

A Comparison of Two Programmatic Approaches to Increasing Efficiency in Multifamily Buildings

How Programs Influence Outcomes

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ABSTRACT

Two different contractors for Wisconsin's Focus on Energy Apartment and Condo Efficiency Services (ACES) program have taken two different approaches to providing assessments and implementation of measures in multifamily housing. The Center for Energy and the Environment (CEE) fielded a program that identified large apartment buildings and then made what amounted to "cold calls" to sell an assessment to owner/managers of large multifamily properties. Owners received financial assistance for the installation of some measures. In the CEE model owners were approached anywhere in the building and equipment life cycles.

Franklin Energy Services (FES) worked with trade allies to offer an assessment to owners that trade allies identified as being in the process of replacing major pieces of equipment. Owners received a one- or two-page incentive offer with specific efficiency recommendations for the equipment that was being replaced and recommendations and incentive offers for other building systems when appropriate. In the FES approach, most owners received recommendations when making major decisions about their property.

One hypothesis is that the FES model might result in higher across the board implementation of energy efficiency measures because of the salience of the advice at a time when decisions were being made. This paper compares the effects of the two models on implementation rates as measured by the percentage of measures that were implemented and the percentage of estimated savings from measures that were implemented. The analysis shows that there are differences in the rate at which measures are implemented but the differences are not consistently in favor of one or the other program but rather vary between the programs on a measure-by-measure basis. The differences in outcome appear to relate more to structural characteristics of the programs rather than the overall strategic approach. The paper focuses on some of the important program characteristics that may influence outcomes. The paper also addresses the issue of what is needed to motivate multifamily owners and managers to implement energy efficiency measures.

Introduction

The goal of the Apartment and Condominium Efficiency Services Program is to help multifamily property owners and managers in Wisconsin increase the energy efficiency of their properties by conducting an on-site inspection of their multifamily buildings, preparing a set of recommendations focusing on ways to improve the energy efficiency of those facilities, presenting the recommendations to the owner/manager, and providing financial assistance in the form of rewards to reduce the incremental costs of efficient technologies compared to standard technologies. Early in the life of the program, the goals of the program were to acquire resources and transform the market. More recently, the goal of the program has been resource acquisition.

Two earlier evaluations (Winch and Foltz, 2001; Winch and Foltz, ND) found that even with the comprehensive version of the program offered in the early days, it was difficult to sell energy efficiency to multifamily operators. The early evaluations concluded that financial incentives remained essential to

capturing energy savings in apartment and condominium buildings. In the absence of incentives, energy efficiency recommendations were being adopted slowly or not at all. The early evaluations were completed soon after the initial round of building assessment reports was presented to participants and there was concern that insufficient time had elapsed to allow multifamily owners to implement recommendations.

The Wisconsin Focus on Energy has had two versions of this program focused on the multifamily sector. The first program was managed by the Center for Energy and the Environment (CEE). It was primarily conducted in the northeastern part of Wisconsin from 2000 onward and was expanded into a statewide program in July 2001. CEE identified eligible large buildings with central heating and boiler systems and then essentially made “cold calls” to the owner/managers asking if CEE could conduct an assessment of the building. If the owner/manager agreed, CEE did an assessment and provided a set of written recommendations typically within two to three months. The recommendations along with findings, a historical energy analysis, a codes and standards check list, and other items were bound into a multi-page report that was presented to the owner managers. The recommendations were of two types: recommendations for the immediate replacement or installation of equipment and recommendations for the installation of efficient equipment when equipment, whose immediate replacement could not be economically justified, was at the end of its useful life. We refer to this latter type of recommendations as replace-on-failure recommendations. Incentives were provided for some measures such as lighting and indoor/outdoor controls. No attempt was made to tie the assessments to the imminent replacement of major systems although there may have been some instances where this occurred. This version of the program was discontinued in the fall of 2002 (Reed, et. al., 2002a).

In 2001, FES joined the ACES program but used a different marketing strategy (Reed and Riggert, 2005). FES established a network of vendors and contractors. When these vendors and contractors were contacted by an owner or manager contemplating replacing, modifying, or upgrading an existing major system, such as a central boiler or heating system, the contractor or vendor asked the customer if they would like to be referred to the ACES program. If the customer agreed, the vendor or contractor informed FES which then contacted the customer and offered the assessment service. FES completed the assessment and offered a set of recommendations. The recommendations took the form of a one or two page offer that recommended a specific equipment configuration that was more efficient than the configuration of the equipment being offered by the contractor who made the referral.

