIHTC) housing, which overlap with HUD-assisted housing, and 1.8 million Section 8 housing vouchers that can be used in affordable or conventional multifamily housing developments (EPC 2007; HUD 2012; FM 2012). Many of the households utilizing Section 8 vouchers live in conventional multifamily housing, but we do not have data on their overlap with affordable housing. There are also residents of state-assisted housing, concentrated in Massachusetts, Connecticut, New York, New Jersey, and Illinois. Many of these units are also beneficiaries of Federal Housing Administration incentives, so they qualify as HUD-assisted properties.

Multifamily energy efficiency can also help support states in meeting utility planning goals as well as targets set through energy efficiency portfolio standards, public benefits funds, and clean air standards. According to an analysis by the ACEEE, “as of September 2012, 24 states have fully-funded policies in place that establish specific energy savings targets that utilities or non-utility program administrators must meet through customer energy efficiency programs.”

The strongest Energy Efficiency Resource Standards exist in Massachusetts and Vermont, which require almost 2.5% savings annually. State-level standards implemented in California, Connecticut, Hawaii, Nevada, and Texas have all met or are on track to meet their long-term targets.<sup>110</sup> The opportunity for multifamily energy efficiency is particularly evident in states such as California, which set ambitious energy-use reduction goals in 2008 to target zero-net-energy use in all new homes by 2020, and which has led to the establishment of projects and pilots to test the feasibility in multifamily properties.<sup>111</sup>

Energy efficiency and renewable energy also offer a multi-pollutant, cost-effective approach to attain and maintain compliance with National Ambient Air Quality Standards, representing another large area of opportunity and motivation for states to pursue multifamily energy efficiency. On this front, NASEO has been working with state energy offices and their state air regulator counterparts to enable energy efficiency and renewable energy to be a viable resource in air quality planning, following the example of states such as Connecticut, Texas, New Jersey, Massachusetts, and Maryland.<sup>112</sup>

In all of the above cases, and in many states, the state energy office plays a key role in convening partners, developing strategies, directing and/or providing insight into the appropriate use of public benefit funds, assisting in energy policy development, participating in regulatory proceedings, and gaining buy-in from key decision-makers, including the governor, state legislature, and public utility commission. As such, even in instances where they may not be directly involved in the implementation or administration of multifamily policies and programs, state energy offices are crucial players in determining whether state policies and programs can be directed to advance multifamily energy efficiency.

---

<sup>109</sup> Maryland Department of Housing and Community Development. Expanding the Role of Energy Efficiency in Housing Programs. National Council of State Housing Agencies Awards. 2012. [www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=13&ved=0CFoQFjACOAo&url=http%3A%2F%2Fwww.ncsha.org%2Fsystem%2Ffiles%2FMaryland\\_Special%2BAchievement.pdf&ei=JfZCUt6-LcXC4APvkYCYBg&usg=AFQjCNEyYyBSN5O-n9nWoMDm1k3MRSqTvA&sig2=xfXFnzeWyMax3tb2yEarzg&bvm=bv.53077864,d.dmg](http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=13&ved=0CFoQFjACOAo&url=http%3A%2F%2Fwww.ncsha.org%2Fsystem%2Ffiles%2FMaryland_Special%2BAchievement.pdf&ei=JfZCUt6-LcXC4APvkYCYBg&usg=AFQjCNEyYyBSN5O-n9nWoMDm1k3MRSqTvA&sig2=xfXFnzeWyMax3tb2yEarzg&bvm=bv.53077864,d.dmg)

<sup>110</sup> American Council for an Energy-Efficient Economy. Energy Efficiency Resource Standards (EERS). 2013. <http://aceee.org/topics/eers>.

<sup>111</sup> California Energy Commission’s Public Interest Energy Research Program. Achieving Zero-Net Energy Affordable Multifamily Homes. Technical Brief. July 2011. [www.energy.ca.gov/2011publications/CEC-500-2011-TB/CEC-500-2011-TB-001.pdf](http://www.energy.ca.gov/2011publications/CEC-500-2011-TB/CEC-500-2011-TB-001.pdf).

<sup>112</sup> National Association of State Energy Officials. Incorporating Energy Efficiency and Renewable Energy into the State Implementation Plans.

## Examples of Energy Office and Other State Programs

---

State energy office involvement in multifamily energy efficiency covers a wide variety of activities, ranging from “low-touch” offerings to “high-touch” comprehensive programs that guide multifamily property owners and/or tenants through the energy upgrade process. In states where resources for multifamily efficiency are scarce, some energy offices have taken important steps to research and understand the market, and offer technology- or measure-specific pilots and programs.

The Minnesota Department of Commerce’s Division of Energy Resources, for instance, partnered with the Energy Center of Wisconsin and Franklin Energy, LLC to commission and develop the “Minnesota Multifamily Rental Characterization Study,” in support of the development of multifamily programs offered by CenterPoint Energy, Minnesota Energy Resources Corporation, and Xcel Energy through their 2013–2015 Conservation and Improvement Plans.<sup>113</sup>

Similarly, the Tennessee Department of Environment and Conservation Office of Energy Programs conducted a study of new construction and acquisition/rehabilitation projects in the state to better address multifamily properties through the Tennessee Energy Education Initiative, which provides workshops and conferences to multifamily builders, developers, property owners, and facility managers.<sup>114</sup>

Other state energy offices have used available funds to implement small-scale, targeted pilots and projects. In North Carolina, the WAP, housed in the North Carolina Energy Office, conducted a Multifamily Pilot Program from 2011 to 2012 targeted to residents with an annual income at or below 200% of the federal poverty level. In conjunction with weatherization service providers in the eastern, central, and western regions of the state, the energy office weatherized an estimated 4,500 units with approximately \$9 million in funds. In addition, multifamily direct install programs are offered in the District of Columbia (through the DC Sustainable Energy Utility)<sup>115</sup> and in Arizona (through the Arizona Public Service Company’s Multifamily Energy Efficiency Program).<sup>116</sup>

On the other end of the spectrum, a few states are undertaking comprehensive programs that offer robust packages of technical services for multifamily owners in one place, increasing ease of program participation with concerted program marketing, education, awareness, and workforce development efforts. One such program is offered by MassSave, an initiative sponsored by Massachusetts’ gas and electric utilities and energy service providers and close

---

<sup>113</sup> Minnesota Department of Commerce. Study Captures Energy Savings Potential of State’s Multifamily Sector. Conservation Improvement Program Newsletter. August 2013.

<http://mn.gov/commerce/energy/topics/resources/Newsletters/Conservation-Improvement-Program/2013-CIP-News/August-2013/study-captures-energy-savings.jsp>.

