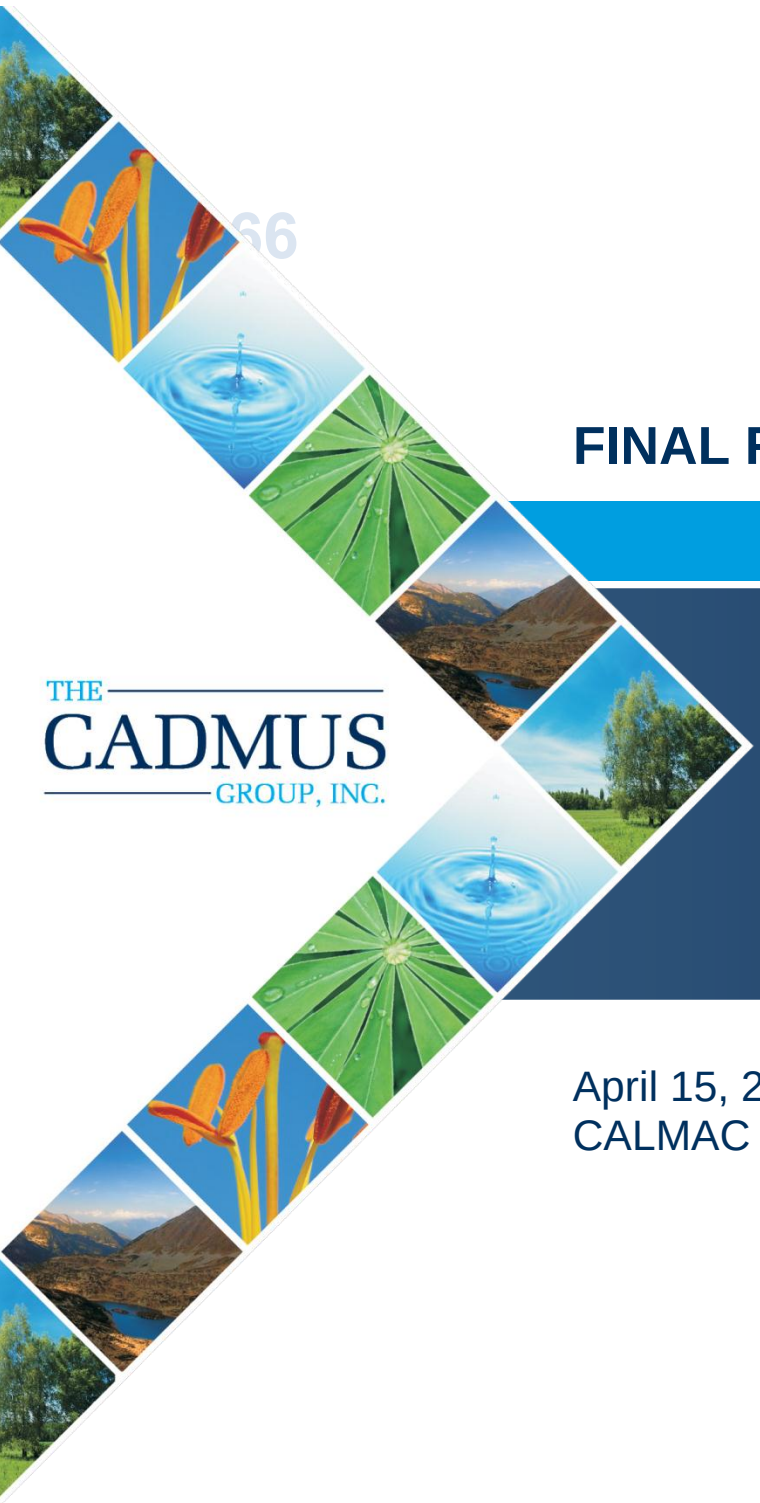

THE CADMUS GROUP, INC.

FINAL REPORT

2010-2012 PG&E & SCE Multifamily Property Owners & Managers General Population Survey Study

April 15, 2013
CALMAC # PGE301.02

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EXECUTIVE SUMMARY

PG&E and SCE (the IOUs) have sponsored a survey of the general population of multifamily property owners and managers. This was, in part, to support development of a standard approach to the measurement of awareness, knowledge, attitudes, and behaviors (akAB) among multifamily property owners and managers. Use of a standard approach is intended to facilitate the tracking of changes in akAB among energy-efficiency program participants, or in the population as a whole, for a particular segment of market actors. A second use of the survey was to support a process evaluation of the Multifamily Energy Efficiency Rebate (MFEER) Program and to provide insights into the structure and workings of this sector.

The Cadmus Group, Inc., developed and implemented a survey of multifamily property owners and managers in which a baseline of akAB was measured along with other characteristics of the sector. This is a report on the findings of that survey.

Study Objectives

The research reported here had the dual goals of determining the feasibility of the akAB approach and, if feasible, providing a baseline measurement on a sample of multifamily building operators from the general population. Cadmus' research entailed these activities:

- Develop a set of indicators of awareness, knowledge, and attitudes related to energy efficiency behaviors.
- Administer the items to a sample of 360 customers.
- Analyze results to determine whether the akAB items perform well.
  - Do they form scales capturing the intended concepts?
  - Is the model supported that relates awareness, knowledge, and attitudes to behaviors
- Establish a baseline measurement of akAB.
- Investigate relationships between akAB items and other business characteristics to deepen understanding of the distribution of cognitive and attitudinal perspectives in the market.
- Provide insights into the structure and workings of this sector. Special attention was given to the decision-making structure of businesses serving the multifamily sector and in particular to who has authority to make decisions regarding energy efficiency upgrades.
- Develop a set of metrics for use in the multifamily operator segment to track akAB over time.

The akAB Construct

The conceptual underpinnings of akAB are elaborated in Randazzo and Peters (2011). The basic construct is that a set of distinct, structured, and measurable social psychological dispositions lead decision-makers toward desired behaviors, such as the adoption of energy-efficiency measures.

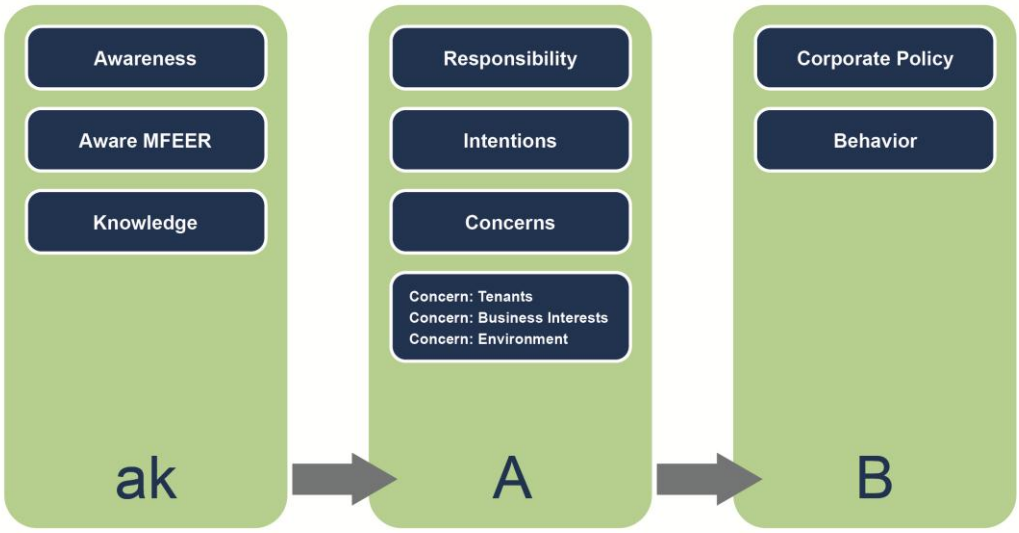
1. Developing ***awareness*** of and ***knowledge*** about the possibilities for gaining benefit through actions are the first steps in a decision-making process that leads toward

those actions.

2. Awareness and knowledge about actions must also be accompanied by positive ***attitudes*** that dispose a person toward the behavior. Attitudes are of two varieties:
    a. Concerns, which are motivational attitudes, define what is good to do.
    b. Attitudes of ***responsibility*** for doing the behavior oneself rather than expecting someone else to do it.
3. Supported by positive attitudes, the factors of awareness, and knowledge lead to the formation of an intention to act. This concept isolates a class of ***behaviors*** that are not automatic or unconscious; rather, they are deliberative and can be said to be part of a decision-making process.

Figure 1 shows the model we tested in the current research effort.

Figure 1. The akAB Model as Tested



We note that the use of knowledge-seeking in the model was something of a deviation, propelled by early evidence that direct indicators of knowledge *per se* were unlikely to provide a distribution of responses that would allow differentiation of respondents. The use of this proxy for knowledge means conclusions about this portion of the construct remain open to further testing.

Summary of akAB Items

For each of the concepts in Figure 1, Cadmus developed a set of items that provided an indicator of the underlying concept.

Awareness

- Awareness of five energy-efficiency programs
- Awareness of MFEER

Knowledge Seeking

- Has sought information
- Specific sources where information sought

Concern

- Importance of 10 factors in motivating respondent to make improvements in the property
- Importance to tenants that each of six types of equipment are energy efficient

Responsibility
Agreement with three statements expressing responsibility for decreasing energy use

Intention
Plans to take 10 actions to save energy within the next three years

Company Policy
Agreement with three statements related to the company regularly considering energy efficiency in decision-making

Behavior
Company has already taken each of 10 actions to save energy.

In addition to akAB items, our survey contained items intended to capture a number of other important characteristics of the property and the operating business.

- The number of units at the property
- Total number of units managed by the company
- The relationship of the respondent to the property (owner, manager, or owner/manager)
- Socioeconomic characteristics of tenants
- The decision-making process for investments in energy-efficiency upgrades
- Age of the building
- Basic details of HVAC and hot water equipment
- Responsibility for paying the cost of utilities

Survey Implementation

Gilmore Research, on behalf of Cadmus, administered the survey by phone to 363 owners and operators of multifamily properties on April 2012. Approximately half of the respondents (182) operate buildings served by PG&E and half (181) operate buildings served by SCE. A Spanish language version of the survey instrument was also developed to accommodate Spanish-speaking respondents.

Evaluating the akAB Conceptual Scheme

Correlation Analysis

Correlation analysis partially supports the akAB model. Some of the expected relationships are borne out; other correlations are either not statistically significant or very weak. A correlation matrix of Pearson's *r* statistics is shown in Table 1, and the shaded cells are significant and non-trivial. Note that the awareness and knowledge indices are not well correlated with attitude indices.

Table 1. Correlations Among akAB Items

	Knowledge	Awareness	Aware MFEER	Concern	Responsi-bility	Intention	Company Policy	Behavior
Knowledge	1.00							
Awareness	0.25	1.00						
Aware MFEER	0.23	0.35	1.00					
Concern	0.06	0.08	0.11	1.00				
Responsibility	0.18	0.11	0.12	0.53	1.00			
Intention	0.10	0.06	0.10	0.34	0.35	1.00		
Company Policy	0.28	0.12	0.21	0.36	0.47	0.22	1.00	
Behavior	0.34	0.32	0.27	0.22	0.34	0.11	0.44	1.00

A Regression Test of akAB

As a second test of the akAB conceptual scheme, we ran an Ordinary Least Squares regression to determine whether the akA indices can be used to predict behaviors. Table 2 shows the regression fit statistics for a refinement of the basic model.

Table 2. Regression Fit Statistics

Statistic	Value
F – Value (P-value)	39.57 (<.0001)
R-Square	0.3183

Table 3 shows the parameter values and significance.

Table 3. Final Regression Model of akA Indices Predicting Behavior

Variable	Parameter Estimate	Standard Error	T-Statistic	P-Value	Standardized Estimate
Intercept	-0.0047	0.0337	-0.32	0.7529	0
Knowledge	0.0303	0.0089	3.84	0.0001	0.1837
Awareness	0.2156	0.0416	5.44	<0.0001	0.2498
Responsibility	0.1170	0.0426	2.38	0.0178	0.1212
Company Policy	0.2238	0.0377	5.80	<0.0001	0.3022

The regression model lends support for a reduced set of akA predictor variables. The parameter estimates of the final model indicate that all of the independent variables are highly significant. Of the akA variables, company policy has the largest impact on behavior, followed by awareness and attitude. This relative impact is indicated by the relative size of their standardized estimate.[1]

Correlates of akAB

Cadmus investigated a series of structural variables for their relationship with akAB:

- The total number of units managed by the company managing the property sampled for the survey
- The socioeconomic status of tenants at the sample property
- The structure of decision-making at the company
- Past participation in the MFEER program

Our investigation of correlates of the akA indices has yielded mixed results, which are summarized in Table 4.