The reward was intended to cover a significant proportion of the incremental cost of the more efficient technology. When warranted, FES offered rewards and recommendations for additional systems beyond the one(s) that the owners intended to replace. Thus, FES might offer rewards for lighting, insulation or other measures in addition to rewards for a high efficiency boiler replacement. In the case of lighting systems, FES either worked with the owner’s contractor or a program affiliated lighting contractor to offer lighting retrofits. FES proposals were based on standardized reward offers for each measure as well as additional incentive awards for installing multiple measures.

The FES offers were generally good for 30 days. If the owner/manager agreed to the offer, the owner signed the offer and FES then set aside funds. Installations sometimes occurred as much as six to 12 months later. For example, an owner might have the assessment in the winter but wait until late spring to do the installation when the heating system could be turned off without affecting the tenants.

The CEE version of the program was based on tried and true boiler technologies. CEE had technical concerns about some of the most efficient boilers and was reluctant to recommend them. FES encouraged customers and contractors to look at the newer alternative technologies and approaches to their systems. For example, FES promoted Munchkin high efficiency boilers (92 percent efficient) that previously have not been widely used within Wisconsin. They also more aggressively promoted the use of staged systems in which a large boiler might be replaced with two to several smaller boilers that were organized to fire based on heating requirements, thus reducing the need to heat a single massive boiler, efficient or not, on moderately cool days. They sometimes recommended that small efficient boilers be

used in line with an older boiler so that a large older boiler only fired on days when the capacity of the larger boiler was needed. One goal of the FES effort was to introduce contractors to more efficient practices and technologies (especially new boiler technologies and concepts) and to encourage them to adopt these as standard practice. The CEE program was less engaged with contractors and vendors than the FES program.

Given the differences in approach, it was hypothesized that the FES approach might result in a higher penetration of measures. A key reason for this was the tactical focus on replacement situations and the fact that the incremental costs of equipment could be economically justified at the time of replacement. This paper explores the differences between these two programs and how these differences may have influenced outcomes.

Overview of the methods

The findings in this paper are based on four sets of data.¹

- The CEE tracking system
- The FES tracking system
- An in-person survey of 21 participants in the CEE version of the program
- A telephone survey of 40 participants and 10 nonparticipants in the FES program

The CEE tracking system was used to identify 42 firms that had participated in the program at the time of the survey. An assessment report was obtained for a specific building that had been assessed for each of these 42 companies. Buildings were assigned a random order for the purposes of making contacts. We were able to contact 27 of the 42 owners. Interviews were completed for 21 sites. There were five refusals and one dropout after the appointment was scheduled. The assessment report was used to identify the measures that were recommended for a specific building.²

The FES tracking system was used to identify the population of firms and multifamily properties or buildings owned by those firms that had an assessment. This information was used to draw a sample of buildings for a set of unique firms where measures had and had not been installed. Because data about incentives that had been paid were available, it was also possible to develop penetration measures from these data.

A survey was constructed for participants in the CEE version of the program. The survey covered reasons for participating in the assessment program, experiences with the assessment, response to and use of the assessment report, measures that were installed, and firmographics. The survey was conducted on-site at the respondent's location and lasted between 45 minutes and an hour or more. Surveys were completed for 21 sites.

A participant and partial participant survey (firms that had had assessments but did not implement measures) was administered to those who had had an assessment as part of the FES version of the program. These surveys were administered by telephone and lasted from 20 to 45 minutes depending on the respondent. The survey covered reasons for participating; responses to the assessment; measures that were installed; reasons for implementing or not implementing recommendations; firmographics; and other information. Surveys were completed with 40 participants who had implemented measures and 10 participants who had not. Participants were contacted at random and sample points were replaced when it proved impossible to contact the owner or the owner/manager refused to participate.

¹ There was also a survey of 25 contractors the results of which are not reported here.

² The goal was to complete 20 surveys. No attempt was made to compare the owners who were contacted and those who were not contacted. We don't have any reason to believe that they were substantially different.