<sup>114</sup> Tennessee Department of Environment and Conservation. Innovations in Multifamily Energy Efficiency Education and Financing in Tennessee. Presentation at NASEO Annual Meeting, Denver, CO. September 15, 2013. <http://annualmeeting.naseo.org/Data/Sites/2/presentations/Gebhard.pdf>.

<sup>115</sup> District of Columbia Sustainable Energy Utility. Low-Income Multifamily Implementation Contractor Direct Installation (ICDI) Program. 2013. [www.dcseu.com/for-your-business/low-income-multifamily/icdi](http://www.dcseu.com/for-your-business/low-income-multifamily/icdi).

<sup>116</sup> ACEEE 2012b, p. 22.

partner of the Massachusetts Department of Energy Resources. The MassSave Multi-Family Retrofit Program offers comprehensive energy efficiency services for multifamily owners and property managers and relies on a network of qualified Energy Specialists, who perform building assessments and identify available rebates, incentives, and financing.<sup>117</sup>

The nation's first energy efficiency utility was created in 1999 by the Vermont legislature and the Vermont Public Service Board (PSB). The PSB issued a competitive request for proposal for services. The Vermont Energy Investment Corporation (VEIC) was the winning bidder and began to operate Efficiency Vermont in March 2000, under a performance-based contract, with payment of contract incentives when performance benchmarks were met.<sup>118</sup>

The Washington DC City Council passed the Clean and Affordable Energy Act of 2008 (CAEA), which stipulated that the District Department of the Environment create the DC Sustainable Energy Utility (DCSEU). The CAEA included aggressive energy efficiency goals, and also goals related to renewable energy generation, local economic development, resident employment, and a requirement that 30% of the funds go for low-income energy efficiency. The CAEA established a consumption-based assessment on the city's utilities to fund the DCSEU via the Sustainable Energy Trust Fund.<sup>119</sup>

In 2013, National Grid, the main electric and gas utility provider in Rhode Island, launched the Multifamily Energy Efficiency Services program designed to create a single point-of-contact structure under the utility's existing program portfolio (including a variety of initiatives, such as EnergyWise, commercial and industrial retrofits, residential new construction and renovation services, income eligible services, and Energy Star rebates).

The Northeast Energy Efficiency Partnerships reported a \$6.4 million budget<sup>120</sup> for multifamily buildings, covering one-on-one guidance from a representative dedicated to multifamily energy efficiency, a no-cost energy assessment, and assistance with rebate forms and paperwork. This initiative enabled multifamily property owners and managers to better navigate and tap into the

---

<sup>117</sup> Mass Save. Home Energy Assessments: Multi-Family Facilities (5+ Units). 2013.

[www.masssave.com/residential/home-energy-assessments/how-to-participate/multi-family-facilities-5-units](http://www.masssave.com/residential/home-energy-assessments/how-to-participate/multi-family-facilities-5-units).

<sup>118</sup> Performance-based contracts provide the means for the state to establish overall budget, goals, and performance benchmarks, but leaves it to the contractor to change programming (e.g., new initiatives for new technologies, changing incentive or rebate levels) to meet changing market conditions. In 2012, the PSB moved from a performance-based contract and provided that VEIC would operate Efficiency Vermont under a 12-year order of appointment, making VEIC a utility as provider of efficiency services, and allowing longer-term planning and budgeting.

Initial contracts were for three-year periods with a three-year option. One performance benchmark in early years was the creation of a project pipeline for later years. This not only removed the barrier that some efficiency programs work under that do not allow projects to carry across years, but actually encouraged the Efficiency Vermont program to work with clients on longer-term pipeline projects that would complete in later years.

<sup>119</sup> The District Department of Energy, working with the DCSEU Advisory Board, the representational membership of which is stipulated in the CAEA, issued a competitive request for proposal in July 2010 to identify a contractor to provide DCSEU services under a performance-based contract. VEIC won the competitive bid and began operations as the DCSEU on March 24, 2011.

<sup>120</sup> Northeast Energy Efficiency Partnerships. Multifamily Energy Efficiency Program Profile: Rhode Island Multifamily Energy Efficiency Services. 2013. [www.neep.org/Assets/uploads/files/public-policy/multifamily-retrofit/Rhode%20Island%20Multifamily%20Program%20Profile%20%28final%29.pdf](http://www.neep.org/Assets/uploads/files/public-policy/multifamily-retrofit/Rhode%20Island%20Multifamily%20Program%20Profile%20%28final%29.pdf).

numerous incentives available through National Grid's program offerings.<sup>121</sup> Another comprehensive program, the Multifamily Performance Program, was recently launched by NYSERDA (see Section IV).

## State Funding and Financing Strategies

---

In addition to program options, state energy offices are also involved in funding and financing energy efficiency, including for multifamily properties. Notably, the past decade has seen a marked transition from subsidy- and grant-based funding toward financing models that revolve and leverage available capital. For instance, Nebraska's revolving loan fund, which leverages local bank and credit union capital through a blended interest rate, makes funds available to eligible multifamily properties.

Nevertheless, the rate of participation of multifamily properties in state energy financing as a whole is low, in comparison to the level of investment made for single-family residential or commercial energy efficiency. In many instances, state energy financing has focused on making loans to a single major target sector (often single-family residential or commercial), at the exclusion of multifamily properties. Even in programs where multifamily properties are eligible for financing, the size and structure of the financing vehicle and the program design are typically not customized to meet the unique financing and technical needs of multifamily buildings. Especially in lower-value or highly leveraged multifamily properties, the availability of low-cost financing may certainly trigger the interest of the building owner to invest in efficiency. However, barriers to investment persist, including a lack of technical understanding of energy efficiency projects and high first costs.

In recognition of this dynamic, some pioneering states are responding with programs to overcome these barriers and quicken the sluggish pace of energy efficiency improvements in the multifamily sector. Recent examples of state energy financing that is specifically targeted and customized for multifamily properties, discussed in the paragraphs below, are addressing specific market barriers and are beginning to show promise.

### **Strategy: Establishing a Multifamily-Specific Pool of Capital**

In Tennessee, Pathway Lending, a community development financial institution, has partnered with the state energy office to offer a targeted multifamily option as part of its \$50 million loan pool, which combines state petroleum violation escrow funds, a Tennessee Valley Authority forgivable loan, and private capital from Pathway Lending and Pinnacle National Bank.<sup>122</sup> In early 2013, Florida's state energy office, housed in the Department of Agriculture and Consumer Services, and the Florida Housing Finance Corporation began discussions to use \$2 million in

---

<sup>121</sup> State of Rhode Island and Providence Plantations Public Utilities Commission. Energy Efficiency Program Plan for 2013. November 2, 2012.

