Rethinking Multifamily Energy Efficiency Programs and Services: A Program Design Study in Massachusetts

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ABSTRACT

Pursuant to the 2008 Massachusetts Green Communities Act (GCA), an advisory board called the Energy Efficiency Advisory Council (EEAC) recommended that Program Administrators (PAs) "implement a comprehensive, user-friendly multifamily initiative that provides seamless multifamily service to the customer regardless of the rate class." A successful program would: a) be fuel-blind and take a whole building approach to energy efficiency; b) provide consistency and coordination across service territories; c) offer eligible program measures regardless of rate class; d) include a streamlined application process and seamless customer experience; and e) encourage deeper savings per participant. An initial multifamily energy efficiency program workshop was conducted with customers, the PAs, members of the EEAC and their consultants as well as local and state agencies. The workshop was key to the development of the final program design. The most important characteristic of a successful program as identified through the workshop was a "single point of contact" to serve as a liaison from project inception through to completion. The workshop was complemented by primary and secondary research including a comprehensive review of multifamily literature, in-depth interviews with PAs in other states, and four focus groups with market rate customers. Recommendations from the research included creating a broad definition of multifamily, offering bundled prescriptive incentives, shifting customer focus from split incentives to other benefits, implementing contractor training, and developing a comprehensive website that serves as a clearinghouse for all multifamily energy efficiency information.

Introduction

Background

On July 2, 2008, the Massachusetts Green Communities Act was signed into legislation. The law was designed to advance energy efficiency activity throughout the Commonwealth. Compliance with the GCA required gas and electric distribution companies, as well as Municipal Aggregators (together referred to as Program Administrators) to develop Energy Efficiency Plans that "provide for the acquisition of all available energy efficiency and demand reduction resources that are cost-effective or less expensive than supply."[1] Furthermore, these Plans were to be developed in coordination with a newly created advisory board called the Energy Efficiency Advisory Council (EEAC). The EEAC is composed of eleven voting members representing various customer segments and government agencies, a non-voting member from the heating oil industry, a non-voting member from the energy efficiency business sector and a non-voting member from each of the nine PAs operating in Massachusetts. PA.

In March of 2009, the EEAC published "Priorities to Guide the Development, Implementation, and Evaluation of the PA Efficiency Plans" ("EEAC Priorities Document"). This document was intended to

[1] G.L.c.25 & 21(b)(1).

highlight key areas of concern for the EEAC. Many of the items called for standardization, simplification, and comprehensiveness in PA programs. Examples include:

> "… it is the Council's expectation that programs serving similar customer segments across the Commonwealth will with all deliberate speed transition to common programs with the same program characteristics, delivered either by each PA or by one or more combinations of PAs.
>
> "The PAs shall strive to maximize seamless delivery to the customer, without duplication or complexity, regardless of a given property's rate class, territory or utility type."[2]

Scope

The subject of this paper is the research involved in developing a statewide energy efficiency program for the multifamily retrofit sector. The EEAC Priorities document referenced above includes specific recommendations for a multifamily retrofit program.

> "The PAs shall implement a comprehensive, user-friendly multifamily initiative that provides seamless multifamily service to the customer regardless of the rate class."[3]

A successful program would: a) be fuel-blind and take a whole building approach to energy efficiency; b) provide consistency and coordination across service territories; c) offer eligible program measures regardless of rate class; d) include a streamlined application process and seamless customer experience; and e) encourage deeper savings per participant.

Methodology

The methodology used for research involved two components. The first included a Program Design workshop hosted by the PAs. The second research effort used a combination of primary and secondary research techniques, which involved a literature search and in-depth interviews to glean lessons learned throughout the country. This was followed by focus groups with building owners and managers.

Multifamily Energy Efficiency Program Workshop

The number of interested stakeholders combined with the inherent complexities involved with serving the multifamily market supported the idea of conducting a workshop to inform the program design. The invite list contained a diverse group with representation from customers, the PAs, members of the EEAC and their consultants, as well as local and state agencies. The session was facilitated by Point380 LLC.