Characteristics of the Participants

The respondents in the CEE sample owned an average of seven Wisconsin properties compared to 11 properties for the FES survey participants. The median number of Wisconsin properties owned was two for the CEE respondents and 4.5 for the FES respondents. The average number of buildings owned was 17 and 29.9 with the medians being five and nine for the CEE and FES respondents respectively. The average number of Wisconsin rental units was 333 for the CEE sample and 365 for FES sample while the median number of rental units was approximately 100 for both groups. As indicated by the differences in the means and medians, both samples contained owners with large numbers of buildings (more than 50) and units (more than a thousand units) and owners with one or two properties and smaller numbers of units. Outliers are clearly influencing the averages. The medians are probably a better representation of the samples. While the owners/managers in the FES sample typically had more buildings, the two groups are quite similar in the number of units with which they deal.

We know from the baseline study (Xenergy, 2002) that there are a relatively small number of large owners who control large numbers of units (>70) in Wisconsin and a very large number of smaller owners who control relatively few (<16) units. This is consistent with what we know about multifamily building ownership in the rest of the country.

As noted above, both versions of the program targeted larger buildings and buildings with central heating systems. Thus, the owners in our sample are more like owners who control the largest buildings and owners with the most units rather than owners of multifamily units in general.

Participation and Savings in the Two Programs

We used the tracking databases from the two programs to tally the number of recommended measures and the estimated savings for the recommended measures. The CEE database did not have information about installations that resulted from recommendations. Thus for CEE, we estimated installation rates based on a survey of participants. To accomplish this, survey participants were asked whether or not an installation was completed for each recommendation for a specific building.

FES recommendations were almost always accompanied by a reward offer. We were able to track whether a measure was installed by whether or not a reward had been paid. There is one caveat. Participants in the FES program could have accepted an offer but not had sufficient time to have the measures installed. Thus, there were some outstanding offers that had been accepted that included measures that had yet to be installed that are not included in the count. Inclusion of these measures in the counts would have slightly increased the installation rate for the FES version of the program.

One of the difficulties in producing comparable estimates was categorizing the measures. For both programs we had to rely on the descriptions of the measures that were available in the databases. At the time we worked with the data, neither CEE nor FES had fully completed an internally consistent system for categorizing measures. There were numerous instances within each of the databases where the same type of measure was referred to by different labels. Also, there was no consistency between the programs in how measures were categorized. For both programs, we had to assign measures to categories using our best judgment based on the information in the tracking systems. The categories are as consistent as we could make them based on the information that we had.

Percentage of Recommendations Implemented for Selected Measures

The installation rates were examined in two ways. The first was to compare the number of measure installations to the number of recommendations by measure. The second was to compare the estimated savings for installed measures to the total estimated savings for recommended measures. We used two methods to estimate penetration because different types of installations yielded different levels

of savings. One program could have had a higher installation rate but have saved less energy because the installed measures did not yield as many savings per measure.

According to the respondents in the CEE survey, about 41 percent of the recommendations in the CEE program were implemented. A high percentage (94 percent) of lighting recommendations were implemented. Half of the heating systems control recommendations were implemented but just one of the four boiler recommendations in the sample was implemented. Water heating temperature set back recommendations were implemented 66 percent of the time but recommended changes to water heating systems were implemented 20 percent of the time. The water heating system equipment recommendations were replace-on-failure recommendations. For the CEE program, the boiler recommendations, the laundry recommendations and the water heating replace-on-failure recommendations were implemented at a combined low rate of 14 percent at the time of the surveys.

The overall measure implementation rate for the FES program (37 percent) was nearly the same as the overall CEE implementation rate. Participants in the FES and CEE programs implemented the boiler control recommendations (48 percent compared to 50 percent) and boiler recommendations (27 percent compared to 25 percent) at almost exactly the same rate as CEE. FES participants implemented air infiltration measures (63 percent versus 55 percent) at a slightly higher rate than the CEE participants. The opposite was true for lighting where FES participants implemented 63 percent of the time compared to 94 percent of the time for CEE participants. About 80 percent of FES participants implemented water heating temperature setback compared with 66 percent of CES respondents. FES participants implemented recommended water heating equipment recommendations (24 percent versus 20) at a slightly higher rate than CEE.