Table 4. Summary of Correlates of the akA Indices

Correlate	Awareness	Knowledge	Responsibility	Company Policy
Company Size	+	+		+
Tenant SES				
Decision-Making	+			
MFEER Participation		+	+	+

Program Performance Metrics

Based on the discussion of desirable qualities, Cadmus proposes that a modified Knowledge index, the Responsibility index, and the Company Policy could be adopted as possible PPMs. We are not proposing Awareness as a PPM for reasons discussed below.

Awareness

Awareness, which is well correlated with behavior, performed well in our regression model. There is good face validity for asserting that people who are aware of more energy-efficiency programs are more attuned to the issues and, thus, more likely to undertake the desired set of behaviors.

It would seem likely that the list of programs asked about for this index will change over time and that the implications of not knowing about one or more items would not be constant. A second problem with Awareness is that there is no significant difference in the average score of program participants and nonparticipants.

[1] Standardized estimates allow analysts to evaluate the impact and magnitude each independent variable has on the dependent variable by putting all variables into standardized form, that is, with a common metric. Once in standardized form, the variables' parameter estimates can be directly compared to each other. The variable with the largest standardized estimate has the largest impact on the dependent variable.

If contact with the program is not related to this index, it seems unlikely the program can influence it. Indeed, it would seem less than efficient for programs to expend resources promoting programs other than their own. Thus, although awareness fits well within the akAB framework, it does not seem suitable as a PPM.

Knowledge Seeking

Knowledge seeking is well correlated with the performance of energy efficiency behaviors. It performed well in our regression model so, again, there is good face validity for asserting that people who seek information about energy-efficiency programs are more likely to act on the information they receive. We believe knowledge-seeking is something programs can reasonably be expected to promote through outreach to customers, thereby, increasing awareness. Thus, we tentatively recommend the Knowledge index as a PPM.

Responsibility

Responsibility performs slightly less well than knowledge in the correlation and regression analyses, but it still firmly supports the akAB scheme. It would seem that the sense of responsibility for energy efficiency would be a significant challenge for programs to influence. Nevertheless, because of its good showing within the akAB scheme and the face validity that responsibility is related to behavior, we tentatively recommend the Responsibility index as a PPM.

Company Policy

Company policy reflects the average rate at which companies adopt three policies favorable to energy-efficiency behaviors. This index has the best empirical relationship with behavior, and the causal relationship has high face validity. As currently designed, however, there is little room for improvement on this metric because the average score is already 0.74 out of a maximum 1.0. Also, we see little opportunity for programs to affect this index. We recommend that items for a Company Policy index be refined in an effort to achieve greater variance among responses.

Recommendations

Based on the findings of our research, Cadmus makes the following recommendations.

- Combine akAB research with additional research into decision-making
- Establish three standard indicators for future tracking
- Clarify the intended application of PPMs related to akAB
- Develop akAB PPMs that are more specific to programs

INTRODUCTION

PG&E and SCE (the IOUs) have sponsored development of a standard approach to the measurement of awareness, knowledge, attitudes, and behaviors (akAB) among different segments of their customers. Use of a standard approach is intended to facilitate the tracking of changes in akAB among energy-efficiency program participants, or in the population as a whole, for a particular segment of market actors.

The California Public Utilities Commission (CPUC) has indicated that an increase in awareness of energy efficiency (broadly construed) and an increased knowledge of and positive attitudes toward energy efficiency are conditions that favor desired behavioral outcomes and market transformation. Because market transformation is an important goal of the energy-efficiency programs funded by the California IOUs, the CPUC has required that such programs develop program performance metrics (PPMs) related to akAB.[2]

The effort to develop a model of the relationship among these proximate indicators of market transformation is discussed in a recently published akAB white paper, "Reconsidering What We Measure: A White Paper, Parts I & II" (Randazzo and Peters, 2011). Part I of this white paper discusses akAB with respect to home owners and renters; Part II discusses akAB with respect to multifamily property owners and operators.

As part of this ambitious research effort, The Cadmus Group, Inc., developed and implemented a survey of multifamily property owners and managers in which a baseline of akAB was measured. In collaboration with the white paper authors, Cadmus developed a survey instrument that measured each of the akAB elements. We then implemented the survey with a sample of multifamily property operators (owners and managers) in the PG&E and SCE territories.

We analyzed the results to determine: (1) whether the cognitive and attitudinal items (akA) form reasonable scales; and (2) whether they are predictive of behaviors. From this analysis, we developed a set of PPMs that can be used to track progress in the multifamily operator market relative to akA.

We also investigated the relationship between akAB and a set of business characteristics—specifically, the number of units managed, the socioeconomic status of tenants, and the decision-making structure. Our goals for this analysis were to: (1) help programs target their marketing efforts; and (2) provide context that would aid in explaining the distribution of akA in the market.

The research reported here is only part of a broader study conducted by Cadmus for the IOUs in 2011 and 2012. In addition to a survey of the general population of multifamily property operators, we conducted a process evaluation of the Multifamily Energy Efficiency Rebate program (MFEER). Our process evaluation entailed a literature review, a market characterization effort, and focus group research with participants. Our research included in-depth interviews

[2] As we understand it, the idiosyncratic capitalization of the acronym "akAB," which we have adopted from Randazzo and Peters, is intended to capture the intertwined, difficult-to-separate character of awareness and knowledge as they feed into the motive-driven relationship between attitudes and behaviors.

with program implementers and with decision-makers at large property management companies. To a degree, the process evaluation research has contributed to the current report. However, to an even greater degree, the general population study contributed to the findings of the MFEER program process evaluation. Above all, the general population survey findings represent the nonparticipant sample that is often included in process evaluation research.

The goals of the akAB research have a broader purview than the MFEER program: the entire market segment and participants in future as-of-yet un-designed programs. Thus, another function of this report is to present the entirety of findings from the General Population Survey. Some of these findings, as well as additional research into the characteristics of the multifamily market, are reported in "2011-2012 PG&E and SCE Multifamily and Mobile Homes Programs Process Evaluation Findings" (Rambo and Dethman, 2013).

Study Objectives

The Cadmus research reported here had the dual goals of: (1) determining the feasibility of the akAB approach, and if feasible, (2) providing a baseline measurement on a sample of multifamily building operators from the general population. Specifically, the activities of the research were as follows.

- Develop a set of indicators of awareness, knowledge, and attitudes related to energy-efficiency behaviors appropriate to the multi-family property operator market segment.
- Determine—through the administration of items to a sample of customers—whether the akAB items perform well. That is, do they form scales capturing the intended concepts? Do the results support the model that relates awareness, knowledge, and attitudes to behaviors?
- Develop a set of metrics for use in the multifamily operator segment to track akAB over time
- Establish a baseline measurement of akAB.
- Investigate relationships between akAB items and other business characteristics to expand the understanding of the distribution of cognitive and attitudinal perspectives in the market.

In parallel with the survey of the general population, Cadmus conducted a survey of participants in the MFEER programs of PG&E and SCE. Most of the akAB items were included in this survey so, for the purposes of comparing participants and nonparticipants with respect to their akAB index scores, we combined these two samples. For the majority of the analysis, however, we did not combine samples because: (1) of the difficulty in weighting the combined sample results to the population, and (2) a small number of akAB items were not included in the MFEER survey.

Decision-Making in the Multifamily Operator Market

Decision-making in the multifamily operator market is subject to complexities that are (in many ways) missing from the home owner and renter market. To be sure, the decision-making of households often has a social, negotiated quality—as when spouses must come to agreement regarding home upgrades. However, decision-making among multifamily operators happens

within a business context, which tends to vary from something nearly indistinguishable from family decision-making (typically occurring in the smallest businesses), to something that is highly formalized and rationalized (as in hierarchical decision-making among large corporate operators).

Although there are many more small operators than large ones, more total units are operated by the large owners or managers than by small operators. Given the formal and rational decision-making typically done within large businesses (usually dominated by a motive of profitability), it is reasonable to ask whether akA are essential elements in an understanding of relevant behaviors—the decision-making relative to energy-efficiency upgrades—within these organizations. Randazzo and Peters argue forcefully that it is. While the current research does not resolve the issue, the resulting information helps establish metrics that will, in time, shed light on the question.

In theory, a distinction could be made between two categories of decision-making in this market:

- Operators who make decisions solely on the basis of financial return but who conceive that customer attitudes require them to engage in energy-saving behaviors to secure those returns; and
- Operators who have themselves internalized attitudes that favor energy-efficiency behaviors for reasons extrinsic to financial return.

In practice, it may not be possible to isolate these two orientations except as a matter of emphasis. In either case, behaviors are predicated on: (1) awareness of and knowledge about energy efficiency, and (2) the formation of a positive attitude toward the behavior. Thus, a set of indices may help target efforts to shape behavior even without a full understanding of the complex processes behind decision-making. It is with this expectation that Cadmus pursues the research.

The akAB Construct

The conceptual underpinnings of akAB are elaborated in Randazzo and Peters (2011), so that paper should be consulted as background for this report. The basic construct is that a set of distinct, structured, social psychological dispositions lead decision-makers toward desired behaviors, such as the adoption of energy-efficiency measures.

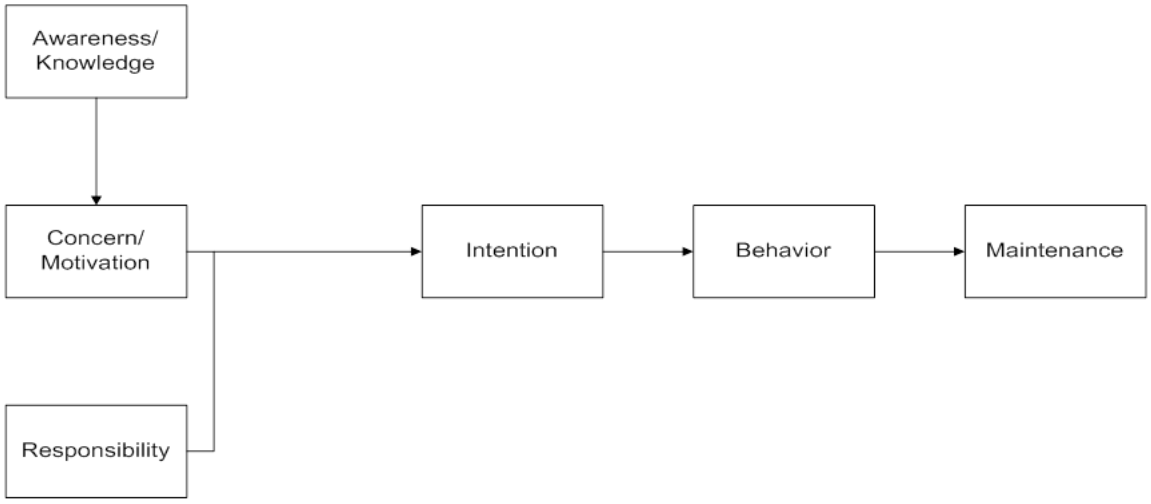
1. Developing ***awareness*** of and ***knowledge*** about the possibilities for gaining benefit through actions are the first steps in a decision-making process that leads toward those actions.
2. Awareness and knowledge about actions must also be accompanied by positive ***attitudes*** that dispose a person toward the behavior. Attitudes are of two varieties: (1) concerns, or (2) motivational attitudes define what is good to do.
3. Accompanying those attitudes must be a corollary attitude of ***responsibility*** for doing the behavior rather than leaving that responsibility to someone else.

4. Supported by positive attitudes, having awareness and knowledge lead to the formation of an intention to act. This concept isolates a class of ***behaviors*** that are not automatic or unconscious but are deliberative and can be said to be part of a decision-making process.