[www.nationalgridus.com/non\\_html/ee/ri/2013%20EEPP%20Final%20w%20Rev%20Att%205%2020121204.pdf](http://www.nationalgridus.com/non_html/ee/ri/2013%20EEPP%20Final%20w%20Rev%20Att%205%2020121204.pdf).

<sup>122</sup> NASEO interview with Amy Bunton and Paul Hoffmann, Pathway Lending, December 2012.

de-obligated ARRA State Energy Program funds for energy retrofits for affordable multifamily housing.<sup>123</sup>

Additionally, an increasing number of state energy offices are interested in using their remaining allocations of Qualified Energy Conservation Bonds (QECCBs) for multifamily housing projects, a heretofore untapped market for QECCBs.<sup>124</sup> QECCBs are tax credit bonds with an associated federal interest rate subsidy to the borrower of up to 100% of the interest due to bondholders. QECCBs may be used for energy improvements in multifamily housing. For example, capital improvements to reduce energy consumption in publicly owned buildings (such as public housing developments) by at least 20% is an eligible use of QECCBs.

In fact, one of the first known QECCB issuances in the country was for multifamily housing in Boulder, Colorado. In addition, affordable and market-rate multifamily buildings could be included in a “green community program” issuance in which QECCBs are used to fund loans to private building owners to undertake energy improvements. The use of QECCBs in the multifamily sector seems to have stalled, however, despite significant funding (up to \$2.4 billion<sup>125</sup>) apparently remaining. (Some multifamily stakeholders expressed lack of familiarity with QECCBs as recently as this year, which may help explain the lag.) More communication and collaboration between the administering agencies (often state energy offices) and multifamily stakeholders could facilitate greater realization of the potential for QECCB-funded improvements in the multifamily sector.

### **Strategy: Addressing High Upfront Costs**

Beyond revolving loan funds, states are also exploring other sophisticated models of multifamily energy efficiency financing. On-bill financing and repayment models are becoming more common. Since 2010, the Residential Multifamily Housing Program offered by Public Service Electric and Gas (PSE&G) in New Jersey has offered multifamily owners and property managers free investment-grade audits and subsidies for cost-effective measures, allowing remaining costs to be financed on the utility bill over a 10-year period with no interest.

Initially, the PSE&G program was targeted to master-metered affordable housing developments, but the program expanded to a second phase that included individually metered projects. Within one year of program launch, 23 developments had received an audit, representing 131 buildings with 4,484 rental units, demonstrating the rapid success of the program and financing offering.<sup>126</sup>

---

<sup>123</sup> Florida Housing Finance Corporation. Board Meeting Action Items. March 15, 2013. [www.floridahousing.org/FH-ImageWebDocs/AboutUs/BoardOfDirectors/BoardPackages/2013/03-March%2015%20-%20Tallahassee%20City%20Hall/01-Action%20Items.pdf](http://www.floridahousing.org/FH-ImageWebDocs/AboutUs/BoardOfDirectors/BoardPackages/2013/03-March%2015%20-%20Tallahassee%20City%20Hall/01-Action%20Items.pdf).

<sup>124</sup> Based on discussions with NASEO Buildings Committee and Multifamily Taskforce.

<sup>125</sup> Based on known issuances tracked and recorded by the Energy Programs Consortium, as of September 2013.

<sup>126</sup> Reply Testimony of Charles Harak on Behalf of the National Consumer Law Center, National Housing Law Project and California Housing Partnership Corporation.

In a recent energy financing milestone, in June 2013 the District of Columbia’s Department of the Environment became the first in the United States to use Property Assessed Clean Energy (PACE) financing for an affordable multifamily energy efficiency project.<sup>127</sup>

Finally, states such as Colorado (where the Colorado Energy Office recently signed a Memorandum of Understanding with the state chapter of the Appraisal Foundation) are placing a heavier focus on green building valuation and developing training opportunities for appraisers in the residential market.<sup>128</sup>

## State Policy Levers, Opportunities, and Considerations

Beyond programs, funding, and financing, state-level codes, policies, and standards can serve as effective tools to increase energy efficiency in the multifamily building sector. State policies may come in a number of forms, including data-sharing, benchmarking, and disclosure rules; utility procurement of energy efficiency; enabling certain financing mechanisms, such as on-bill financing and PACE; and appliance and equipment standards. These, in addition to other policy options, are explained in detail in resources prepared by the ACEEE and CNT Energy<sup>129</sup> and by the DOE.<sup>130</sup>

Another potentially impactful policy lever available to states includes the adoption and enforcement of building energy codes for multifamily properties; however, multifamily-specific education and awareness are needed. For instance, although national groups such as the Building Codes Assistance Project and regional energy efficiency organizations have tracked the development and adoption of energy codes for commercial buildings (for multifamily properties with four stories or more) and residential buildings (with three stories or less), fewer trustworthy resources exist on the status of code implementation efforts for multifamily buildings, the ability of state codes officials to verify compliance in this type of property, and the effect of code updates on multifamily affordability.<sup>131</sup> Some state energy offices, such as the Texas State Energy Conservation Office, have websites and compliance resources that are focused on

<sup>127</sup> District Department of the Environment. DC PACE Commercial: An Energy Finance Solution. NASEO Multifamily Task Force Presentation. August 22, 2013.

<http://naseo.org/Data/Sites/1/documents/taskforces/multifamily/2013-08-22-Good.pdf>.

<sup>128</sup> Colorado Energy Office. The Colorado Energy Office and the Green MLS, Presentation. June 7, 2013.

<http://naseo.org/Data/Sites/1/documents/committees/buildings/calls/2013-06-13-colorado.pdf>.

<sup>129</sup> See ACEEE 2012b, in particular the section titled “Measuring Savings” that starts on p. 15.

<sup>130</sup> US Department of Energy, Energy Efficiency & Renewable Energy. Building Technologies Office. Appliance & Equipment Standards. August 28, 2013. [www1.eere.energy.gov/buildings/appliance\\_standards/](http://www1.eere.energy.gov/buildings/appliance_standards/).

<sup>131</sup> One multifamily-specific analysis prepared for the National Multi Housing Council and National Apartment Association argues that the 2009 and 2012 editions of the International Energy Conservation Code (IECC) place undue costs on multifamily structures compared to the 2006 edition. See National Multi Housing Council, National Apartment Association. Impact of the 2009 and 2012 International Energy Conservation Code in Multifamily Buildings. March 2012. [www.nmhc.org/files/ContentFiles/ResearchReports/IECC%202009-2012%20Analysis%20FINAL.pdf](http://www.nmhc.org/files/ContentFiles/ResearchReports/IECC%202009-2012%20Analysis%20FINAL.pdf). This conflicts with state-specific cost-effective analyses performed by the Pacific Northwest National Laboratory, which concludes that the 2009 and 2012 IECC for residential buildings are cost-effective for all states (but admittedly excludes high-rise multifamily from its calculations). See Pacific Northwest National Laboratory. Cost-Effectiveness Analysis of the 2009 and 2012 IECC Residential Provisions--Technical Support Document. PNNL-22068. April 2013.