Initially, the participants were divided into groups that allowed for significant diversity within each group. The goal was to assign representatives from each of the segments described above into each group. The task at hand was to develop a description of the market and identify key segments within the overall market. Once this exercise was completed, the participants were again divided into groups, this time based on their area of expertise. The three categories included high-rise existing buildings, low-rise existing buildings and low-income/affordable housing. Each group then worked over a two-day period with a facilitator to complete the following activities as they related to their assigned category.

- Identification of requirements for successfully serving the market.
- Development of a high-level flow chart to illustrate what the process would look like.

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[2] "EEAC Resolution Concerning Its Priorities to Guide the Development, Implementation, and Evaluation of the PA Efficiency Plans", pp.2-5.

[3] Ibid, p.4.

- Identification of intervention points (who would intervene with whom, when and what would be provided).
- Completion of a program design template.
- Identification of potential barriers along with remedial actions.

Between completion of the individual activities, each group selected a spokesperson to summarize their findings for the larger group. This promoted shared learning and allowed for incorporating feedback from each group into future activities.

Literature Review, In-depth Interviews, and Market Research Focus Groups

As the workshop was attended largely by representatives from the low income/affordable housing sector, the PAs engaged NMR to validate the recommendations with market rate building owners and property managers. The overall objectives of this study were to:

- Confirm or disconfirm, as well as augment, the findings and recommendations from the workshop.
- Understand the progress made to date on overcoming technical barriers.
- Identify successful strategies for delivering a program that is fuel- and rate class- blind, takes a "whole building" approach to identifying energy efficiency opportunities, and encourages customers to achieve "deeper savings" within multifamily properties.

Pursuant to achieving these objectives, NMR conducted the following research activities:

- A comprehensive review of available multifamily literature.
- Eight in-depth interviews with multifamily program administrators in other states. Key topics addressed in the interviews included: program design and structure, program incentive structure, program barriers and strategies to overcome them, and key program strengths and weaknesses.
- Four focus groups with multifamily building owners, managers, and landlords. Key topics addressed in the focus groups included: steps taken to improve energy efficiency, energy efficiency barriers and motivations, familiarity and experience with energy efficiency programs, ratings of characteristics of the ideal energy efficiency program. Each focus group was tailored to a specific market-rate sector:[4]
    - Small retrofit, existing buildings.
    - Large retrofit, existing buildings.
    - Small new construction.
    - Large new construction.

[4] Multifamily properties were defined as buildings with five or more attached units. Small multifamily properties were identified as buildings with heights of up to three stories and large multifamily properties were identified as buildings with heights greater than three stories.

Findings

Provided below are the results for each research strategy employed through the program design process.

Multifamily Energy Efficiency Program Workshop

The most striking finding from the perspective of the facilitators was the fact that the initial working groups had such difficulty articulating a description of the multifamily market. The group presentations addressing this subject ranged from multiple pages including ways to define multifamily buildings (i.e. number of units, number of floors, construction type, ownership type, utility-related characteristics, occupant characteristics, etc.) to multi-dimensional graphs trying to illustrate the varying characteristics associated with the multifamily sector.

In sharp contrast to defining the market sector itself, the workshop participants were easily able to identify the requirements for a successful multifamily retrofit program. Overwhelmingly, the most important characteristic cited by both the market rate and low-income/affordable housing sectors was the availability of a "single point of contact" to serve as a liaison from project inception through to completion. It would be the responsibility of this contact to shield the customer from implementation specifics that were important to the PAs, but only served to frustrate and confuse customers. The mantra "treat the building, care for the customer"[5] was an outcome of this discussion. For example, building owners and property managers believed that they should not have to be concerned with the fact that there may be more than one PA involved in serving them (customer may have different gas and electric utility) or that one building they own is billed on a commercial rate and another on a residential rate (oftentimes the services available to a building were dependent on the rate class under which they were served). The building should be treated based on its need for energy efficiency improvements, with any back-office adjustments made visible solely to the PA and their vendors.

Differences between the market rate and low income/affordable housing sectors dealt primarily with financial matters. Market rate participants felt that milestone payments would help with the cash flow problems experienced by some owners; whereas the income eligible sector was most interested in being able to pool all the financial resources (those from multifamily programs as well as state and federal agencies) and expanding the grant aspect of the program to affordable housing as well as low-income properties.