Figure 2 reproduces a basic model of energy-related decision-making, as presented by Randazzo and Peters. Although the arrows in this diagram imply a single direction of cause, the authors acknowledge that there are feedbacks between all of the boxes. Thus, behaviors may reinforce attitudes, for instance, or may undermine them, depending on subsequent outcomes.

- The box on the upper left represents "ak" in the akAB conceptual framework.
- The center and lower boxes on the left side represent the two types of attitudes.
- On the right are energy efficiency-related behaviors and a second set of maintenance behaviors that both follow initial decision-making and maintain the effect of the original behavior.

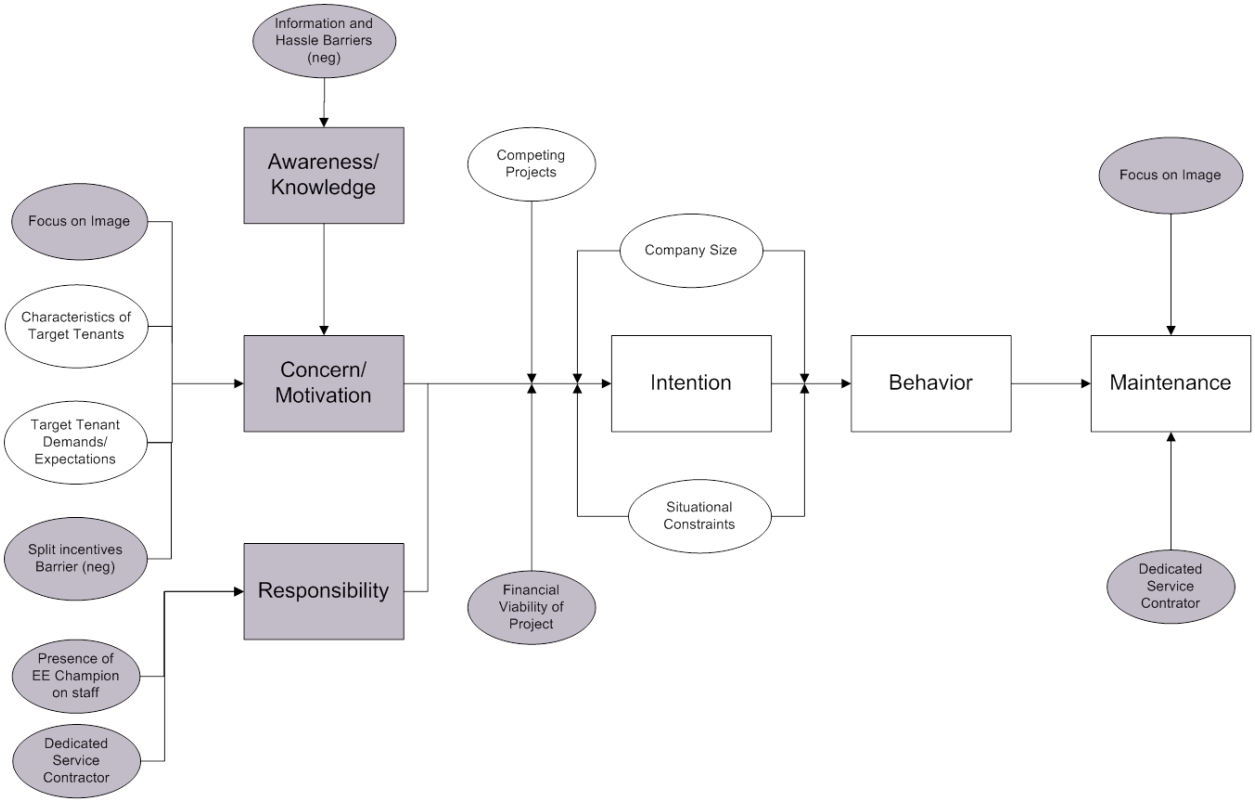
Figure 2. Basic Model of Energy-Related Decisions[3]



While Figure 2 is general enough to apply across a wide variety of circumstances, Figure 3 (also reproduced directly from the Randazzo and Peters white paper) shows a more elaborate form of the akAB construct, as it contains additional inputs specific to the multifamily operators' market. It also includes a variety of structural factors that impinge on decision-making.

[3] Randazzo and Peters. 2011. P. 52.

Figure 3. Elaborated Model of Multifamily Owners'/Managers' Energy-Related Decisions[4]



akAB as Tested

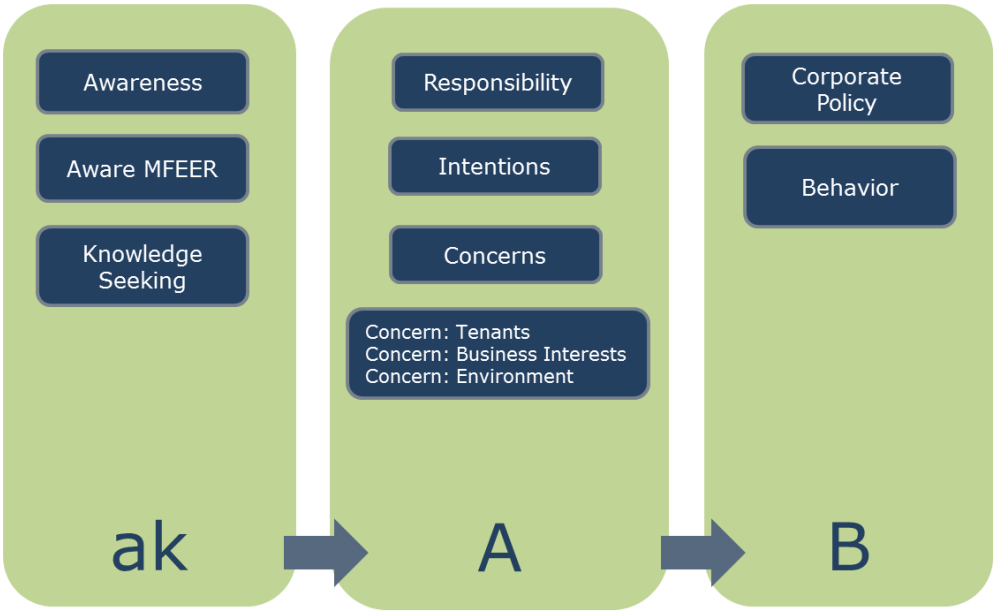
While the elaborated model is conceptually more appealing, it was too complex to explore fully within a single survey instrument.

Figure 4 shows the model Cadmus tested in the current research effort. Ours is essentially the same as the basic model presented by Randazzo and Peters, but we made these slight modifications.

- Elements are arranged to be consistent with the akAB schema;
- The specific categories of concern explored in the survey are identified;
- Intentions are included along with attitudes (although these are arguably a distinct psychological category);
- "Maintenance" is replaced by "Company policy" and, in particular, those policies related to ongoing efforts to save energy and adopt efficient measures.

[4] Randazzo and Peters. 2011. P. 53.

Figure 4. The akAB Model as Tested



To test the construct, Cadmus developed survey items intended to capture each of the components as it pertains to multifamily building operators. We then looked for evidence that both having awareness and seeking knowledge of energy efficiency *and* holding energy-efficiency related attitudes are each related to having undertaken energy-efficiency behaviors in the recent past. We present details of our approach and our findings in the sections that follow.

One significant change made to the akAB conceptual scheme that we tested, compared to the scheme as developed by Randazzo and Peters, was the substitution of a proxy concept for "knowledge." Pretesting of knowledge items by Randazzo and Peters on single family owners and renters indicated that it is problematic to develop of a set of knowledge items that discriminate among respondents. Items developed for that research were all easy enough that nearly all respondents answered correctly. We were not able to develop an alternative set of items that seemed more likely to discriminate well--the alternative to overly easy items seems to be development of very technical items, which can be answered only by a very few respondents. Since our budget for pretesting items was quite limited, we substituted knowledge-seeking items with the thought that pursuing knowledge would be correlated with holding knowledge, however difficult it is to ascertain what the knowledge is within the context of a telephone survey.

METHODS

To further the akAB research effort, Cadmus developed and implemented a survey of multifamily property owners and managers in which a baseline of akAB was measured. As mentioned in the introduction, we analyzed the results to determine:

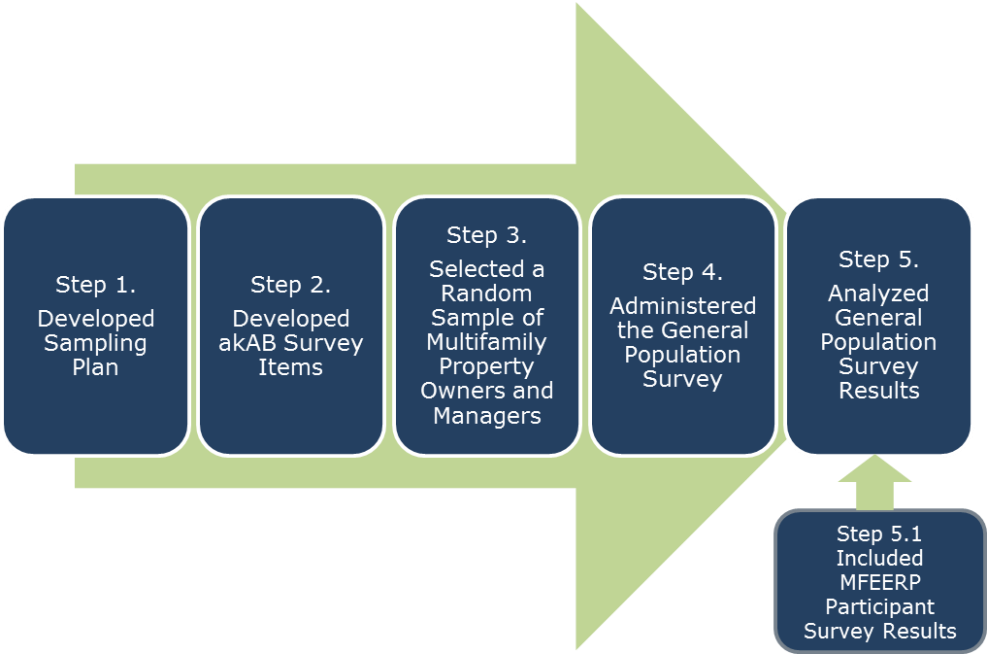
- Whether the cognitive and attitudinal items (akA) form reasonable scales; and
- Whether they are predictive of behaviors.

From this analysis we developed a set of PPMs that can be used to track progress in the multifamily operator market relative to akA.

We also investigated the relationship between akAB and a set of business characteristics—specifically, the number of units managed, the socioeconomic status of tenants, and the decision-making structure. Our goals for this investigation were to: (1) help programs target their marketing efforts, and (2) provide context that would aid in explaining the distribution of akA in the market.

Our research project followed the steps shown in Figure 5. In addition to the data collected for the general population survey, we looked for differences between participants and nonparticipants by including data from a survey of Multifamily Energy Efficiency Rebate Program (MFEER) participants.

Figure 5. Research Project Steps



Sample Design

A typical sample design for conducting research with multifamily property owners and managers begins with a purchased list of property management companies, supplemented by association lists and other sources. However, there can be no pretense that such lists provide a comprehensive sampling frame.

The sample for Cadmus' research was designed around customer account data provided by each utility. To identify distinct properties and to obtain an estimate of the property size, we matched multifamily residential accounts at a given address to common area accounts at that address. The matching of addresses tends to be difficult because a significant number of apartments cannot be linked to a common-area meter. From our review of the data—which entailed looking up unmatched addresses on various mapping resources—these unmatched apartments tend to be in small buildings with few units.

Although some bias may be introduced though these unmatched records (for which we have no owner to contact), we had no shortage of small properties in our sample. In some cases, a single property (from the standpoint of the owners) might have multiple common-area meters at different addresses, each associated with a subset of apartments. To our sample, these would appear to be different properties.

We combined properties into management units by matching company names and billing addresses. Again, this is not a perfect process for finding common management companies, as there were cases where multiple company names were located at the same billing address. We treated these as different companies when the contact information for the two companies was different. By summing units for all properties with a common utility billing address, we estimated the number of units managed by that entity.