[www.energycodes.gov/sites/default/files/documents/State\\_CostEffectiveness\\_TSD\\_Final.pdf](http://www.energycodes.gov/sites/default/files/documents/State_CostEffectiveness_TSD_Final.pdf).

multifamily high-rise residential construction (as part of the 2009 International Energy Conservation Code for commercial, industrial, and residential buildings),<sup>132</sup> but further efforts are needed to make these resources more robust and encourage other states to make multifamily-specific tools available.

Whatever form a multifamily energy efficiency policy or program takes, policy support and coordination are critical in driving its success. State-directed utility efficiency programs have played a particularly important role in energy efficiency implementation in many states. The utilities provided with the largest multifamily energy efficiency budgets are in the West, the Pacific Northwest, and the Northeast. A number of state and local organizations, often supported by foundations and national advocacy groups, have played a catalytic role in expanding multifamily energy efficiency resources and coordination. For example, the National Housing Trust has organized a consortium of affordable housing organizations, environmental groups, and policy organizations to encourage utilities to improve and increase the funding for multifamily programs.<sup>133</sup>

It is widely agreed that well-designed and better-funded utility incentive programs are one of the most important sources of financial support available—beyond innovative public-private financing programs—in the foreseeable future for multifamily efficiency efforts. In most states, however, the opportunity to leverage state-directed utility energy efficiency programs remains underutilized. Further, once resources are allocated through these programs, state and local policy support in program design, implementation, and leverage are essential. Although utility commissions are a key audience in changing this equation, their regulator role should not be mistaken for a policy role and needed program coordination and implementation. Focusing only on the utility commissions will likely result in slower implementation results.

Building a foundation of policy support from governors and legislatures through state energy offices, for example, is important to ensuring long-term support for ratepayer funds being allocated by state commissions to multifamily efficiency efforts. Thus, the policy function typically played by state energy offices, with the support of governors and legislators, is a key factor. Similarly, local government policy support plays an important role in this overall process.

The potential of the combination of state and local policy and regulator efforts—rather than a primarily regulatory approach—should result in greater leverage and would expedite changes that would catalyze utility partnerships with state and local agencies and organizations. Declining federal support for efficiency and affordable energy and housing issues, and pressure on state and local budget constraints, are drivers for multifamily and affordable housing policy changes among governors and legislators. Utilizing state-directed utility efficiency funds, public-private financing, and other innovative approaches offer both policymakers and regulators a longer-term solution set.

---

<sup>132</sup> State Energy Conservation Office. Multi-Family Residential Construction. 2013. [www.seco.cpa.state.tx.us/tbec/multifam.php](http://www.seco.cpa.state.tx.us/tbec/multifam.php).

<sup>133</sup> ACEEE 2012b[**QUERY: 2012b correct, or should be 2013a?**]; NHT 2013a. [**QUERY: 2013a correct, or should be 2013b?**]

## SECTION IV. PROVEN STRATEGIES

Despite the increasing focus and sophistication of state and federal programs on multifamily energy efficiency (as described in Section III), the absence of mandatory retrofit standards means that no single strategy will move low-income multifamily owners from today's participation rates of far less than 1% in comprehensive retrofits to a rate five- to tenfold greater (as would be required to meet longer-term national climate change objectives<sup>134</sup>). In addition, each market subsector will respond differentially to any new program design or marketing strategy. Nonetheless, we believe a number of strategies exist that have worked at least in the limited contexts in which they have been tried:

1. Electric and gas utility incentive programs (“Pay for Performance”)
2. Utility on-bill repayment programs
3. “One-stop shopping” program centers
4. Commercial Property Assessed Clean Energy Financing (PACE)

There are many examples of successful rebate programs as well, which we will not address in this paper.

### Electric and Gas Utility Incentive Programs (“Pay for Performance”)

---

Most utility incentive programs today target a particular set of limited measures for grants ranging from 25% to 75% of measure costs—lighting, motors, controls—but fail to systematically treat the building. Yet as far back as the early 1990s, Pacific Gas & Electric Company (PG&E) piloted a program called “Power Saving Partners” that targeted several market subsectors and invited energy performance contractors to bid prices per kilowatt-hour and term for demonstrated savings, regardless of end use or technology.<sup>135</sup>

One of those markets was low-income multifamily housing, and a nonprofit company won the bid to provide lighting, controls, envelope, and hot water measures. (There were very few heating load or air-conditioning opportunities because of the area's unusually temperate climate.) The program design was such that the property owner pays little or nothing for measures, and the energy services company is compensated based on the demonstrated post-retrofit savings (as proven by a third-party contractor). Over the next three years, 22,000 units of multifamily

<sup>134</sup> Executive Office of the President. The President's Climate Action Plan. June 2013. [www.whitehouse.gov/sites/default/files/image/president27sclimateactionplan.pdf](http://www.whitehouse.gov/sites/default/files/image/president27sclimateactionplan.pdf).

<sup>135</sup> See PG&E Company Study No. 396a-f R1; [PSE&G, 2011-12: Source PSE&G Program Manager Rachel Fredericks – in Bibliography]

housing received retrofits totaling about \$4 million.<sup>136</sup> Savings averaged approximately 10% for electricity and 15% for gas.<sup>137</sup>

Today New Jersey’s electric utilities have been mandated to provide a similar “pay for performance” program, targeting multifamily buildings among other commercial sectors. Affordable housing buildings of any size, and other multifamily buildings with a minimum 100-kilowatt peak load (approximately 40 units) must prepare an energy efficiency investment plan with 15% minimum projected savings. Upon approval, the program managers pay for post-retrofit savings based on the savings as measured by an independent third party.

The program’s “partners”—prequalified energy services companies—make the investments and receive the payments for the properties they address. The attractiveness of the program is not only the absence of an owner or tenant cost contribution requirement, but also the breadth of measures eligible: virtually any equipment whose savings can be measured. Although the program was changed last year to offer a richer set of incentives and more control from the utility provider at PSE&G, the central concepts remain in place.<sup>138</sup>

Similar programs exist in Colorado, New Hampshire, and New York.<sup>139</sup> A few case studies illustrate the success of NYSERDA’s Multifamily Performance Program (MPP) in New York:

- Grant Village Apartments: Three dated, failing atmospheric boilers for 520 apartments across 45 buildings were upgraded to a decentralized approach that saved 25% in electricity and natural gas costs (a total of \$293,643) for this complex in Syracuse.
- Saranac Lake Building: The mixed-use residential and commercial building at 135 Broadway in Saranac Lake turned around a long period of deferred maintenance and high energy bills with a comprehensive plan that cut energy use by 27% and delivered annual savings of \$6,495. The projected payback time is 6.8 years.
- Trump Tower at City Center: Just a few years after this White Plains high-rise was built, residents saw dramatically higher energy bills than expected. After completing a comprehensive energy upgrade project that improved lighting and added a combined heat and power unit, the building slashed energy use by 21%.