Estimated Percentage of Savings Achieved for Selected Measures

Overall, the two programs show nearly identical energy savings implementation rates, measures representing slightly more than 40 percent of the recommended savings for the CEE program and 38 percent for the FES program were implemented. As with the number of measures, the estimated savings from measures that were implemented differed at the measure level.

Table 1 shows the percentage of estimated savings for selected recommendations that were implemented for each of the two programs. Comparisons are only available for selected measures because of the previously noted categorization problems. These data show that CEE was significantly more successful with air infiltration and lighting measures such as exit lighting and T-8 lighting with electronic ballasts than FES. In terms of estimated savings, FES was just modestly more successful with boiler controls, boiler recommendations, pipe insulation, and significantly more successful with laundry recommendations.

Lessons about Program Design and the Effects of Program Design on Program Outcomes

Because of the distinct differences in the two programs, it was anticipated the outcomes of the two versions of the program might be quite different. An hypothesis was that that FES' tactical focus on multifamily owners and managers, who were making changes to buildings or buildings systems, would prove superior to the cold call approach with its frequent use of replace on failure recommendations. It was hypothesize that owner managers making changes to their buildings might take the opportunity to incorporate efficiency measures. As we saw above, there were only small differences in overall implementation rates. There were also differences in implementation rates across measures but they do not uniformly favor one version of the program over the other. For these two programs, the data do not strongly support the idea that the tactical approach is advantageous.

Table 1 Comparison of Savings from Implemented Measures for the CEE and FES Programs

Measure	CEE Program implementation rate (percent of recommended savings)	FES Program implementation rate (percent of recommended savings)
Air sealing/air infiltration	97	61
Boiler controls (primarily indoor/outdoor reset controls)	29	55
Boiler recommendations for heating	22	31
Pipe insulation	24	39
Laundry	14	96
Exit lighting	98	61
CFLs and CFL Fixtures	100	58
T-8s with electronic ballasts	97	17

Before we discuss some of the factors that might have affected the outcome, it should be pointed out that the differences between the two programs are not large and that the sample size for the CEE is small, which makes it difficult to assess the causal effects of program characteristics and draw strong conclusions.

The Specificity of Recommendations as a Factor

At the intuitive level, getting owners to incorporate energy efficiency measures when making changes seems like an obvious winner. So, how can we explain why the tactical approach does not seem to have made as much difference as we might have expected? The key point is that the tactical approach is just one many explanations for the performance of a program. Programs are multifaceted and there are multiple causal factors that affect the result. Thus, there are likely several explanations for the mixed results from these two program interventions.

One possible factor is the nature of the recommendations. In this case the nature of the recommendations probably worked against CEE. FES was mainly dealing with replacement situations where the useful economic lifetime of equipment had been reached, where the incremental costs of installing efficient equipment could be justified, and where it was possible to make specific equipment recommendations. Many of the situations with which CEE was dealing were cases where the useful life of equipment had not been reached, the installation of efficient equipment could not be cost justified until it was time for equipment replacement, and, given the dynamics new technology development, it made the most sense to make a recommendation non-specific recommendations to install the most efficient equipment at replacement. About twenty percent of all CEE's recommendations were replace-on-failure recommendations. At the time of our study, just 15 percent of these replace-on-failure recommendations had been implemented (3 percent of all of CEE's recommendations).

This could be because "general" replace-on-failure recommendations are not effective or because the opportunity to replace the equipment did not arise between the time of the assessment and the study. The difficulty with replace-on-failure recommendations is that managers and decision-makers change and/or memory fades and recommendations can get lost. Larger properties often "turn" when large investments, such as investments in a heating system, are required and the existing owners do not want to invest new capital in the existing building. Changes in management an institutional memory change at these points as well. There is also a fair amount of general manager and decision-maker turn over in property management companies.

To get a better handle on the effectiveness of the replace-on-failure recommendations, we asked whether the respondents had some way of keeping track of the recommendation and whether they were likely to follow the recommendation. Half of the CEE participants told us that they had no plan for keeping track of the replace-on-failure recommendations so they are only available if the manager remembers them when the time for an equipment change comes.

We also asked CEE participants, who received replace-on-failure recommendations and who hadn't implemented the recommendations, if they would implement the recommendation in the future. Only one of the respondents who received a replace on failure indicated that he was certain to make the recommended replacement, five said that they might make a replacement and eight participants clearly indicated that they would not. In other words, 57 percent of the respondents indicated that they would not follow the replace on failure recommendations that they received and another 33 percent were "iffy." These findings suggest that replace-on-failure recommendations do not have a high probability of being implemented.