We expect that in some cases, the billing address was a regional office of a larger company, but we did not try to aggregate to this larger scale because the information that would allow us to do that was too imperfect. We describe our method of developing a sample frame in Appendix B.

We treated the billing address as the sampling unit, and we sampled with a probability of inclusion proportionate to the number of units managed at each billing address. Thus, if our sampling frame had been perfect, each unit would have had an equal probability of being included in the sample. Because we sampled with a probability proportionate to size, we did not stratify the sample by size. The majority of the survey items were related to a specified property, so for each sampled billing address, we randomly selected a property about which to enquire.

In many cases and for many kinds of decisions, the property is the unit of decision-making. Even where decisions are made by managers of multiple buildings, we did not want to assume that decision-making would be the same for all buildings managed. Consequently, when contacting the billing address, we asked to speak to the person who "who makes decisions about building and equipment upgrades to the property and rental units" at a specific address.

For the purposes of investigating differences between MFEER program participants and nonparticipants, we included a sample of 210 program participants from the PG&E and SCE territories. This was a stratified random sample drawn from the lists of program contacts. Three

strata were defined by the median rent paid within each ZIP code, and we sampled equally into high, medium, and low rent strata.

Generalization to the Entire Market

Because of the complexity inherent in multifamily market sector, generalization of the results of our survey to the sector as a whole becomes problematic. Our sample is designed around the property; yet in conducting a survey we must speak to a person, to a decision-maker, who makes decisions for the sampled property—possibly not with complete autonomy—but may also make decisions for other properties. What weight, then, should we apply to the responses of a given decision-maker, to correctly capture the state of the entire market? The complexity of the sector has led us to use two different approaches.

Unweighted, we conceive the results of our survey to reflect the distribution of decision-makers within the sector. Inasmuch as the market is a population of decision-makers, this is the more appropriate approach. There are many more decision-makers operating within small companies than within large companies, however, with more *units* controlled by a relatively small number of decision-makers within large companies. So, inasmuch as the market consists of a population of rental units, the unweighted approach gives too much importance to small-scale decision-makers. To account for the market as a pool of units and associated common areas from which energy savings can be derived, it is more appropriate to weight survey responses by the size of the company for which the respondent works.

In the survey, we asked respondents how many units were present at the address that had been sampled. We also asked how many other units were owned or operated by the company for which the respondent works. For our weighted survey results, we treated the total number of units managed at the company as the response weight. Thus, a respondent who works for a company that manages four units has 1/1,000 the weight of a respondent working for a company that manages 4,000 units.[5]

Again, we conceive the unweighted results to reflect the population of decision-makers, and the weighted results to reflect the population of housing units. Other weighting schemes could be conceived, such as weighting by the number of units managed by each respondent across one or more properties. Our survey did not ask for this information, however; moreover, conceiving the population that this scheme would represent is more difficult. The two approaches presented in our research are, in effect, the two most extreme possibilities. The difference between weighted and unweighted results is most noteworthy in relation to the structure of decision-making at the respondent's company. For the awareness, knowledge, and attitude items, we found only a few important differences between weighted and unweighted data, especially related to knowledge-seeking and awareness.

[5] Because these are extremely unequal weights, the results must be interpreted with caution. For instance, using the weighted data, the respondents from the four largest companies count more heavily than respondents from the smallest 339 (out of 362!) companies. Thus, in using the weighted data the random error around the largest operators' responses is greatly increased relative to error around the others.

Development of akAB Items

In developing a set of akAB items for multifamily property operators, Cadmus worked closely with the team developing the akAB survey items for homeowners and renters. Our goal was to make the two sets of items as compatible as possible, given the different sectors we were addressing. For instance, we coordinated with the other research group to establish a common 11-point scale to be used on ratings.

In addition to having developed the original conceptual framework, the homeowner/renter team was working in advance of the progress of the multifamily operator research. Thus, we were able to take advantage of lessons that team was learning as the research progressed. For instance, responses to a homeowner/renter pretest of energy-efficiency knowledge items suggested it was difficult to construct questions that were not highly skewed in the responses received and, hence, of little use for predicting behavior. As a result, we developed items about knowledge-seeking rather than attempting to gauge the factual knowledge held by survey respondents.

Table 5 shows all akAB items used. (The full survey instrument is presented in Appendix C.)

Table 5. Summary of akAB Survey Items

Concept	Item
Awareness	*Which of the following labels or programs for energy efficiency have you heard of? [Answer: Yes or No]*
	• ENERGY STAR
	• ENERGY STAR MOST EFFICIENT
	• Flex Your Power
	• Top Ten
	• Energy Upgrade California
	Are you aware that [SCE/PG&E] offers multifamily property owners and managers rebates and incentives for installing high efficiency equipment and other energy efficiency upgrades through its Multifamily Energy Efficiency Rebate Program? [Answer: Yes or No]
Knowledge Seeking	*Have you ever looked for information or help on how to make your rental property more energy-efficient, such as looking for information on high efficiency appliances, lighting, or insulation? [Answer: Yes or No]*
	When looking for information or help on how to make your rental property more energy efficient, what sources have you used? [Open Ended, Multiple Responses]
Attitudes: Concerns	*Using a scale of 0 to 10 where 0 means Not at all Important and 10 means Very Important, how important are these factors in motivating you to make improvements to your property?*
	• Attracting tenants
	• Retaining tenants and keeping them happy
	• Reducing tenant utility costs
	• Making the property safer for the tenants
	• Demonstrating your properties are well maintained
	• Needing to replace equipment
	• Reducing owner operating costs
	• Increasing the value of your property
	• Doing the right thing for the environment or being greener
	• Saving energy
	• Increasing the rent value

Concept	Item
	• Receiving free lighting or rebates to lower the cost of new equipment
	• Meeting code requirements

Table 5. (continued)

Concept	Item
Attitudes: Tenant Concerns	*Using a 0 to 10 scale where 0 means Not at all Important, and 10 means Very Important, how important is it to your tenants that your company has high efficiency versions of these types of equipment in your buildings and units?*
	• Lighting in common areas
	• Lighting in units
	• Washing machines
	• Refrigerators
	• Heating systems
	• Air conditioners and other cooling systems
Attitudes: Responsibility	Finally, please rate how (you, as the owner / the owners of the property) at [SERVICE ADDRESS] view using energy at that property. Using a scale from 0 to 10, where 0 means do not at all agree and 10 means strongly agree, how much do (you / the owners) agree with each of these statements?
	• Feel a responsibility to decrease the energy use at this property in order to protect the environment.
	• Feel a responsibility to decrease energy use at this property in order to reduce greenhouse gasses.
	• Feel a responsibility to decrease energy use at this property in order to reduce energy costs.
Attitudes: Intentions	*For each of the following specific energy saving actions at the [ADDRESS] location, is your company planning to take that action within the next three years? [Answer: Yes or No]*
	• Install energy efficient lighting for common areas/outdoors
	• Install energy efficient cooling equipment for common areas
	• Install energy-efficient heating in property
	• Install more energy-efficient clothes washers for the common area
	• Increase the energy efficiency of the property shell, such as putting in insulation
	• Had a whole property energy audit performed by a building professional
	• Increase the energy efficiency of appliances in tenant units
	• Install more energy-efficient lighting in tenant units
	• Market your properties as being energy efficient
	• Provide prospective tenants the average electric and gas bills for units before they rent
Behaviors	*For each of the following specific energy saving actions at the [ADDRESS] location, is your company planning to take that action within the next three years? [Answer: Yes or No]*
	• Install energy-efficient lighting for common areas/outdoors
	• Install energy-efficient cooling equipment for common areas
	• Install energy-efficient heating in property
	• Install more energy-efficient clothes washers for the common area
	• Increase the energy efficiency of the property shell, such as putting in insulation
	• Had a whole property energy audit performed by a building professional
	• Increase the energy efficiency of appliances in tenant units

Table 5. (continued)

Concept	Item
Behaviors (continued)	• Install more energy-efficient lighting in tenant units
	• Market your properties as being energy efficient
	• Provide prospective tenants the average electric and gas bills for units before they rent
Company Policy (Maintenance	*Would you say your company always, often, sometimes, or never considers energy efficiency when deciding to make improvements for your property (ies) that would affect its/their energy use? This might include the efficiency level of appliances and lighting or changes to doors, windows and the building's insulation.*
	And, as a routine part of your company's property maintenance, does your company take steps to make sure the property is operating as energy efficiently as possible—such as changing furnace filters or weather-stripping doorways?
	Are energy-efficient HVAC and building improvements considered part of keeping your tenants comfortable?

In addition to akAB items, our survey contained items intended to capture a number of other important characteristics of the property and operating business.

- The number of units at the property
- Total number of units managed by the company
- The relationship of the respondent to the property (owner, manager, or owner/manager)
- Socioeconomic characteristics of tenants
- The decision-making process for investments in energy efficiency upgrades
- Age of the building
- Basic details of HVAC and hot water equipment
- Responsibility for paying the cost of utilities

Survey Implementation

On behalf of Cadmus, Gilmore Research administered the survey by phone to 363 owners and operators of multifamily properties during April of 2012. Approximately half of the respondents (182) operate buildings served by PG&E and half (181) operate buildings served by SCE. A Spanish language version of the survey instrument was also developed to accommodate Spanish-speaking respondents.

FINDINGS FROM THE MULTIFAMILY OWNER AND OPERATOR SURVEY

The General Population Multifamily Property Owner Survey included items on the following topics.

- The structure of the operating company of the respondnet
    - size of the property and company
    - The respondent's relationship to the property as owner or manager
- Decision-making
- Occasions when management has access to tenant units
- Site characteristics
- Respondent awareness, knowledge, attitudes, and behavior
- Perceived tenant concerns

As noted above, we present the findings using both unweighted data, which represents the population of decision-makers, and with weighted data which reflects the population of tenant units. The need for this weighting scheme is highlighted when we consider the structure of companies that operate multifamily properties.

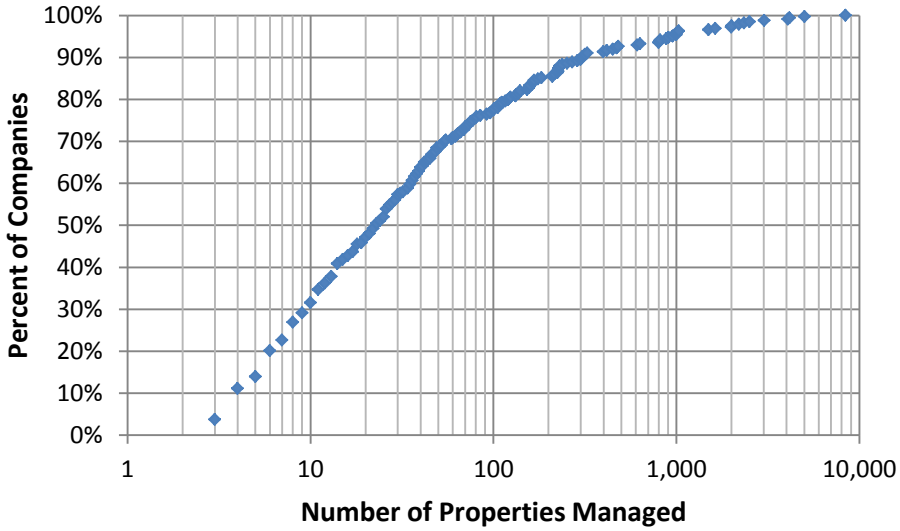
The Structure of Operating Companies

Estimates of the number of entities owning and managing multifamily properties in California are difficult to obtain. Surveys of households, which provide useful information about the number of units within buildings, cannot be used to identify company size because household respondents do not reliably have this information. In the *Multifamily Energy Efficiency Rebate Program Process Evaluation and Market Characterization Study*, Oh et al. (2002) report that, nationally, the top 50 multifamily companies own or manage about 2.5 million units. They further estimate that 5% of multifamily rental operators control as much as 75% of the market. Oh et al. describe a California market that is dominated by large companies. Based on the earlier ADM/TecMarket research—indeed, several authors contributed to both studies—they repeat the view that slightly fewer than half of all units in California are in complexes of 101 units or more. They argue that this points to a large concentration of control by a relatively small number of companies.