Branded as the “marquee” program in the NYSERDA Multifamily Performance Portfolio, MPP connects developers, building owners, and other decision-makers with Multifamily Performance Partners to identify energy-saving opportunities and develop an energy savings plan, tap into NYSERDA financial incentives, collaborate with the design team (for new construction and major renovations), and inspect and verify the installations to ensure energy savings.<sup>140</sup>

---

<sup>136</sup> Morgan 2013.

<sup>137</sup> Morgan 2013.

<sup>138</sup> Fredericks 2013.

<sup>139</sup> See [http://blog.rmi.org/blog\\_Pioneering\\_Pay\\_Performance\\_Pacific\\_Northwest](http://blog.rmi.org/blog_Pioneering_Pay_Performance_Pacific_Northwest). For more information about New York’s program, see: <http://www.nyserda.ny.gov/BusinessAreas/Energy-Efficiency-and-Renewable-Programs/Multifamily-Performance-Program/Multifamily-Performance-Program.aspx>.

<sup>140</sup> NYSERDA. What to Expect from Your Multifamily Performance Partner. January 31, 2013. [www.nyserda.ny.gov/BusinessAreas/Energy-Efficiency-and-Renewable-Programs/Multifamily-Performance-Program/Multifamily-Performance-Program/Existing-Buildings/EB-What-to-Expect.aspx](http://www.nyserda.ny.gov/BusinessAreas/Energy-Efficiency-and-Renewable-Programs/Multifamily-Performance-Program/Multifamily-Performance-Program/Existing-Buildings/EB-What-to-Expect.aspx).

The NYSERDA program offers customized paths both for existing buildings and new construction. Recognizing contractors within the state as an important program marketing channel and direct connection for multifamily property owners, NYSERDA allows qualified program partners to capture leads through NYSERDA's website and offers webinars, free and/or discounted training, and marketing support through its EStar partner network.<sup>141</sup>

## Utility On-Bill Repayment Programs

---

The paucity of affordable, accessible financing is readily addressed by utility financing offerings, wherein creditworthiness standards are relaxed to admit customers whose utility bill-paying track record is good. Green For All provides a detailed set of case studies illustrating the quantitative results achieved by on-bill programs in the multifamily sector.<sup>142</sup>

The program works by allowing customers to finance energy efficiency measures and negotiate a payment term such that monthly savings retire the debt, and by enabling payment as a line item on the standard monthly utility bill. When that opportunity is also linked to utility energy efficiency incentives and one-stop contracting by utility-qualified contractors, additional barriers are effectively addressed.

Another positive feature is the provision of debt capital by third parties, affording building owners the option of investing in measures that use gas, oil, or water, not just the electricity provided by the utility. Most on-bill payment programs in recent years have been handicapped by limitations of electric measures only and regulator-imposed cost-effectiveness criteria because utility ratepayer funds were the source of capital. Increasingly, state regulators and utilities themselves have preferred third parties to provide the capital, overcoming both of these handicaps.

Another advantage of on-bill repayment programs is the opportunity for tenants to participate. Tenants who pay their own electric bills (more than 75% nationwide) are eligible for the program. Certain measures, including lighting and room air conditioners, can be financed by tenants directly, provided that the tenants are utility bill payers in good standing. (Other measures may be linked to the meter rather than the tenant.)

As on many other energy efficiency fronts, California is leading the way in providing utility customers with this option: by the end of next year, multifamily owners and their tenants should be fully eligible. Many New England, New York, and New Jersey utilities have been ordered by their regulatory commissions to provide comparable on-bill financing programs, phasing in over the next two or three years for multifamily building owners and their tenants, among other customers. A few progressive municipal utilities, including Austin, Texas, and Sacramento, California, offer this service now.

---

<sup>141</sup> NYSERDA. *Becoming a Multifamily Performance Partner*. July 29, 2013. [www.nyserda.ny.gov/BusinessAreas/Energy-Efficiency-and-Renewable-Programs/Multifamily-Performance-Program/Multifamily-Performance-Partner/Become-a-Partner.aspx](http://www.nyserda.ny.gov/BusinessAreas/Energy-Efficiency-and-Renewable-Programs/Multifamily-Performance-Program/Multifamily-Performance-Partner/Become-a-Partner.aspx).

<sup>142</sup> See [http://greenforall.org/wordpress/wp-content/uploads/2013/09/NHT\\_GFA\\_OnBill\\_Brief\\_FINAL.pdf](http://greenforall.org/wordpress/wp-content/uploads/2013/09/NHT_GFA_OnBill_Brief_FINAL.pdf)

## “One-Stop Shopping” Organizations

---

A number of organizations across the country provide “one-stop shopping” for building owners interested in energy efficiency improvements. These organizations play a critical role in compiling and making sense of the numerous and fragmented programs and incentives in the area and often in linking owners to financing as well. Many are also doing extensive work tracking energy use and performance in their projects.

For example, since 2007 CNT Energy Savers (working with Community Investment Corporation for financing) has retrofitted 5,000 units in Chicago at an average cost of \$2,500 per unit. The retrofits have resulted in a 30% reduction in energy consumption; other benefits include a 5,000 metric ton reduction in greenhouse gas emissions and 75 new jobs.<sup>143</sup>

Similarly, organizations such as Stewards for Affordable Housing for the Future (SAHF) and Enterprise Community Partners facilitate multifamily energy efficiency projects, partnering with financing organizations National Affordable Housing Trust (NAHT) and Bellweather Enterprise, respectively, to bring together owners and financing. CPC’s multifamily site provides a snapshot of some of the many multifamily energy efficiency initiatives the organization has facilitated, including financing retrofits and tracking performance.<sup>144</sup> The New York City Energy Efficiency Corporation (NYCEEC) has partnered with ConEdison on multifamily energy efficiency and offers both information and financing.<sup>145</sup> The National Housing Trust (NHT) leverages financing and incentives from myriad available programs to improve existing affordable rental homes (including energy efficiency).<sup>146</sup>

These organizations have a track record of overcoming barriers and successfully closing transactions to improve energy efficiency in multifamily housing. Their strategy, providing “one-stop shopping” for building owners who need a simple guide to the various incentives and programs available, as well as financing to complete projects, has been demonstrated to be effective time and time again. To date, the impact of these organizations may be limited primarily by the limitations on funding available to them.