Literature Review, In-depth Interviews and Market Research Focus Groups

Defining Multifamily. Defining multifamily can be difficult but it is vitally important that the definition is clear, easily understood, and takes into account interactions with external factors such as other programs, utility or program territories, existing building stock, and building codes. Program administrators reported that by carefully considering these interactions, programs can avoid disenfranchising market segments and can align program requirements with other existing programs. All but one of the program administrators interviewed for this study reported using a simple definition of multifamily based on the number of attached units; definitions ranged from three to five or more attached dwelling units.

Furthermore, participant understanding of building science varies. Using a definition that may confuse potential participants could create a barrier to program participation. By using a simple, universally understood definition, multifamily programs can avoid this potential barrier.

Based on the focus groups, both the size and type of participants has at least some bearing on the level of energy efficiency knowledge. In both the new construction and existing building focus groups,

[5] "Multifamily Housing EE programs: Workshop Results", Point380 LLC, April 2009, p.20.

small participants demonstrated a lower level of knowledge of energy efficiency as compared with large participant groups; they indicated taking an approach to energy efficiency that focused more on incremental, measure-level changes. However, relative to the two new construction groups, even the large existing buildings group exhibited a more measure-level approach to energy efficiency improvements.

The program administrators also reported working with single-family and commercial energy efficiency programs to address properties that do not meet their program definitions. A few program administrators reported addressing only the residential portions of mixed-use properties. The inability to address commercial space was seen as more of a barrier in existing building retrofit programs than in new construction programs.

Energy Efficiency-Related Behaviors. The majority of focus group participants reported implementing at least some energy efficiency improvements at their properties. Participants typically reported focusing on the implementation of individual measures as opposed to taking a "whole building" approach to improving the energy efficiency of their properties. Compared with the large new construction group participants, participants in the two existing building groups as well as those in the small new construction group demonstrated a lower level of knowledge of energy efficiency. In particular, the small new construction group participants reported difficulty in understanding the type of equipment that qualified for existing incentives and said they were hesitant to make additional investments in energy efficiency without assurance that they would be reimbursed for the upgrades. Participants in both of the large building focus groups (existing and new construction) exhibited a higher level of reliance on consultants such as designers, architects, and engineers.

When asked about the use of labeling programs, such as ENERGY STAR or LEED, only one participant in the small new construction group reported using a labeling program to advertise properties. Other participants said that clients and tenants ask about energy efficiency or green aspects of their buildings but not about whether or not their property is ENERGY STAR or LEED certified. In contrast, the majority of builders interviewed in December 2008 and January 2009, as part of a 2008 evaluation of the Massachusetts New Homes with ENERGY STAR program, said that building and marketing ENERGY STAR-qualified homes is valuable in the current housing market. In addition, over one-half (57%) of these same builders said awareness of and/or interest in buying ENERGY STAR homes has increased (Nexus Market Research & Conant 2009). This suggests that multifamily owners, developers, managers, tenants, and buyers may benefit from education about the availability and benefits of labeling programs.

Barriers, Motivations, and Strategies. In general, while conducting the literature review and in-depth interviews NMR staff found that the prevailing barriers identified for multifamily energy efficiency programs in 2009 were similar to those identified by previous studies in 1995 (DeCicco et al. 1995) and in 2001 (Winch 2001).

In both the literature review and the in-depth interviews, split incentives[6] was the most frequently mentioned barrier. In addition, participants in each of the four focus groups also mentioned split incentives as a primary barrier.

To address split incentives, program administrators almost unanimously reported that they reject the premise that owners, developers, and managers do not benefit from tenant energy savings. Instead of focusing on financial savings associated directly with lower utility bills, program administrators seek to educate property owners, developers, and landlords on the benefits that they derive from increasing the energy efficiency of their properties. Primarily non-energy benefits, these benefits include: increased tenant

[6] The split incentives barrier describes a situation where property managers/owners are responsible for facility improvements but do not pay the energy bills for the tenant spaces. Therefore they do not have any financial incentive to install energy-efficiency measures in the tenant spaces.

comfort, increased tenant satisfaction, decreased tenant turnover, labeling and marketing, increased property values, aesthetic improvements, and energy savings in common areas. Working with property owners and other market actors to promote non-energy benefits was also identified as a best practice in the literature review (Quantum Consulting 2004). This focus of the efforts of program administrators found support in the focus group findings where participants noted non-energy benefits of making energy efficiency that include aesthetic improvements, acoustic comfort improvements, and providing a competitive advantage. In addition, program administrators reported that tying energy efficiency improvements to these non-energy benefits enables property owners to view the improvements as an investment with tangible returns.