The multifamily owner and operator general population survey provides some insight into the size of companies operating in PG&E's and SCE's territories. Figure 6 shows the distribution of company size among survey respondents, defined by the total number of units managed. These results should be interpreted with caution, because we suspect a non-response bias that increases the likelihood that operators of small and medium-size companies were more likely to respond to the survey than operators of the largest companies. Nevertheless, what we observe in the data is significant concentration of the market in the control of large operators. For instance, the 20% of respondents at the bottom of the size distribution, representing 65 companies, collectively manage 295 units. The next quintile (21% to 40% in terms of size) manages 686 units. The third and fourth quintiles manage 1,413 and 4,231 units, respectively. The top quintile, representing

the largest companies, manages 58,828 units. The top 5% of companies manage 41,838 units. That represents 64% of the total units managed by respondents to the survey.

Figure 6. Distribution of Company Size among General Population Survey Respondents



Decision Making

Oh et al. identify four market segments among multifamily property operators, representing different, partially overlapping scales of operation and different decision-making structures.

- **Small operators** have fewer than 70 units located in one or more buildings. Typically, these owners have other employment. The owners themselves conduct much of the maintenance. It is unlikely they have on-site personnel to manage buildings. These operators are often strained by the time commitment involved in managing and maintaining their properties on a part-time basis.
- **Mid-sized operators** own or manage as many as 500 to 1,000 units. The owner is likely to be involved full-time in the business. The owner probably hires at least one paid staff person or contracts maintenance to another company. The buildings operated in this segment tend to have more units, likely to be in the range of 20 to 150 units. Toward the upper end of this segment, operators may hire others to manage the properties, creating a hierarchy of decision making related to building maintenance and other decisions.
- **Large operators** own and manage more than 270 units, with an upper range in the tens of thousands of units. The largest firms may operate complexes in several states or even nationwide. Large firms may specialize in high-rise or suburban properties. Large firms may be involved in the development of properties in addition to their operation. Large operators are more vertically structured, with several layers of management. A maintenance manager may oversee one or more properties. Some companies may have technology standards that site managers are required to follow.

- **Large fee property managers** specialize in multifamily property management for a large numbers of owners. In many cases, these companies are structured like the large operators. This type of arrangement adds an additional layer in the hierarchy of management, however, because capital projects must gain approval of the property owner.

In an effort to gain greater insight into the decision-making process in the market, we asked respondents to the general population survey, "When you want to make improvements in the rental units or to the property itself at the [ADDRESS] location, or when you purchase new equipment at that site, are you usually the only person involved in the decision or are others involved?" In the unweighted data, reflecting the population of decision makers, 62% of respondents said they were the only person involved. The weighted data, reflecting the population of dwelling units, presents a much different picture with only 27% saying they are the only person involved and 72% of respondents saying others are involved in decision making. This is reflected in Table 6 in the column labeled "Marginal %," comparing the weighted and unweighted percentages.

Cadmus also looked at the frequency of decision-making autonomy by the relationship of the respondent to the property. The weighted verses unweighted analysis indicates big differences in specific decision-making autonomy and property relation categories. When units were managed by a non-owner, 35% required another person involved to make decisions compared to only 11% of total respondents. Only 9% of the weighted responses had autonomous decision makers, who both owned and managed the property. Table 6 shows the percentage of autonomous and non-autonomous decision makers, by the respondents' relationship to the property; that is, owner, manager, or both.

Table 6. Decision-Making Autonomy by Relationship to the Property

Decision-Making Autonomy Weighted	Owns	Manages	Own and Manage	Marginal %
Others Involved	25%	70%	78%	72%
Self Only	75%	30%	20%	27%
Family Member	0%	0%	2%	1%
Marginal %	4%	50%	46%	100%
Unweighted				
Others Involved	18%	65%	24%	30%
Self Only	76%	35%	65%	62%
Family Member	6%	0%	11%	8%
Marginal %	17%	17%	66%	100%

We probed further on the question of decision-making autonomy among those who said others were involved. We asked respondents to name the person who would make the final decision for purchases that cost less than $1,500, again for purchases that cost more than $1,500, and again for purchases that cost more than $10,000. Table 7 shows the weighted and unweighted results.

Table 7. Decision-Making Authority at Different Decision Costs

Decision Making Authority			
Weighted	< $1500	> $1500	> $10,000
Self Only	61%	57%	42%
Self and Others	1%	1%	0%
Others Only	38%	42%	58%
Unweighted			
Self Only	74%	72%	71%
Self and Others	5%	5%	4%
Others Only	21%	23%	25%

Cadmus discerned little difference within the weighted and unweighted groups, but found notable differences between the weighted and unweighted groups. All three purchase categories have an increased frequency of others involved in the weighed analysis. The largest difference in the "others-only" category is when the final decision is over $10,000. Fifty-eight percent of weighted responses have others involved over $10,000, while only 25% of unweighted responses indicated others were involved. At the same $10,000 purchase level, 42% of weighted responses have a sole autonomy decision maker, compared to 71% of unweighted responses. These differences reflect presence of large, multi-unit properties in the California market, which tend to have multiple decision makers for property improvements.

We asked respondents to the general population survey who would do the work if a decision was made to install four different efficiency measures.

Table 8 shows the responses. The responses from the weighted analysis are fairly consistent across measures. Company employees are more likely to install lighting fixtures and water heaters than HVAC equipment and shell measures, which makes sense given the additional technical skills required to install HVAC equipment and shell measures. With the exception of lighting fixtures, more than half of all weighted responses indicated they would use a contractor to complete installation measures. These percentages are consistent with the unweighted data except in two cases. Eighteen percent of respondents said they would use a contractor they did not have a relationship with to install a water heater compared to 9% in the weighted data. In the second case, 15% of building managers said they would install lighting fixtures themselves compared to 2% in the weighted data.

Table 8. Responsibility for Work to Install Efficient Measures

Party Who Would Perform Work	Lighting Fixtures	HVAC Equipment	Shell Measures	Water Heater
Yourself	2%	1%	1%	1%
An employee of your company other than yourself	26%	7%	9%	16%
A company other than your own with whom you have a contract	15%	21%	12%	21%
A contractor with whom you have an ongoing relationship but no contract	49%	58%	54%	53%
A contractor selected for this work with whom you do not have an ongoing relationship	8%	13%	24%	9%
Total	100%	100%	100%	100%

Finally, we asked respondents where appliances are purchased when they are replaced. Figure 7 shows the distribution of weighted and unweighted responses.

Figure 7. Appliance Replacement at Property

The distribution shows a big difference between the weighted and unweighted data reflecting the fact that larger unit properties are more likely to use a supplier than a home improvement store, due to economies of scale.

Access to Tenant Units

The General Population Survey asked questions regarding apartment turnover and entry for repairs. This is important because these represent occasions when program implementers might have easier access to apartment units for installation of energy efficient measures. The items asked asked respondents what percentage of units turn over each year, defined as when one tenant moves out and another moves in; and, what percentage of occupied units do they enter

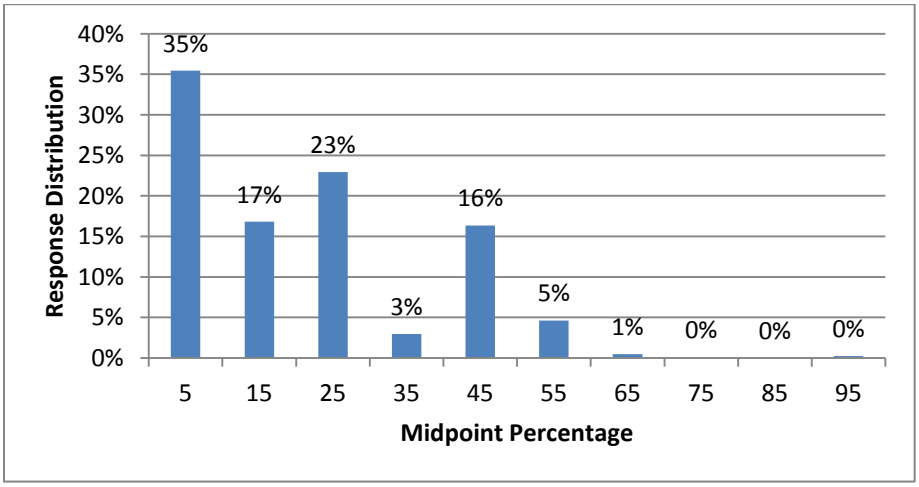
each year make repairs. Table 9 shows the weighted and unweighted mean percentage to both of the questions. Mean values vary little between weighted and unweighted data.

Table 9. Percent of Annual Repair Opportunities

Item	Weighted Mean Percentage	Unweighted Mean Percentage
About what percentage of those units turn over each year, that is, one tenant moves out and another tenant moves in, where there is an opportunity to make repairs?	19%	14%
Over the course of a year, about what percentage of occupied units do you or someone from your company need to go into to make repairs?	49%	44%

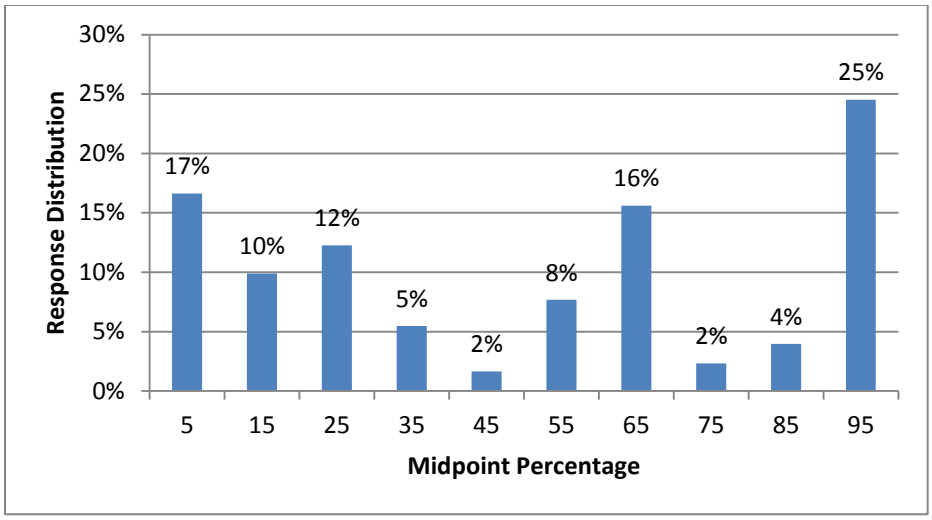
For these items, the question of market size is more appropriately thought of as the number of units, so in Figure 8 and Figure 9 we show the weighted distribution of responses to both items. Figure 8 shows that responses representing 50% of the market's units said that 20% or more of those units turn over each year.

Figure 8. Weighted Distribution of Annual Percentage of Units that Turn Over



As shown in Figure 9, responses representing 50% of the market's units said that half or more of all occupied units are entered each year for repairs.

Figure 9. Weighted Distribution of Annual Percentage of Occupied Units Entered for Repairs



The mean percentages between the weighted and unweighted figures are similar and reflect that property size is not an influential factor in annual repair opportunities.

Site Characteristics

The survey asked respondents about site characteristics, including questions about heating, air conditioning, hot water, whether tenants pay their own utility bills, and what type of fuel is used to heat units. The weighted data indicate that 60% of units have a central heating system and 21% have central cooling. A majority of units, 64%, are connected to a central hot water system.

Ninety six percent of multifamily units require tenants to pay for their own electricity, while only 27% of units have tenants that pay their own water bills.

Eighty-six percent of units use natural gas as the primary heating source. Only 13% of units use electricity for their primary heating fuel. Of the units that have natural gas service, 93% require tenants to pay their own natural gas bills.

Tenant Concerns

The survey asked respondents how important they thought certain energy-efficiency measures were to their tenants. Table 10 presents the weighted and unweighted scores.

Table 10. Tenant Concern Scores of Energy-Efficient Measures

Item	Weighted Mean Score	Unweighted Mean Score
Using a scale of 0 to 10 where 0 means not at all important and 10 means very important, how important is it to your tenants that your company has high-efficiency versions of these types of equipment in your buildings and units?		
Lighting in common areas	6.1	7.0
Lighting in units	6.9	7.1
Washing machines	5.6	7.0
Refrigerators	6.7	7.6
Heating systems	6.8	7.6
Air conditioners and other cooling systems	6.2	7.0

For each measure, the weighted score is lower than the unweighted score. The consistency of this relationship across items suggests—whatever the true level of concern among tenants—that smaller operators tend to have attitudes more consistent with adoption of measures *because tenants want them*. We will see below, however, that beliefs about tenant concerns are not well correlated with energy efficiency behaviors.