## Commercial Property Assessed Clean Energy Financing (PACE)

---

PACE is an innovative financing instrument, similar to that used commonly by municipal governments to pay for public benefits ranging from neighborhood sidewalk improvements to new sewer lines. Although federal regulators have temporarily rendered most single-family residential homeowners unable to take advantage of this mechanism, commercial and multifamily building owners are not precluded, and Washington DC recently closed a multifamily commercial PACE transaction (see Section III). Owners select measures that project energy savings, receive 100% of the financing, and repay the debt over a period of up to 20 years as a property tax assessment. Just as on-bill repayment overcomes the stringent creditworthiness

<sup>143</sup> <http://www.huduser.org/portal/periodicals/em/summer11/highlight1.html>

<sup>144</sup> <http://www.communityp.com/search/node/multifamily>

<sup>145</sup> <http://www.nyceec.com/conedison/>

<sup>146</sup> <http://www.nhtinc.org/poppleton.php>

requirements of conventional secondary debt and provides an already existing bill, so too does PACE: the bill is an add-on to the property tax.

The program requires state legislation, local approval, and first mortgagor notification or approval for the debt, which takes a primary position. Many programs also provide bond financing to assure low-cost debt. State or local program administrators provide marketing, prequalify ESCOs, assist owners with compliance, and assure that the scope of work can be paid for with utility savings. Building benchmarking and ongoing monitoring of savings are required in some programs. Water, gas, electricity, and oil measures are all eligible.

Twenty-eight states offer PACE programs, and more than 60 projects have been done or approved, with a dollar value of more than \$30 million, as of August 2013. In at least two locations—Washington DC and Connecticut—multifamily buildings have been approved for participation. Local PACE providers have even created property tax “accounts” so that nonprofit taxpayers, such as nonprofit and government buildings, can participate. Unlike on bill repayment, tenants are not eligible for participation.

## SECTION V. HOW PUBLIC- AND PRIVATE-SECTOR STAKEHOLDERS CAN FACILITATE AND ACCELERATE MULTIFAMILY ENERGY EFFICIENCY

Public and private stakeholders can play a critical role in achieving the potential for multifamily energy efficiency. Catalytic funders can play a variety of roles to facilitate stakeholder alliances with a focus on multifamily program and strategy opportunities.

Intervention by public policy advocates, energy agencies, environmental organizations, affordable housing organizations, tenant organizations, utilities, technology manufacturers, energy engineering firms, installing contractors, and federal and state agencies requires greater coordination to be successful. Leadership in assuming these coordination responsibilities and a focus on implementation is an important part of the solution set at the state and local levels. The involvement of all of these stakeholders is needed to ensure appropriate leadership organizations at the state and local levels are in place to coordinate these efforts and make them sustainable over time by utilizing more economically sustainable, in-state resources.

The following are a number of specific recommendations that address the two overarching areas mentioned above—utility resources and financing—as well as other implementation and analytical issues identified in the report:

- Supporting nonprofit organizations and state and local agencies that serve a convening function or leadership role in coordinating policy, regulatory, and program implementation actions that would establish or increase the level of state-directed utility funding dedicated to the multifamily housing sector.

Additional activities could focus on development and implementation of plans that overcome identified project barriers that cross jurisdictional or agency lines, or market participant roles. These stakeholder efforts would be integrated with state and local energy plans for additional long-term leverage. More than 30 states conduct comprehensive energy policy planning (governor or legislature driven), and to date, there is limited emphasis in the existing plans on multifamily energy efficiency.

- Developing pilot programs in partnership with state energy and housing finance agencies that require cost-share commitments to leverage foundation resources aimed at advancing multifamily demonstration (e.g., financing models combined with utility programs) and policy actions (e.g., convening stakeholder processes). Cost-share commitments leverage resources and aid in ensuring longer-term sustainability of the program. For example, they could support equity or debt co-funding (e.g., foundation, local, state, utility funds) of innovative financing concepts integrated with additional program and policy actions to create a more complete approach.

- Funding of best practices research to determine that mix of strategies, developments, and attributes worthy of replication in other locales. These might include more intensive evaluations of existing initiatives.
- Environmental scans and feasibility studies to determine which array of programs, strategies, technologies, and other market-promoting factors are most promising in particular geographies.
- Competitions among states or direct awards to organizations and partnerships with compelling strategy concepts (including legislative initiatives) and stakeholder commitments to meet and overcome the barriers that prevent multifamily owners from undertaking comprehensive energy efficiency and renewable investments.
- Evaluations of the mandatory benchmarking, audits, and disclosure ordinances in New York, San Francisco, Washington, DC, and Austin to determine how well the “deep” leveraging strategies are working for multifamily buildings.
- Equity or debt funding of innovative financing concepts, such as the Pay for Success model.<sup>147</sup>
- An in-depth analysis of the technical and economic feasibility of combined heat and power in multifamily buildings, a technology with larger emphasis at the DOE, EPA, and HUD in the wake of Hurricane Sandy and the need for distributed generation.
- Grants to outstanding nonprofit organizations capable of catalyzing the kinds of multifamily investment results on a regional or national basis.
- Hosting of workshops and conferences to bring together stakeholders and activists in this field on a regular basis.
- Building the capacity of state energy offices and regional energy alliances to maintain a capable and continuous presence in this field.

There may also be other productive options for stakeholders to play that will reveal themselves in this dynamic environment over the next few years. In the interests of income equity, climate change, economic development, infrastructure resilience, and national security, further involvement in this promising, neglected marketplace makes eminent sense.

---

<sup>147</sup> See Harvard KSG guide. June 2013. <http://payforsuccess.org/sites/default/files/social-impact-bonds-a-guide-for-state-and-local-governments1.pdf>.