It has been suggested that replace-on-failure recommendations might have a higher chance of surviving if the equipment were tagged with the recommendation. Our data does not speak to this possibility. The response to such a tag would depend on the survival of the tag, the amount of time that passed, the specificity of the recommendations on the tag, whether changes in equipment and practices in the intervening years had reduced the saliency of the recommendations, whether or not incentives were available, and whether or not the contractor was willing to bring the tag to the attention of the managers or owners.

Program Structure and Contractor Motivations

CEE appears to have been more successful with air-infiltration and lighting recommendations than FES. We believe that these differences are explained by the structure of the program and the motivation of the contractors. Lighting and air-sealing were recommendations that clients could implement immediately although in the CEE version of the program the owner paid for these. These recommendations, along with indoor/outdoor controls, were at the core of the CEE version of the program because other recommendations were of the replace-on-failure type. If CEE's clients did not implement the lighting and air-infiltration recommendations, then their assessments would produce few immediate results for the client. For this reason, we believe that CEE was motivated to encourage changes to lighting and implementing air infiltration measures as well as to "sell" the indoor / outdoor reset controls, for which a reward could be received at least during part of the program period, that both had good pay-backs as well. This probably accounts for the high implementation rates for lighting and air sealing.

The structure of the FES program hinges on the contractor referral process and is built around heating and boiler replacements. While making recommendations for boilers and heating systems, FES and/or its allies also made additional recommendations for measures to other systems such as lighting and the building envelope. The clients who were replacing heating and boilers systems likely were focused on the primary rather than the secondary recommendations. FES encouraged clients to implement lighting and air infiltration measures but there may have been less interest on the part of the clients and less emphasis may have been placed on them.

The Nature of the Proposals

There are also contrasts in the content of the proposals that were presented to the clients. As noted above, the CEE proposals were multi-page documents that contained information about energy usage, findings from the assessment, recommendations, discussions of technical measures, and a discussion of code compliance. FES proposals were typically one or two pages in length and focused on specific recommendations with a reward attached. The more elaborate CEE proposals clearly did not cause

greater acceptance of recommendations than the shorter FES proposals. Half of the CEE participants had a positive response to the report while the other half indicated a mixed or negative response. We did not have a comparable question in the FES survey but respondents rated the FES proposals as an 8.2 on a scale of one to ten with ten meaning very satisfied. This indicates that high proportions of respondents were very satisfied with the proposal. Twenty-five percent of the CEE participants (much less than half) felt that the proposal was fine as received. In contrast, seventy-eight percent of the FES respondents (much more than half) felt that the proposal was complete or had no recommendations for changes to them. Twelve of the remaining 22 percent of FES participants wanted information about technologies that were not included in the proposal. FES only included information in the proposal for technologies that had acceptable paybacks. The requests for information about more technologies came from participants who were interested in specific technologies that did not meet payback criteria and who therefore did not receive information about those technologies.

It is clear from our data that both groups of participants focused on the recommendations in the reports. Because of the replace-on-failure recommendations in the CEE reports were less specific about equipment, there was some complaint that the CEE recommendations were too general. Participants did not voice this complaint about the FES recommendations.

The Role of Savings Estimates in Proposals

Interestingly, participants in both programs gave only modestly positive and the lowest overall average ratings among all rated decision factors to the estimates of savings produced by the assessments. On a scale of one to ten where one was “not at all credible” and ten was “very credible,” CEE participants rated the credibility of the estimates as a 6.4. For FES, the estimated accuracy of the savings on a scale of one to ten where one was “very poor” and ten was “excellent,” was a 6.2. Although the two studies used different scale anchors, it appears that the two sets of respondents evaluated the estimates at about the same point on the scale. Many participants did not find the estimates credible or were clearly not more than modestly satisfied with the accuracy of the energy savings estimates. The savings estimates were an issue.

In the FES study, it was possible to examine factors that contributed to the overall satisfaction with the proposal. We regressed satisfaction with several factors, including ease of understanding the report, the amount of information the report contained, specificity of recommendations for equipment, rewards/rebates, accuracy of the estimated dollar savings, and accuracy of the estimated energy savings, on overall satisfaction. Eight-five percent of the variance in overall satisfaction with the proposal was explained by two factors, the estimated amount of energy savings and ease of understanding the report. Rewards/rebates were not a factor in satisfaction with proposal.