Awareness, Knowledge, Attitudes, and Behavior

As noted above, the current research project was a survey of the general population of property owners and managers. A key goal of this research was to assess the relationship between subjective decision-making factors and objective behaviors. Significantly more detail on this portion of the research is reported in the akAB section of this report. Here, we want to make the point that the state of these subjective factors—awareness, knowledge, and attitudes—is also a characteristic of the multifamily market.

The conceptual underpinnings of this research have been elaborated upon in Randazzo and Peters (2011). The basic construct is that a set of distinct, structured, and measurable social psychological dispositions lead decision makers toward desired behaviors, such as the adoption of energy-efficiency measures.

1. Developing ***awareness*** of and ***knowledge*** about the possibilities for gaining benefit through actions are the first steps in a decision-making process that leads toward those actions.
2. Awareness and knowledge about actions must also be accompanied by positive ***attitudes*** that dispose a person toward the behavior. Attitudes are of two varieties:
    a. Concerns, which are motivational attitudes that define what is good to do.

b. Attitudes of ***responsibility*** for doing the behavior oneself rather than expecting someone else to do it.

3. Supported by positive attitudes, the factors of awareness and knowledge lead to the formation of an intention to act. This concept isolates a class of ***behaviors*** that are not automatic or unconscious; rather, they are deliberative and can be said to be part of a decision-making process.

For the current section, we provide a summary of findings on the individual items that make up indices of awareness, knowledge, and attitudes used in the akAB model that is presented in a subsequent section of the report.

Awareness

We measured awareness as an awareness of state and federal programs that provide information and other assistance related to energy efficiency. Additionally, we evaluated two statements to measure the respondents' awareness of energy's negative environmental impact and how energy efficiency can result in energy savings. Table 11 shows the percentage of respondents who were aware of the programs.

Table 11. Awareness of Energy-Efficiency Programs

Item	Weighted Percent "Yes"	Unweighted Percent "Yes"
Which of the following labels or programs for energy efficiency have you heard of? [Answer: Yes or No]		
• ENERGY STAR	94%	85%
• ENERGY STAR MOST EFFICIENT	40%	35%
• Flex Your Power	49%	47%
• Top Ten	6%	9%
• Energy Upgrade California	31%	27%
Are you aware that [SCE/PG&E] offers multifamily property owners and managers rebates and incentives for installing high-efficiency equipment and other energy-efficiency upgrades through its Multifamily Energy Efficiency Rebate Program? [Answer: Yes or No]	*82%*	*53%*

The table shows little difference between the weighted and unweighted analysis except in two instances. There is slightly greater awareness of ENERGY STAR in the weighted data and much greater awareness of SCE and PG&E rebates and the MFEER program. When weighted by property size, 82% were aware of rebates and incentives offered by both utilities compared to 53%.

The survey also asked respondents how interested they were in the MFEERP program and how likely they were to use the program if they had to make improvements in the next three years. The scores for both questions were higher when weighted by property size.

Table 12 presents the weighted and unweighted mean scores of two statements regarding energy use and energy efficiency.

Table 12. Awareness of Energy Use and Energy Efficiency

Item	Weighted Mean Score	Unweighted Mean Score
Using a scale of 0 to 10 where 0 means agree not at all and 10 means agree strongly, how much do you agree with the following statements?		
· Use of energy has a negative impact on the environment	5.1	6.0
· Using energy-efficient appliances and equipment results in sizeable savings on energy bills	7.8	8.0

Figure 10 and Figure 11 show the weighted and unweighted distributions of responses to both questions.

Figure 10. Energy has a Negative Impact on the Environment

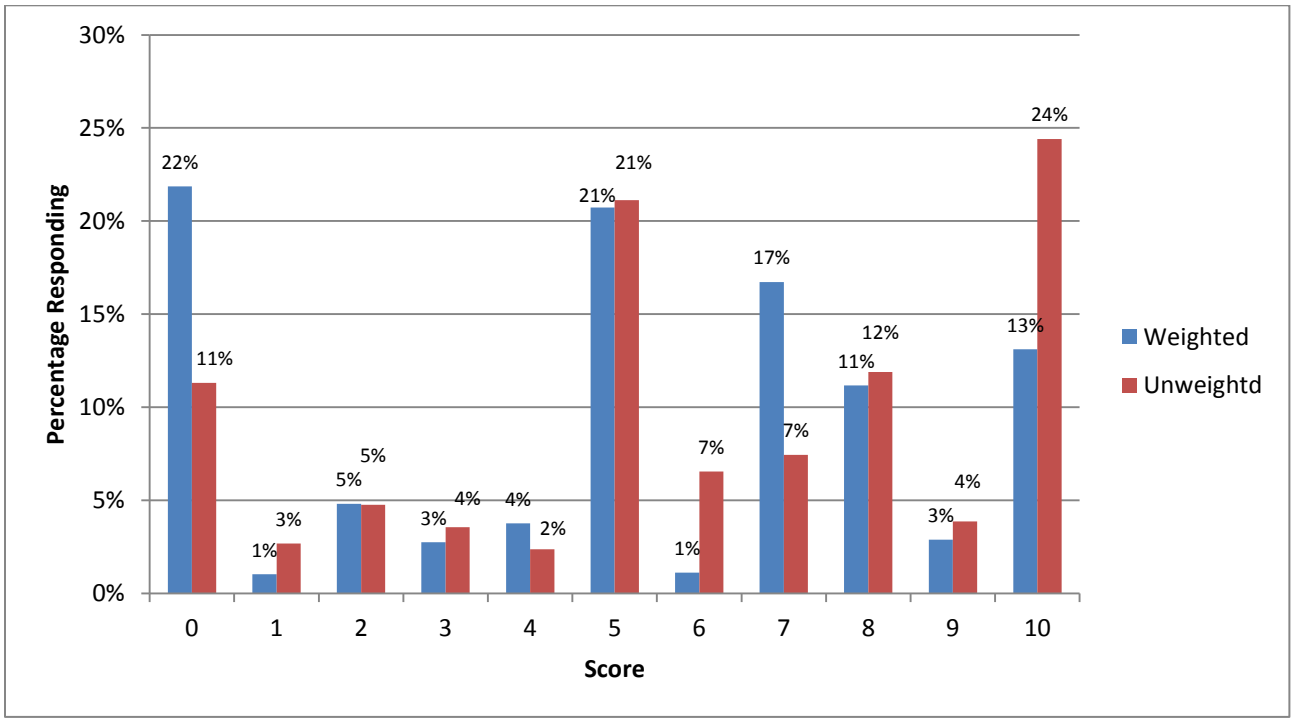
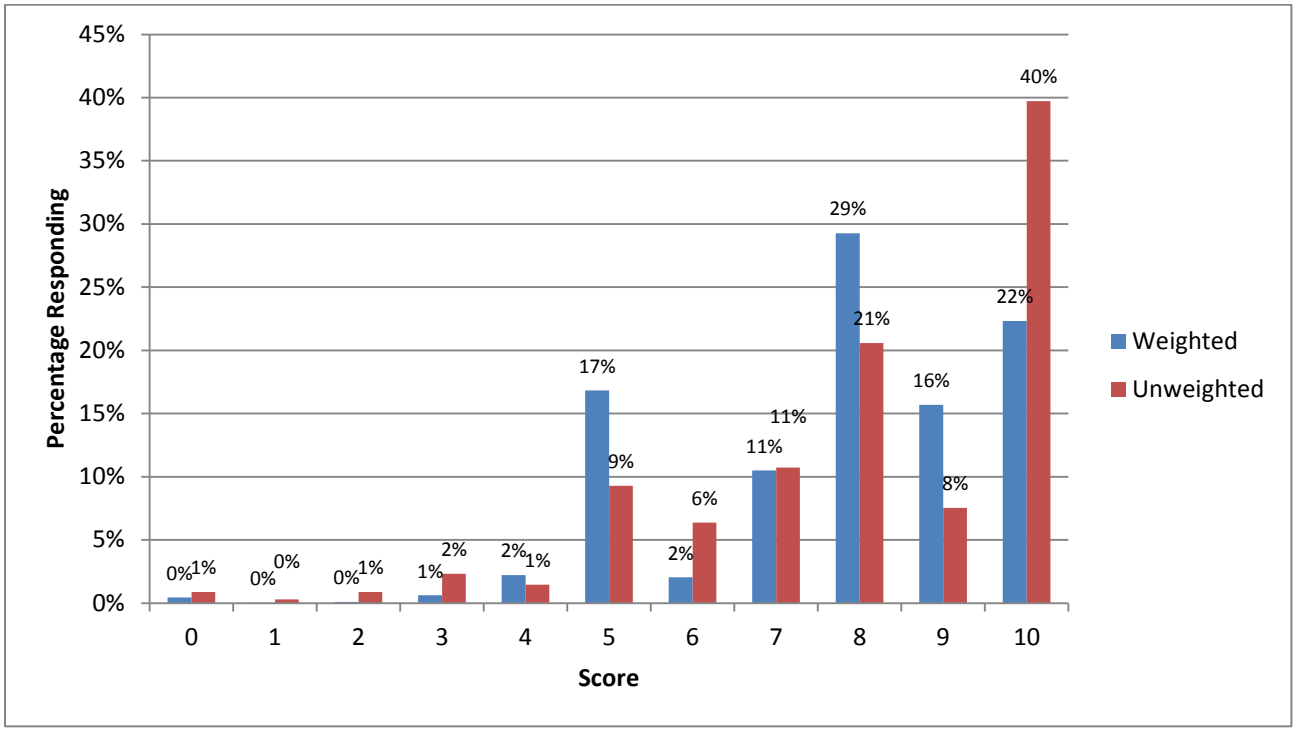


Figure 11. Energy-Efficient Appliances and Equipment Results in Sizeable Savings on Energy Bills



The weighted data for both questions have a lower mean score than the unweighted data. The main shift in responses is away from the highest, most enthusiastic agreement with the item. This may reflect a generally more skeptical or more conditional attitude toward the item. Both histograms illustrate how weighting by property size shifts the distribution of scores.

Knowledge

We measured knowledge indirectly, as the effort to gain knowledge through seeking information about energy efficiency. Table 13 shows the percentage of survey respondents who said they have sought information. There is little difference in knowledge-seeking behavior between the weighted and unweighted data.

Table 13. Knowledge-Seeking With Respect to Energy-Efficiency Programs

Item	Weighted Percent "Yes"	Unweighted Percent "Yes"
Have you ever looked for information or help on how to make your rental property more energy-efficient, such as looking for information on high-efficiency appliances, lighting, or insulation? [Answer: Yes or No]	69%	64%

Attitudes

We investigated two different types of attitudes: concerns that could motivate a decision maker to invest in energy-efficiency improvements, and the attitude of responsibility for making changes that will improve efficiency.

Table 14 shows the weighted and unweighted mean value on an 11-point (0 to 10) importance scale where 10 means "very important." All of the concerns are considered to be of relatively high importance, regardless of whether the means have been weighted or not, with "reducing owner operator costs," "demonstrating [the] properties are well maintained," and "making the property safer for the tenants" rated highest.

Table 14. Attitudes of Concern Motivating Improvements to Rental Properties

Item	Weighted Mean Score	Unweighted Mean Score
Using a scale of 0 to 10 where 0 means Not at all Important and 10 means Very Important, how important are these factors in motivating you to make improvements to your property?		
• Reducing owner operating costs	8.8	8.9
• Demonstrating your properties are well maintained	8.8	8.8
• Making the property safer for the tenants	8.6	9.0
• Increasing the rent value	8.6	8.0
• Retaining tenants and keeping them happy	8.5	8.7
• Needing to replace equipment	8.4	8.0
• Increasing the value of your property	8.4	8.3
• Saving energy	8.3	8.4
• Attracting tenants	8.1	8.1
• Meeting code requirements	7.8	9.0
• Reducing tenant utility costs	7.6	7.3
• Receiving free lighting or rebates to lower the cost of new equipment	7.4	7.7
• Doing the right thing for the environment or being greener	7.0	7.7

Table 15 shows the weighted and unweighted mean value for items related to the sense of responsibility toward energy efficiency on the part of the owners of the property. It is clear that the most consistent sense of responsibility is directed toward energy costs, rather than protection of the environment or decreasing greenhouse gases. By comparing the weighted and unweights means it becomes evident that larger operators have an even greater disposition to view their responsibility attached foremost to keeping costs down.