# BIBLIOGRAPHY

Papers Included in Review	Abbreviation as Cited in Text	Full References
*	<b>Abromowitz 2008</b>	David M. Abromowitz. Green Affordable Housing: Within Our Reach. Center for American Progress. December 17, 2008.
*	<b>AHEEA 2008</b>	Affordable Housing Energy Efficiency Alliance. The Affordable Housing Energy Efficiency Handbook. 2008.
*	<b>ACEEE 2010a</b>	American Council for an Energy-Efficient Economy. Coast to Coast: Piloting Multifamily Retrofit Program Delivery Models from the New York Empire to the Golden State. 2010.
*	<b>ACEEE 2012a</b>	ACEEE. Cracking the Nut on Split-Incentives: Rental Housing Policy. 2012.
*	<b>ACEEE 1995</b>	ACEEE. Energy Conservation in Multifamily Housing: Review and Recommendations for Retrofit Programs. April 1995.
*	<b>ACEEE 2011</b>	ACEEE. Energy Efficiency Finance 101: Understanding the Marketplace. August 2011.
*	<b>ACEEE 2013a</b>	ACEEE. Engaging as Partners in Energy Efficiency: A Primer for Utilities on the Energy Efficiency Needs of Multifamily Buildings and Their Owners. March 27, 2013.
*	<b>ACEEE 2012b</b>	ACEEE. Engaging as Partners in Energy Efficiency: Multifamily Housing and Utilities. January 26, 2012.
*	<b>ACEEE 2013b</b>	ACEEE. Financing for Multi-Tenant Building Efficiency: Why This Market Is Underserved and What Can Be Done to Reach It. August 2013.
*	<b>ACEEE 2012c</b>	ACEEE. “Follow the Money”: Overcoming the Split Incentive for Effective Energy Efficiency Program Design in Multi-Family Buildings. 2012.
	<b>ACEEE 2013c</b>	ACEEE. Frontiers of Energy Efficiency: Next Generation Programs Reach for High Energy Savings. 2013.
	<b>ACEEE 1994</b>	ACEEE. Improving Energy Efficiency in Apartment Buildings. 1994.
	<b>ACEEE 2010c</b>	ACEEE. North Carolina’s Energy Future: Electricity, Water, and Transportation. ACEEE State Report. 2010.
*	<b>ACEEE 2012d</b>	ACEEE. On-Bill Financing: Exploring the Energy Efficiency Opportunities and Diversity of Approaches. 2012.
	<b>ACEEE 2013d</b>	ACEEE. Opportunity to Save: Scaling Up Utility Programs for Multifamily Homes. ACEEE Fact Sheet. 2013.
*	<b>ACEEE 2012e</b>	ACEEE. Reach for “Stranded Savings”: The Challenges and Opportunities of Energy Efficiency in Affordable Multifamily. 2012.

	<b>ACEEE 2012f</b>	ACEEE. Reaching the “High Hanging Fruit” through Behavioral Change: How Community-Based Social Marketing Puts Energy Savings within Reach. White Paper. 2012.
*	<b>ACEEE 2010d</b>	ACEEE. Results from NYSERDA's Multifamily Performance Programs: Getting 20% Reduction in Multifamily Buildings. 2010.
*	<b>ACEEE 2013e</b>	ACEEE. Scaling Up Multifamily Energy Efficiency Programs: A Metropolitan Area Assessment. March 5, 2013.
*	<b>ACEEE 2010e</b>	ACEEE. The Split Incentive Barrier: Theory or Practice in the Multifamily Sector?. 2010.
*	<b>ACEEE 2006a</b>	ACEEE Summer Study on Energy Efficiency in Buildings. Can Single Family and Multifamily Homes in the Zero Energy New Homes (ZENH) Program in California Reduce Peak Load and Reduce the Need for New Power Plants and Electrical Distribution?. 2006.
*	<b>ACEEE 2006b</b>	ACEEE Summer Study on Energy Efficiency in Buildings. Evaluating Attribution, Causality, NEBs, and Cost Effectiveness in Multifamily Programs: Enhanced Techniques. 2006.
*	<b>ACEEE 2006c</b>	ACEEE Summer Study on Energy Efficiency in Buildings. Multiple Solutions to a Complex Problem: Effective Strategies for Reaching the Multifamily Sector. 2006.
	<b>ACEEE 2010b</b>	ACEEE Summer Study on Energy Efficiency in Buildings. New Jersey’s Clean Energy Programs: Pay for Performance: Integrating Performance Programs and ENERGY STAR. 2010.
	<b>ACEEE 2004</b>	ACEEE Summer Study on Energy Efficiency in Buildings. The Technical Economic and Achievable Potential in the US—A Meta-Analysis of Recent Studies. 2004.
*	<b>ACEEE 2006d</b>	ACEEE Summer Study on Energy Efficiency in Buildings. \$Two Billion and Counting: A Behind the Scenes Discussion on How Focus on Energy Has Successfully Impacted the Wisconsin Multifamily New Construction Sector. 2006.
*	<b>ACNEEP 2013</b>	Alliance Commission on National Energy Efficiency Policy. Residential & Commercial Buildings. January 2013.
	<b>AE 2011</b>	Austin Energy. Austin Resident, Global Citizen. 2010 Annual Report. 2011.
*	<b>BG 2009</b>	Benningfield Group. U.S. Multifamily Energy Efficiency Potential by 2020. October 2009.
*	<b>BPC 2013</b>	Bipartisan Policy Center. Housing America’s Future: New Directions for National Policy. February 2013.
*	<b>BI 2010</b>	Brookings Institution. Scaling the Nationwide Energy Retrofit of Affordable Multifamily Housing: Innovations and Policy Recommendations. December 2010.
	<b>CCR 2012</b>	Chesapeake Crescent Roundtable. Facilitating Energy Efficiency Investments in Commercial Sector [a discussion among multifamily, hotel, and office building owners]. Washington, DC.

		2012.
	<b>Clune 2013</b>	Interview with John Clune, Clean Energy Solutions Senior Consultant and former Multifamily Program Manager, Ameresco. September 13, 2013.
	<b>CEC 2012</b>	The Community Environmental Center. Tales from the AMP Database: Energy Consumption in a Section of New York State Multifamily Buildings. 2012.
	<b>DeBarros 2013</b>	Interview with Janice DeBarros, Vice President for Housing, Ameresco, Framingham, MA. September 10, 2013.
	<b>DEWHA 2008</b>	Department of the Environment, Water, Heritage and the Arts. Energy Efficiency Rating and Housing Price in the ACT. Canberra, Australia. 2008.
	<b>Dettlaff 2013</b>	Interview with Tim Dettlaff, Vice President for Asset Planning, Ameresco, Washington, DC. September 11, 2013.
	<b>DeVries 2013</b>	Cisco DeVries. Building the Case for Utility Financing Programs, Renewable Funding. Presentation to ACEEE 2013 Conference Energy Efficiency as a Resource. 2013.
	<b>ECP 2008</b>	Enterprise Community Partners. Bringing Home the Benefits of Energy Efficiency to Low-Income Households: The Case for a National Commitment. 2008.
*	<b>EGC 2011</b>	Enterprise Green Communities. Utility Allowance Options for Investments in Energy Efficiency: Resource Guide. May 2011.
*	<b>EPA 2011</b>	Environmental Protection Agency. Energy Efficiency in Affordable Housing: A Guide to Developing and Implementing Greenhouse Gas Reduction Programs. Local Government Climate and Energy Series. 2011.
	<b>EPC 2009</b>	Energy Programs Consortium. Bringing Residential Energy Efficiency to Scale. 2009.
*	<b>EPC 2007</b>	Energy Programs Consortium. Energy Efficiency in Multi-Family Housing: A Profile and Analysis. June 2007.
	<b>EPC 2008</b>	Energy Programs Consortium. Income, Energy Efficiency and Emissions: The Critical Paper. 2008.
	<b>EGC 2012</b>	Enterprise Green Communities. The Portfolio Approach to Green Retrofits—Enterprise Multifamily Weatherization Program in New York. 2012.
	<b>FM 2012</b>	Fannie Mae. Energy Efficiency and its Relationship to Household Income in Multifamily Rental Housing. 2012.
	<b>Fredericks 2013</b>	Rachael Pendleton Fredericks. Improving the Energy Efficiency of Affordable Multifamily Housing through PSE&G's Residential Multifamily Housing Program. Presentation to ACEEE 2013 Conference for Energy Efficiency as a Resource.
	<b>Gee 2013</b>	Patricia Gee and Lucrezia Chiappetta. "Engaging Residents in Multifamily Building Retrofits: Reducing Energy Consumption and Enhancing Resident Satisfaction." Chapter 13 in Retrofitting the Built Environment, edited by William Swan and Philip