Program administrators also cautioned that it is important that they avoid focusing exclusively on the split-incentive barrier and as a result ignore other barriers that exist in the multifamily market. Focus group participants identified several other barriers including: uncertainty about the performance of energy efficiency measures, financial factors (lack of financing, long paybacks, etc.), lack of consumer demand for energy efficiency, and lack of program awareness. In-depth interview participants also identified the following barriers: lack of qualified contractors, lack of architects or engineers with expertise in designing energy efficient multifamily properties, overlapping utility territories, first costs, housing market downturn, invasive upgrades, and multiple unit owners.

It is also important to note that not all multifamily properties have the same degree of split incentives. An important point for governmental agencies and non-profit organizations is that they may view capital improvements separately from operating cost improvements. In addition, in both new construction focus groups, participants noted a lower level of split incentives for developers who buy and hold properties versus developers who buy and flip properties. The upfront costs of incorporating energy efficiency can be sometimes be offset overtime by property owners who hold properties but not by owners who flip properties.

In general, however, the majority of program administrators identified condominiums as a market segment that is more difficult to penetrate and the affordable housing market as a market segment that is easier to penetrate. They cited the alignment of the affordable housing market's mission with program objectives to save energy as the primary reason this market is easier to reach. Program administrators thought that affordable housing market stakeholders understand that energy costs are a significant portion of their clients' housing costs and see it is as part of their core mission to ensure that their properties are energy efficient. The program administrators suggested talking in terms of life-cycle costs and reminding developers that construction costs are only one component of housing costs. One program administrator emphasized that it is important for developers to understand that *"building cheap, does not mean building affordable."*

Contractors and Trade Allies. The in-depth interviews and focus groups revealed that multifamily properties rely heavily on outside contractors for energy efficiency information and upgrades. Participants in all of the focus groups reported using outside contractors to implement energy efficiency improvements, and participants in some of the new construction focus groups were in agreement that contractors and consultants need to be a major channel for information regarding energy efficiency programs.

It is perhaps not surprising then that program administrators reported relying on contractors as an important marketing channel and using contractors to help guide participants through their programs. However, they also reported a lack of qualified contractors as a barrier. Most of the program administrators have engaged in outreach and training efforts with contractors, consultants, designers, and/or architects. They particularly reported spending significant resources on contractor training.

All but one of the participants in the large new construction focus group and one participant in the small new construction focus group had done energy modeling of their buildings. One participant reported that utilities used to bring in consultants to do energy modeling but that designers and developers have

begun to use their own energy modeling groups as a cottage industry. This suggests the possibility that the quality and rigor of the energy modeling being performed by such a cottage industry is likely to vary considerably. By providing training on energy modeling, multifamily programs can take advantage of a growing industry and ensure that the energy modeling is done correctly.

Program Design. In general, the energy efficiency investment decisions of multifamily property owners, developers, and managers are driven by the need to balance business viability and profitability. Focus group participants also expressed a need to limit and reduce risk, and they reported being motivated to invest in energy efficiency primarily by marketing and competitive considerations.

A successful program will leverage these motivations by providing participants with clear and comprehensive information on energy and financial impacts that will help them reduce the risk associated with implementing energy efficiency measures. Supporting this approach, the majority of program administrators reported that technical assistance was a strength of their program, with three out of eight program administrators reporting it as their foremost strength.

The program administrators are able to have a greater impact and achieve deeper savings by strategically reinforcing technical assistance with incentives. While they provide technical assistance regardless of fuel type or service area, the program administrators reported that they were unable to provide incentives for certain fuel types or for customers who do not fall completely within a single service area.[7] They indicated that this can cause confusion among participants and prevents them from reinforcing technical advice with incentives. Also, participants in three of the four focus groups gave high ratings to a "statewide program with consistent measures and incentives."