Table 15. Attitudes of Responsibility Toward Energy Efficiency

Item	Weighted Mean Score	Unweighted Mean Score
Finally, please rate how (you, as the owner or the owners of the property) at [SERVICE ADDRESS] view using energy at that property. Using a scale from 0 to 10, where 0 means do not at all agree and 10 means strongly agree, how much do (you / the owners) agree with each of these statements?		
• Feel a responsibility to decrease the energy use at this property in order to protect the environment.	6.1	6.7
• Feel a responsibility to decrease energy use at this property in order to reduce greenhouse gasses.	5.9	6.4
• Feel a responsibility to decrease energy use at this property in order to reduce energy costs.	8.6	7.8

AKAB FINDINGS

Cadmus' research shows that a subset of indicators developed from the survey results performed well in predicting energy-efficiency behaviors. In this sense, we consider the akAB conceptual scheme—as operationalized here—to be supported by data. We found that a number of structural aspects of multifamily businesses were significantly related to akAB indices. In some cases, however, relationships we had expected to observe were not evident. One reservation regarding our findings, however, is that we used an indirect indicator for knowledge, i.e., *knowledge seeking*, rather than an indicator for knowledge *per se*. We discuss the rationale for this, below.

In this section, we present all findings using unweighted data, i.e., taking the decision-maker as the population of interest rather than properties and units. Here, where the search is for relationships among subjective elements, to conflate those relationships with structural variables through weighting by company size would create significant problems of interpretation. A much more straightforward approach is to look for patterns of association among the subjective elements and then test whether those are correlated with size.

In this section, we present our baseline estimates of the akAB indicators, our efforts to validate the model, and an exploration of correlated of the akAB indices.

Baseline akAB Estimates

For each element of akAB listed in Table 5, outlined above, we calculated a baseline index value. Where relevant, we investigated the scalability of the items.

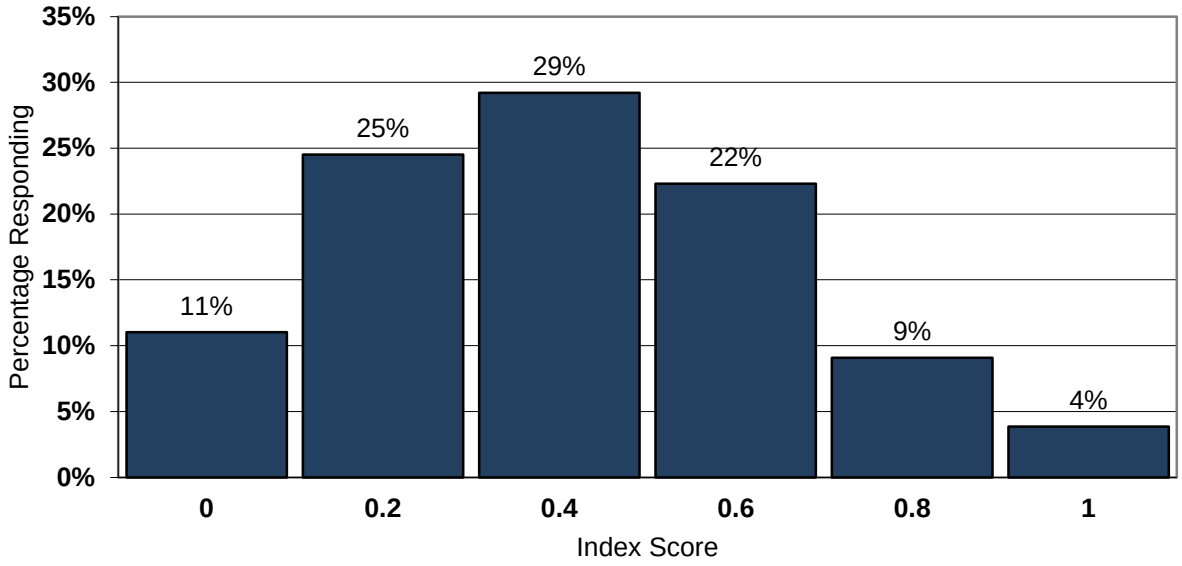
Awareness

We developed two indices of awareness, which we refer to as Awareness Index and Awareness MFEER.

Awareness Index

This refers to having an awareness of five state and federal programs that provide information about energy efficiency. These are binary items (yes/no). The index is the proportion of mentioned items of which the respondent is aware. The distribution of responses (Figure 12) shows good dispersion around a mean value of 0.41.

Figure 12. Distribution of Responses to Awareness Index



We represent this index as a proportion because the number of energy-efficiency programs presented to respondents might change over time, as new programs emerge and the relevance of other programs diminishes. Scoring as a proportion maintains rough equivalence among responses, even as the number of programs changes.

The question of scalability of these items is not determined by the correlations among them. We expect some elements of the list to be more broadly familiar and others to be relatively less familiar. A person who is attuned to the issue of energy efficiency will have encountered and retained more of the relatively less familiar references. Thus, the relationship between the items is additive rather than correlational.

A better way to think of scalability is whether awareness of all of the individual programs queried is related to other concepts in the akAB scheme and, in particular, whether awareness is related to energy-efficiency behaviors. By this test, all of the awareness items in the index are appropriate elements. Awareness of each program is significantly related to energy-efficiency behaviors.

Table 16 shows the result of a t-test comparing the behavior index score (discussed below) for those respondents who are aware of each program and those who are not. The difference in scores is in the expected direction in every case, and the difference in means is statistically significant.

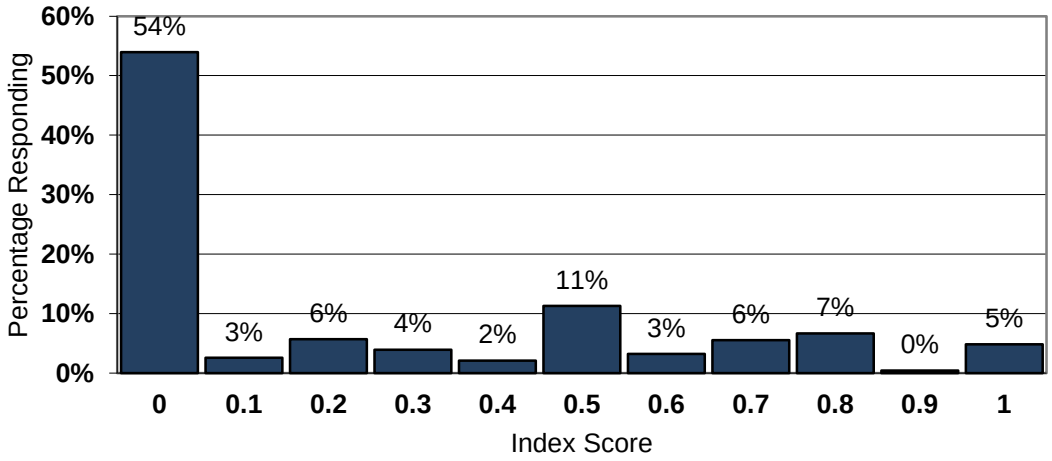
Table 16. T-test of Awareness Items to Evaluate Scalability

Program	Percentage Aware	Behavior Score Aware	Behavior Score Not Aware	t Value	P Value
ENERGY STAR	85%	0.38	0.31	-2.21	0.03
Flex Your Power	47%	0.44	0.37	-2.57	0.01
ENERGY STAR MOST EFFICIENT	35%	0.43	0.33	-4.18	<0.0001
Energy Upgrade California	16%	0.46	0.31	-4.71	<0.0001
Top Ten	9%	0.48	0.36	-2.82	0.01

Awareness MFEER

Level of familiarity with MFEER is rated on an 11-point scale, where 0 means "not at all familiar" and 10 means "very familiar." This single item index had a mean familiarity score of 2.6; however, more than half of respondents (54%) said they were not at all familiar with the program. The distribution of responses is shown in Figure 13.

Figure 13. Distribution of Responses to Awareness MFEER



Knowledge-Seeking

As noted elsewhere, Cadmus created a proxy indicator of respondent knowledge about energy efficiency using items related to knowledge seeking. This was done to address difficulties encountered in developing items that measure knowledge directly. Cadmus developed two indices of knowledge-seeking.

- Index 1. This index attempted to capture the intensity of activity by summing the number of sources the respondent had consulted in seeking knowledge about energy efficiency.

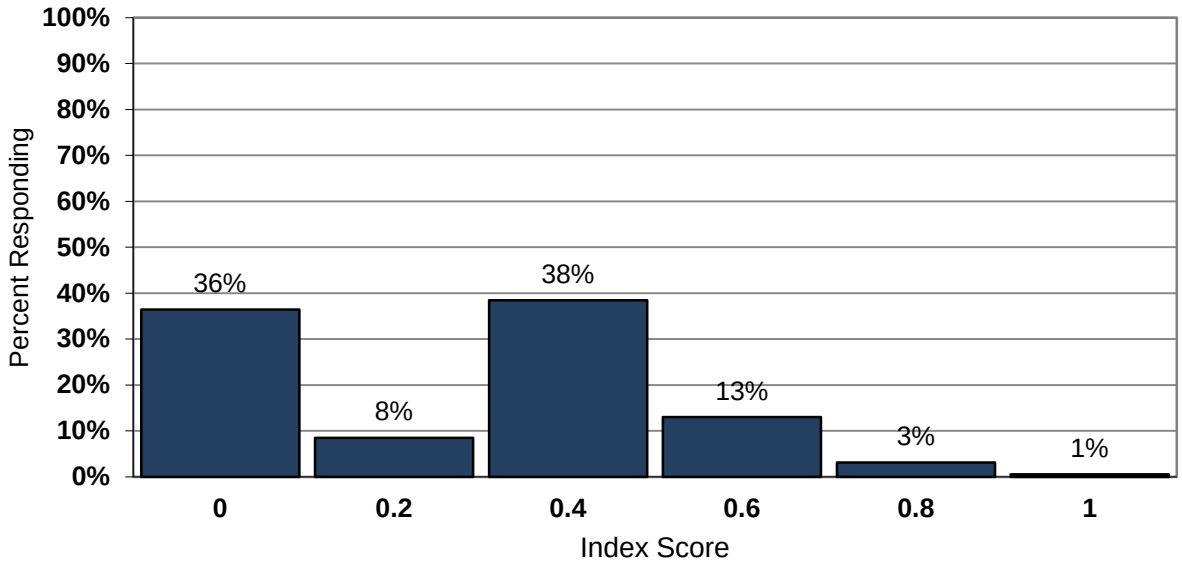
- Index 2. This index was the single binary item indicating whether the respondent had sought information.

About Index 1

Respondents mentioned between zero and five possible sources of information. We grouped the most often mentioned sources to help understand where operators most often seek information. The mean number of sources mentioned was 1.4, with 36% of respondents saying they had not sought information from any source.

Figure 14 shows the distribution of responses. Note that we have again scored the index as a proportion of the maximum number of sources mentioned. This retains a degree of comparability across administrations of the survey, in which a larger or smaller maximum number of sources would be obtained.

Figure 14. Distribution of Responses to Knowledge-Seeking Index



We investigated the scalability of the summed knowledge sources in a way similar to the check we conducted for awareness, asking whether each source in the summation individually was related to energy-efficiency behaviors. This indicates the relevance of each information sources relative to the desired behaviors.

Table 17 shows that all of the mentioned information sources have the expected relationship with energy-efficiency behaviors. (That is, people who consulted each source scored higher on the behavior index.) Two of the sources are either not statistically significant or are only marginally significant; however, most have a low number of mentions. Overall, we interpret this as evidence that all sources are relevant to the scale.