		Brown. West Sussex, UK: Wiley Blackwell, 2013.
*	<b>GG 2012</b>	Global Green. Progress and Possibility: Green Building Criteria in Low-Income Housing Tax Credit Programs. 2012 QAP Analysis.
*	<b>GRS 2012</b>	GreenRoots Strategies, Inc. Retrofit 2012 Conference: Engaging Residents in Multi-Family Building Retrofits to Reduce Consumption and Enhance Resident Satisfaction. 2012.
	<b>HUD 2012</b>	US Department of Housing and Urban Development. Affordable Green: Renewing the Federal Commitment to Energy-Efficiency, Healthy Housing. Progress Report and Energy Action Plan, Report to Congress, Section 154, Energy Policy Act of 2005. 2012.
*	<b>HUD 2011</b>	Housing and Urban Development. Multifamily Green Retrofit Toolkit: Los Angeles Multifamily Hub. March 2011.
*	<b>HUD 2013</b>	Housing and Urban Development, Sustainable Communities Resource Center. Energy-Efficiency Program Targets Affordable Housing Preservation. April 2013.
	<b>ICF 2009</b>	ICF International. Rapid Deployment Energy Efficiency Tool Kit. 2009.
	<b>IEE 2013</b>	Innovation Electricity Efficiency. Summary of Customer-Funded Electric Efficiency Savings, Expenditures, and Budgets, (2011–12). IEE Issue Brief. 2013.
*	<b>IMT 2012</b>	Institute for Market Transformation. Energy Transparency in the Multifamily Housing Sector: Assessing Energy Benchmarking and Disclosure Policies. December 2012.
	<b>Johnson 2013</b>	Kate Johnson. Multifamily Buildings as an Essential Strategy to Meet Energy Savings Targets. Presentation to ACEEE 2013 Conference for Energy Efficiency as a Resource. 2013.
	<b>Kamalay 2013</b>	Interview with Lillian Kamalay, Business Development Housing Director, Ameresco, Framingham, MA. September 10, 2013.
	<b>Kotler 2008</b>	Philip Kotler and Nancy Lee. Social Marketing: Influencing Behaviors for Good, Chs. 3 and 6. Thousand Oaks, CA: Sage Publications, 2008.
	<b>LBL 2010</b>	Lawrence Berkeley Laboratory. The Energy Services Company Industry. 2010.
	<b>LBL 2013</b>	Lawrence Berkeley Laboratory, Environmental Energy Technologies Division. Current Size and Remaining Market Potential of U.S. ESCO Industry. July 2013.
*	<b>LC 2011</b>	Living Cities. Multifamily Utility Usage Data: Issues and Opportunities. June 16, 2011.
*	<b>LC 2010</b>	Living Cities. Recognizing the Benefits of Energy Efficiency: Incorporating Energy Efficiency Savings Projections into Multifamily Underwriting. Interview Summary. October 22, 2010.
*	<b>LC 2012</b>	Living Cities. Recognizing the Benefits of Energy Efficiency in

		Multifamily Underwriting. January 2012.
	<b>McKenzie-Mohr 2011</b>	Doug McKenzie-Mohr. Fostering Sustainable Behavior, Ch. 3. Gabriola Island, BC: New Society Publishers, 2011.
	<b>Morgan 2013</b>	Stephen Morgan. “A Roadmap to Significant Reductions in Energy Use for Existing Buildings: The Long View.” In Retrofitting the Built Environment, edited by William Swan and Philip Brown. West Sussex, UK: Wiley Blackwell, 2013.
	<b>Nadel 2013</b>	Steve Nadel. The Next Big Things: New Opportunities for Energy Savings in the Commercial Sector. Presentation to ACEEE 2013 Conference for Energy Efficiency as a Resource. 2013.
*	<b>NASEO 2013</b>	National Association of State Energy Officials. Advancing State Multifamily Energy Efficiency Policies and Programs. 2013.
*	<b>NHC/CHP 2009</b>	National Housing Conference and Center for Housing Policy. Financing Residential Energy-Efficiency: Assessing Opportunities and Coverage Gaps in the American Recovery and Reinvestment Act of 2009. September 2009.
*	<b>NHT 2013a</b>	National Housing Trust. Partnering for Success: An Action Guide for Advancing Utility Energy Efficiency Funding for Multifamily Rental Housing. March 2013.
	<b>NHT 2013b</b>	National Housing Trust. Unleashing Utility Resources to Energy Retrofit Affordable Multifamily Housing. 2013.
*	<b>NREL 2011</b>	National Renewable Energy Laboratory. Developing Retrofit Financing Programs for Affordable Multifamily Housing. March 2011.
	<b>RF 2011</b>	Rockefeller Foundation. Building Retrofit Industry and Market Research Scan (BRIMs). 2011.
	<b>Stern 2007</b>	Peter Stern. Changing Behavior in Households and Communities Through Education and Information: Critical Insights. Behavior, Energy, and Climate Change Conference, Sacramento, CA. 2007.
	<b>SAHF 2013</b>	Stewards for Affordable Housing Futures. Whitehouse Pay for Success Fact Sheet. 2013 (unpublished).
*	<b>UI 2010</b>	Urban Institute. Scaling the Nationwide Energy Retrofit of Affordable Multifamily Housing: Innovations and Policy Recommendations. December 2010.
*	<b>USGBC 2012</b>	US Green Building Council. Better Buildings Through Executive Action: Leveraging Existing Authorities to Promote Energy Efficiency and Sustainability in Multifamily, Residential and Commercial Buildings. 2012.