Some program administrators also reported using a whole-building approach to achieve deeper energy savings.[8] When asked to rate characteristics of an ideal program, all of the focus group participants gave high ratings to whole-building design. However, participants in all of the focus groups also reported implementing energy improvements at their properties in a piecemeal, single measure approach rather than utilizing a whole-building approach. One program administrator reported using a whole-building approach as a key strength of their program and one administrator reported it as a secondary strength. Both these program administrators reported utilizing HERS raters and modeling existing building conditions before preparing recommendations for improvements. Some program administrators also reported offering higher incentive values to participants who implemented multiple measures or requiring participants to implement specific measures to qualify for other incentives. In the literature, bundling popular measures together with other higher energy value measures was considered a best practice.

In addition, program administrators and focus group participants also identified a need for strong customer service. Program administrators reported that making sure someone is available to walk customers through the process is especially important in emerging markets where all of the barriers, pitfalls, and special cases have not yet been identified. Supporting these findings, focus group participants gave high ratings to characteristics related to information dissemination and customer interface. Additionally, when rating characteristics of an ideal program, the large buildings group participants gave the highest ratings to a comprehensive website. This was rated highly and commented on by a majority of these participants. According to them, the value of such a website would lie in providing up-to-date information on programs available from all sources.

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[7] Note that although the program administrators in other states expressed such concerns, a strength of the program in Massachusetts is that customers do not have to have fall within a single service area.

[8] The Massachusetts program seeks to achieve deeper energy savings by identifying and reviewing with customers all possible energy savings opportunities during the first visit to their facilities. The program contractor then explains all the program assistance and incentives that are available to help customers achieve those savings.

While the focus group participants indicated they generally did not use labeling programs, they did bring up issues such as the inability to differentiate the level of green between one building and another. This is an issue that can be addressed by labeling programs. Supporting this, three program administrators in other states reported that labeling and brand recognition are strengths of their programs.

Recommendations

Defining Multifamily

- Take into account the interaction of external factors such as other programs, existing building stock, and building codes prior to creating a definition for multifamily properties eligible to participate in programs.
- Create a broad definition of multifamily that is clear, concise, and unambiguous. Consider using a definition based on a minimum number of attached dwelling units as a broad definition.
- Decide how special cases, such as mixed-use properties, will be addressed before implementing a new program design. In addition, allow for some flexibility in the treatment of special cases that they may not be aware of prior to implementation.
- Consider transparently classifying participants based on size and project type—existing buildings or new construction—and offer varying levels of assistance to each group. In addition, consider offering simple, prescriptive incentives to existing building participants and small new construction participants. This distinction might also impact how participants learn about the program—large new construction participants should be contacted through design professionals who take a whole building approach offering the participants more sophisticated, and more lucrative, incentive packages.

Motivations and Strategies for Addressing Barriers

- Seek to address the split-incentive barrier by concentrating program marketing and messaging on the non-energy benefits that multifamily property owners, developers, and managers receive from energy efficiency improvements. These benefits include: increased tenant comfort—especially acoustic comfort, increased tenant satisfaction, decreased tenant turnover, labeling and marketing, increased property values, aesthetic improvements, and energy savings in common areas. Programs will need to work with multifamily property owners to help them understand how these benefits can be translated into financial benefits such as increased rents or property values.
- Reach out to affordable housing property owners and appeal to their core mission as a motivation to participate in multifamily energy efficiency programs. Programs should be prepared to educate affordable housing organizations about the difference between first costs and life-cycle costs and the impact of energy bills on housing costs.

Contractor and Trade Allies

- Implement training programs for contractors, designers, architects, engineers, and multifamily property owners, developers, and managers. Training programs should focus on the key principles of building science that make multifamily properties unique. Consider including introductory courses that are less sophisticated, geared towards contractors working with smaller multifamily properties as well as owners, and managers who do not need as rigorous an understanding of building science principles.

- Consider providing energy modeling training and certification to engineering and architectural firms.