When the data were examined in more detail, the owners who had a single building assessed expressed higher levels of satisfaction with the overall proposals. The owners that had eight or more buildings assessed were less satisfied with the proposals than owners who had fewer buildings assessed except for the true partial participants.³ These owners were also less satisfied with the saving estimates and, except for the true partial participants, less satisfied with ease of understanding than other owners included in the analysis. The owners with eight or more assessments were less satisfied with the amount of information than three of the other four groups of owners as well. The owners who had more than eight assessments are mostly the largest property owners and, in our experience, are typically quite sophisticated with respect to analyzing investment opportunities than other property owners.

Finally, participants who implemented recommendations were asked what motivated them to implement them. Respondents could give multiple responses. Forty-two percent cited energy savings, 20 percent cited reduced energy costs, 28 percent cited improvements to buildings and equipment, and

³ The average satisfaction scores of the large owners and the true partial participants were the same.

28 percent cited the rewards or rebates. These data suggest that the energy savings estimates are an important key for deciding to implement.

To summarize the key findings:

- How information is received and is viewed varies systematically across different types of firms.
- More specific recommendations are better received than general recommendations.
- Concise recommendations are needed while extensive discussion of technologies and codes and standards are not needed and in some cases not well received.
- Satisfaction with proposals varied inversely with the number of assessments a firm had.
- Larger firms might like and be more receptive to a more sophisticated and well-presented energy analysis. The data imply that such a well-presented analysis would result in higher implementation rates.

What the Respondents Have Done in the Absence of the Program

A key question in programs such as these is what action respondents would have taken in the absence of the program. Would they implement efficient technologies or stick with existing technologies? We were able to examine this issue using the FES survey data. The short answer to this question is that what clients would do in the absence of the program varies by technology.

We assumed that decisions to implement are a kind of staged process. The first stage is whether the respondent knows about a technology or would ask for an efficient technology. The second is whether the respondent would install an efficient technology without a reward or rebate.

For each FES survey respondent, we named each high efficiency measure recommended for installation in a specific building. After each measure was named, we asked whether the respondent would have been very likely, somewhat likely, somewhat unlikely, or not at all likely to have asked for the measure in the absence of the program. After they answered the question, we used the same response categories and asked if they would have been likely to have installed the equipment without a rebate or reward.

Table 2 shows the responses for participants who installed different types of high efficiency equipment. The data reveal some interesting patterns. Six of the seven respondents, who said they installed a high efficiency boiler for heating, said that they would have been somewhat likely or very likely to have asked for that equipment without the program. Further, they said that they would have been very or somewhat likely to have installed that equipment without rebates.

Controls for heating systems show a pattern similar to that for the heating systems. Eight of 11 of the respondents who installed some form of control said that they would have been somewhat or very likely to have asked for the equipment in the absence of the program and the same numbers said that they would have been somewhat or very likely to have installed the equipment without the rebates.

Table 2 Respondents' Indicated Actions in the Absence of the Program

Respondent installed a:	Number saying they were somewhat or very likely to have asked for the equipment in the absence of the program	Number saying they were somewhat or very unlikely to have asked for the equipment in the absence of the program	Number saying they were somewhat or very likely to have installed the equipment with program but not rebate	Number saying they were somewhat or very unlikely to have installed the equipment with program but not rebate
High efficiency boiler for heating	6	1	7	0
High efficiency equipment for water heating	2	5	3	4
Heating system controls to improve efficiency	8	3	8	3
Efficient lighting equipment	3	10	4	9

Efficient water heating technologies are a different case. Only two of seven who installed efficient water heating technologies based on program recommendations said that they would have been likely or somewhat likely to have asked for the technology and only three of seven said that they would have been somewhat or very likely to have installed the technology without the reward.

The pattern for efficient lighting is similar to that for efficient water heating technologies. Only 3 of 13 who installed efficient lighting technologies said that they would have been somewhat or very likely to have asked for the efficient equipment and only 4 of 13 said that they would have been somewhat or very likely to have installed it without the rewards.