Program Design

- Consider implementing a program with a project facilitator / "Multifamily Market Integrator." The project facilitator should assist building owners, managers, and developers through the program from beginning to end. Consider utilizing existing contractors in a facilitator capacity.
- Rather than developing a cookie cutter approach, to be successful, multifamily programs need to offer a menu of services delivered seamlessly to the customer regardless of variables such as the specific distribution company or billing rate class. Assistance in identifying which options to select from the menu would be provided by the project facilitator / "Multifamily Market Integrator.".
- Consider the development of a comprehensive website that provides up-to-date information on programs available from all sources—not just the program administrators.
- Educate multifamily owners, developers, managers, tenants, and buyers about the availability and benefits of labeling programs.
- Consider implementing a program with a 'whole building' approach to energy efficiency.
- Educate multifamily builders, developers, owners, and managers on the benefits of a whole building approach.
- Consider offering prescriptive bundled incentives. Prescriptive incentives should be bundled with consideration for the interaction of systems and the overall impact of energy efficiency improvements. The incentive bundles should either require participants to implement multiple energy efficiency upgrades to receive the incentives or increase the value of incentives if participants implement multiple energy efficiency upgrades. By bundling incentives, multifamily programs can encourage participants to move beyond their current practices of implementing measures on a piecemeal basis, thereby educating participants about a whole building approach. In addition, by bundling more popular measures, such as windows, with less popular measures that have higher energy savings, such as HVAC, or by bundling electric and non-electric measures, multifamily programs will be able to achieve deeper savings.[9]
- Consider implementing a statewide program with consistent measures and incentives throughout the state.
- Work with other energy efficiency providers within their state to ensure that they are able to offer a program that is blind to fuel type and utility service territory. Identify areas of possible utility service territory overlap and organize programs to address the overlapping areas.

Implemented Components

Following this study, a statewide RFP for Multifamily Market Integrator services was issued by the Massachusetts program administrators early in 2010. The specific tasks in the scope of work included:

- Marketing services
- Allowing for multiple points of entry (into the enrollment process)
- Staffing a toll-free telephone line
- Participant screening
- Whole building assessments
- Measure-specific paths (while comprehensive treatment is suggested, there will be a way to assist customers looking for single measure upgrades i.e. heating systems)

[9] Note, however, that windows are not an eligible measure for the Massachusetts program.

- Coordinating program measures and services
- Tracking project milestones
- Responding to participant inquiries throughout the project
- Resolving complaints
- Participating in a statewide Multifamily Steering Committee
- Participating in program evaluations and quality assurance/quality control reviews
- Program Administration
- Post-participation follow-up

A new statewide Multifamily Program in Massachusetts went in to effect mid-year 2010. The Multifamily Market Integrator (MMI) has been successfully implemented and customers have expressed appreciation of how it has streamlined and simplified program participation. Key MMI functions and services include a single point of contact for the program via an 800 number, obtaining all relevant facility information during the first customer phone call, scheduling contractor visits, tracking milestones, collecting and reporting post-participation information on measure implementation and savings. Year-end program statistics include 12,022 MWh in annual savings for the electric retrofit program and 574,206 therms in annual savings for the gas program.

References

Architectural Energy Corporation. 2005. *Technical Assistance in Determining Options for Energy Efficiency in Existing Buildings.* California Energy Commission, CEC-400-2005-011-F.

Bakalars, K., P. Rathbun, B. Ward, and J. Kraft. 2009. *Residential Evaluation: ACES RHEEP Pilot Results*. Prepared for State of Wisconsin, Public Service Commission of Wisconsin.

Brown, M.. (n.d.). *Brief #3: Paying for Energy Upgrades Through Utility Bills*. Alliance to Save Energy.

The Cadmus Group. 2009. *SCE California New Homes 2006-2008 Program (CANHP) Process Evaluation Report*. Prepared for Southern California Edison (SCE).

ECONorthwest. 2008. *Process Evaluation of the SDG&E 2006-08 Residential Customer Programs*. Prepared for San Diego Gas and Electric (SDGE).

Institute for Market Transformation. 2004. *The Impact of Energy Costs on Multi-Family Residential Building Value: Case Study Pine Harbor Apartments.* Prepared for New York State Energy Research and Development Authority.