These data suggest that a majority of owners and managers who installed high efficiency heating equipment and controls would ask for and would install these pieces of high efficiency equipment in the absence of the program or rewards. On the other hand we found that a majority of owners/managers would not have asked for high efficiency lighting or water heating equipment without the program and would not have installed it without a reward or rebate.

One interpretation of these findings is that owners and managers of multifamily housing perceive the value and importance of technologies differently. Owners may perceive the operational costs of heating to be high and thus may be more interested in and more amenable to addressing this cost with equipment upgrades and controls. The operational costs of lighting and water heating may not be perceived to be as important and therefore owners/managers may be less interested and less amenable to addressing these systems. This is a hypothesis that will have to be tested more directly.

If this is the case, intervention strategies should focus on making sure that owners and managers who are replacing heating systems understand that efficient heating systems and controls are available so that they will ask for them. Contractors should be encouraged to promote them. A key finding from the FES study was that contractors, as opposed to owners, default to recommendations for standard efficiency equipment and/or equipment that is less costly. This finding also suggests that rewards are needed to encourage replacement of water heating and lighting systems. Owners and managers appear to be less attentive to these energy uses and need both the reinforcement of information and rewards to upgrade these technologies.

A Brief Word about Segments and Strategies

It is important to keep in mind that these programs targeted large multifamily rental properties that were likely to have central heating, water heating, and substantial common area lighting. Nationally, buildings with these characteristics are a sizable proportion of the multifamily market. For these properties, the owner receives the benefits from efficiency upgrades, which should make it easier to sell efficiency. National firms tend to be quite sophisticated about investments and will respond when there is a clear business case. However, their planning and decision-making tends to be somewhat centralized which may make them less responsive to local initiatives (Reed, et. al. 2002b; ADM, 2002a; ADM, 2002b)

We note that some large properties and especially some of the new larger properties that are being built are being designed with unit heating and water heating systems. Some large national developers have told us that they prefer not to be in the cooling, heating and water heating business and prefer that lessees be responsible for their own cooling, heating and water heating costs. The strategies used by CEE and FES are not as well suited to these situations because the benefits do not accrue directly to the property owner or managers who pays the utility bill. In general, the strategies that CEE and FES pursued are not likely to be effective in properties with distributed heating and water heating systems.

Summary and conclusion

In this paper we compared two approaches to increasing the energy efficiency that targeted larger multifamily properties where the building or buildings had central boilers or heating systems. Both programs offered owners assessments, recommendations, and rewards. One program approached owners directly. The other leveraged contacts with heating contractors to identify owners who were planning or executing changes to building systems. It was hypothesized that owners making changes to their buildings might be more receptive to efficient equipment upgrades and that they would increase the installation rate of efficient equipment. However, these two programs produced savings at about the same rate, forty percent of the estimated savings from recommended measures. Rather than the implementation rates for measures being consistently higher across the board for one or the other programs, implementation rates varied by measure between the two programs. We attribute some of this to the differences in how the two programs could achieve savings and how these contractors could demonstrate the success of their efforts.

Assessment reports that were concise and specific about equipment appeared to be more effective and better received than reports that contained substantial additional information. Replace-on-failure recommendations had a low implementation rate. This could be because insufficient time had passed for owner and managers to have the opportunity to implement such recommendations. However, only about half of the respondents had a plan for tracking such recommendations. Only one of 14 respondents indicated that he would definitely implement a replace-on-failure recommendation while eight of 14 indicated that they would definitely not implement such recommendations. The five remaining owners indicated that they did not know whether they would implement or not.

Rebates and rewards did not play a role in satisfaction with the proposals. Satisfaction and the credibility of savings estimates was the lowest rated attribute of the proposals. Estimated savings was one of two key factors determining satisfaction with the proposal and satisfaction with the program. Larger and more sophisticated owners rated satisfaction with estimated savings sharply lower and satisfaction with the proposal and program lower than other owners. Because of their sophistication and approaches to property management, they may want and need more accurate and more credible estimates of savings.

Our data suggest that most of the owners who installed heating and control measures would both have asked for and installed them in the absence of rewards from the program. They would not have

tended to ask for lighting and water heating equipment and they would not have tended to install these measures without rewards. Thus depending on the circumstances, rewards may or may not be necessary to achieve penetration in the multifamily market.

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