Institute for Market Transformation. 2005. *The Impact of Energy Costs on Multi-Family Residential Building Value: Case Study Morrison Manor Apartments*. Prepared for New York State Energy Research and Development Authority.

Itron. 2007. *Multifamily Home Energy Savings Program Process and Net-to-Gross Evaluation, Program Years 2005-2006*. Prepared for Energy Trust of Oregon.

KEMA. 2006. *Evaluation of the 2004-2005 Partnership for Energy Affordability in Multi-Family Housing Program – Final Report*. Prepared for The California Public Utilities Commission, Pacific Gas and Electric, ICF International.

KEMA. 2007. *Evaluation of the 2004-2005 Statewide Multifamily Rebate Program, Volume 1*. Prepared for The California Public Utilities Commission, Pacific Gas and Electric, San Diego Gas and Electric, Southern California Edison and Southern California Gas.

Ludwig, P., A. Evens, and L. Kotewa. 2008. "Cook County Energy Savers: How Energy Efficiency in Chicago's Multi-Family Buildings Has Evolved to Meet New Challenges from the 1980's to Present Day." *In Proceedings of the 2008 American Council for an Energy-Efficient Economy Summer Study on Energy Efficiency in Buildings*, 2: 197-205. Washington, D.C.: American Council for an Energy-Efficient Economy.

Miller, N., J. Spivey, and A. Florance. 2008. "Does Green Pay Off?" *Journal of Sustainable Real Estate.*

Muldavin, S. 2008. *Quantifying "Green" Value: Assessing the Applicability of the CoStar Studies*. Green Building Finance Consortium.

Nevin, R. and G. Watson. 1998. "Evidence of Rational Market Valuations for Home Energy Efficiency," *The Appraisal Journal*.

Nexus Market Research, Inc., and D. Conant. 2009. *2008 Massachusetts New Homes with ENERGY STAR® Builder Interview Report*. Submitted to The Joint Management Committee.

Obert, Zach and Carter Dedolph. (2008). "Building and Remodeling a New Construction Program." Paper presented at the 2008 American Council for an Energy-Efficient Economy Summer Study on Energy Efficiency in Buildings, Pacific Grove, CA.

Quantum Consulting, Inc. (2004). *National Energy Efficiency Best Practices Study: Volume R5 – Residential Multi-Family Comprehensive Best Practices Report*. Submitted to California Best Practices Project Advisory Committee.

Tachibana, Debra, Bing Tso and Jeffrey Romberger. (2008). "Multifamily New Construction: Utility Programs Lead the Way Toward Changing Building Practice and Energy Codes." Paper presented at the 2008 American Council for an Energy-Efficient Economy Summer Study on Energy Efficiency in Buildings, Pacific Grove, CA.

Winch, Rick. (2001). *Final Report: Multifamily Energy Efficiency Programs – Secondary Research Report / Nationwide Best Practices Study*. Prepared for the State of Wisconsin, Department of Administration, Division of Energy.

Ward, Bryan, Pam Rathbun, Laura Schauer, and Jeremy Kraft. (2009). *Residential Programs: ACES Impact Attribution*. Prepared for State of Wisconsin, Public Service Commission of Wisconsin.

Wirtshafter Associates, Inc. (2005). 2003 *Californinia Statewide Multifamily Program Evaluation.* Prepared For: San Diego Gas & Electric.

York, Dan, Marty Kushler and Patti Witte. (2008). *Compendium of Champions: Chronicling Exemplary Energy Efficiency Programs from Across the U.S.* American Council for an Energy-Efficient Economy.

DeCicco, J., R. Diamond, S.L. Nolden, J. DeBarros, Tom Wilsin.et al. 1995. *Improving Energy Efficiency in Apartment Buildings.* American Council for an Energy-Efficiency Economy. Washington, D.C. and Berkeley, California.

Nexus Market Research, Inc. and D. Conant. 2009. *2008 Massachusetts New Homes with ENERGY STAR® Builder Interview Report*. Submitted to The Joint Management Committee.

Winch, R. 2001. *Final Report: Multifamily Energy Efficiency Programs – Secondary Research Report / Nationwide Best Practices Study*. Prepared for the State of Wisconsin, Department of Administration, Division of Energy.