Table 17. Scalability of Knowledge Items

Knowledge Source	Percentage Mention	Behavior Score Mention	Behavior Score Not Mention	t Value	P Value

Internet Research	22%	0.42	0.36	-2.36	0.02
Utility Representative	8%	0.48	0.36	-2.82	0.01
Utility Website	6%	0.43	0.37	-1.32	0.19
Maintenance Staff	3%	0.68	0.39	-2.54	0.01
Trade Association	3%	0.58	0.36	-3.25	0.01
Equipment Manufacturers	1%	0.54	0.37	-1.72	0.09
Other	24%	0.42	0.36	-2.35	0.02

About Index 2

Our second index of knowledge-seeking was the single binary item indicating whether the respondent had sought information. As evident in Figure 14, 64% of respondents had sought information from at least one source.

Attitudes

Cadmus' measurement of attitudes was the most complex portion of the study because, as mentioned, it encompasses three separate dimensions: concern, responsibility, and intention. We developed one or more indices for each dimension.

Concerns

We developed indices for the respondent's own set of concerns and for the concerns the respondent believes are held by his or her tenants. From the respondents own concerns, we developed four distinct indices. A general concern index combines the full set of 13 separate items (noted above) related to energy efficiency. Three additional indices use specific subsets of concern items that are related to tenants' well-being, business concerns, and environmental concerns.

The general concern index is scored as the average importance of 13 concerns, rated on an 11-point scale. Figure 15 shows the distribution of scores obtained in our survey. The mean value for this index was 8.3. This is, unfortunately, a highly skewed distribution, with only 11% of respondents scoring below 7.0. Most respondents, no matter what their other akAB orientation might be, scored all of the concern items as being a high concern. This means the ability of the index to discriminate among survey respondents is likely to be low.

Figure 15. Distribution of Responses to General Concern Index

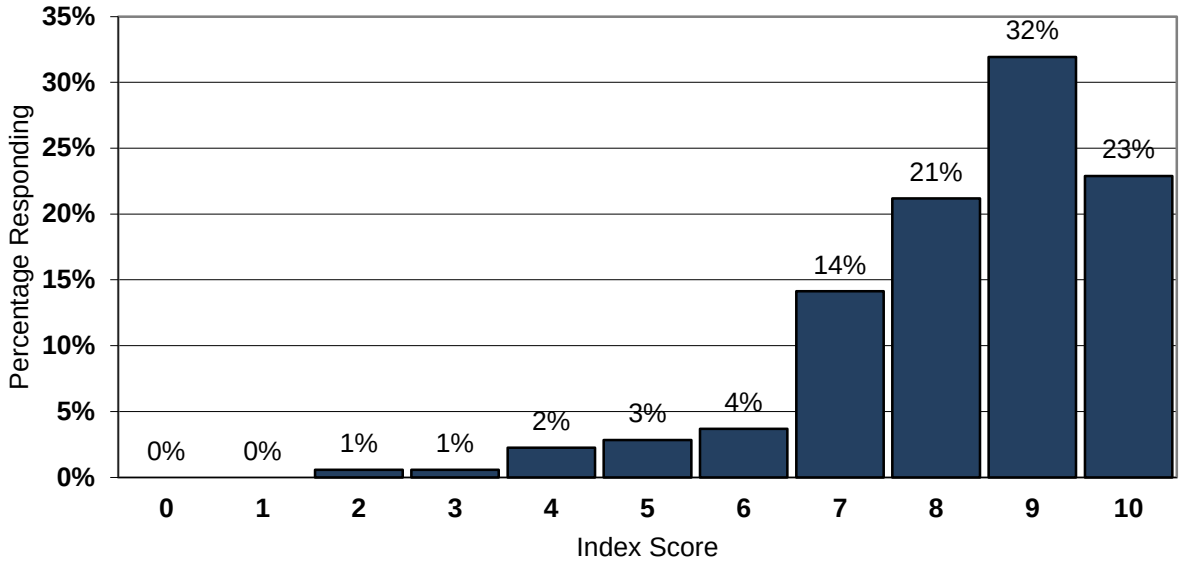
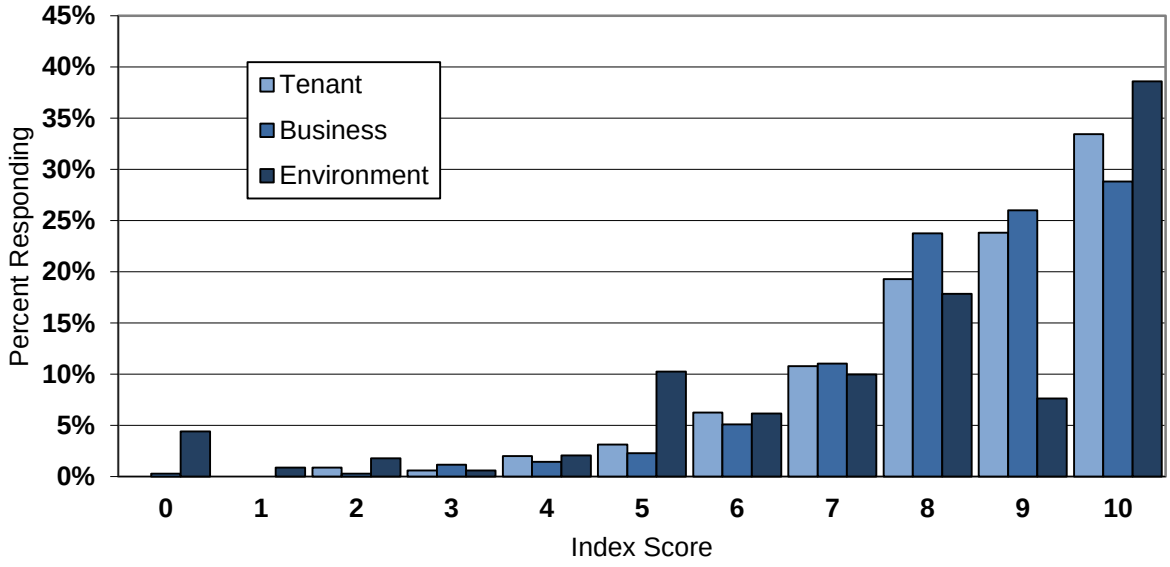


Figure 16 shows that (perhaps not surprisingly) the distribution responses to the subsets of items are similarly skewed, with mean index scores of:

- 8.4 for tenant concerns,
- 8.3 for business concerns, and
- 7.7 for environmental concerns.

Figure 16. Distribution of Responses to Specific Concern Area Indices

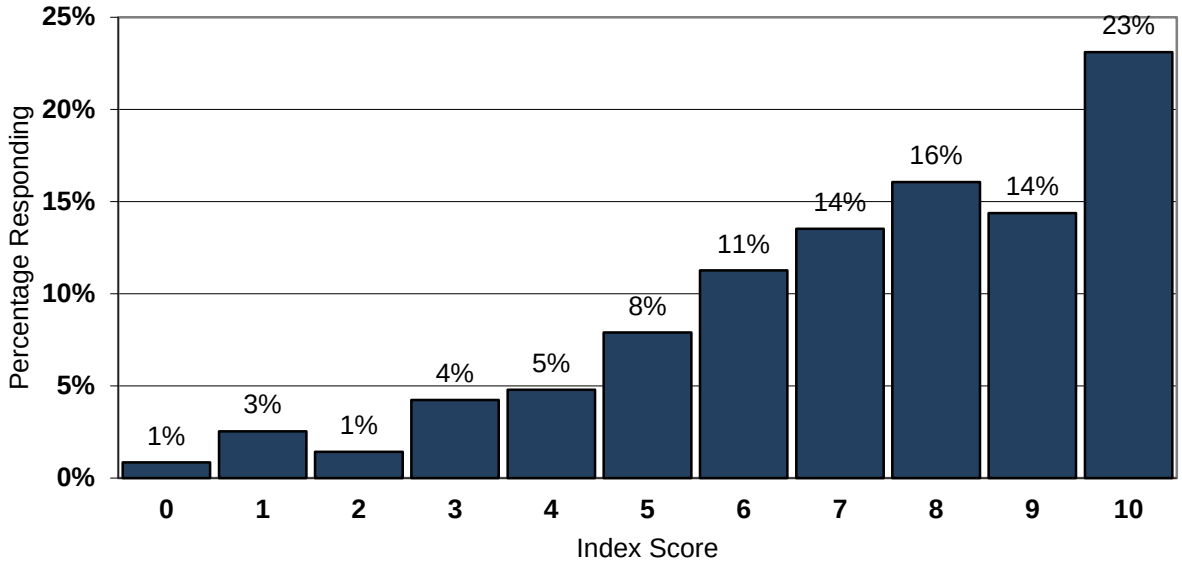


Although the skewedness of the concern items casts doubt on their explanatory power, the items do scale well, with a raw Cronbach Coefficient Alpha value of 0.89 for the general concern index

and similarly high values for the specific concern area indices: 0.79 for tenant concerns and 0.74 for business concerns. Environmental concern relies on a single item.[6]

The index for perceived tenant concerns is scored as the average importance of six energy-efficient measures, rated on an 11-point scale. Figure 17 shows the distribution of responses. The the average score on this index was 7.2. The degree of skewedness on this index is considerably less than other concern scales. The raw Cronbach Coefficient Alpha for this index is 0.91, indicating strong inter-correlation among the items.

Figure 17. Distribution of Responses to Perceived Tenant Concern Index

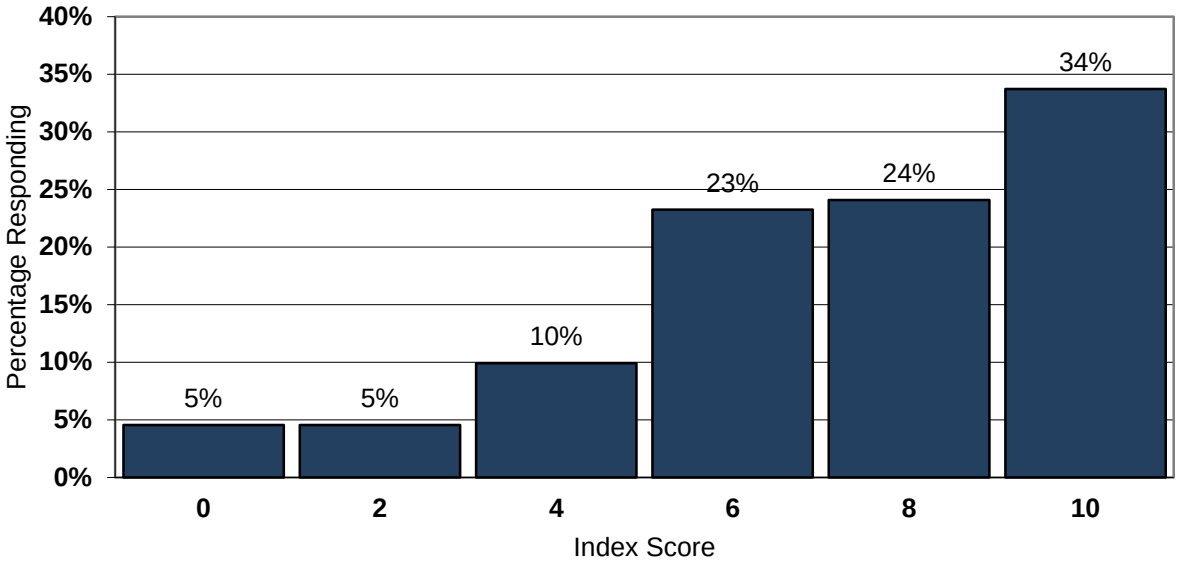


Responsibility

The index for responsibility is the mean of three agreement items, scored on an 11-point scale. The mean score for this scale was 7.0. Although skewed, this distribution is less skewed than the concern indices, as shown in Figure 18. The raw Cronbach Coefficient Alpha for this index is 0.88, once again indicating strong inter-correlation among the items.

[6] Cronbach Coefficient Alpha is a measure of internal consistency among a set of variables. In principal, a group of items intended to indicate a single underlying concept—such as a concern for energy efficiency—should correlate well with one another. Cronbach's Alpha scores above 0.8 are generally considered acceptable.

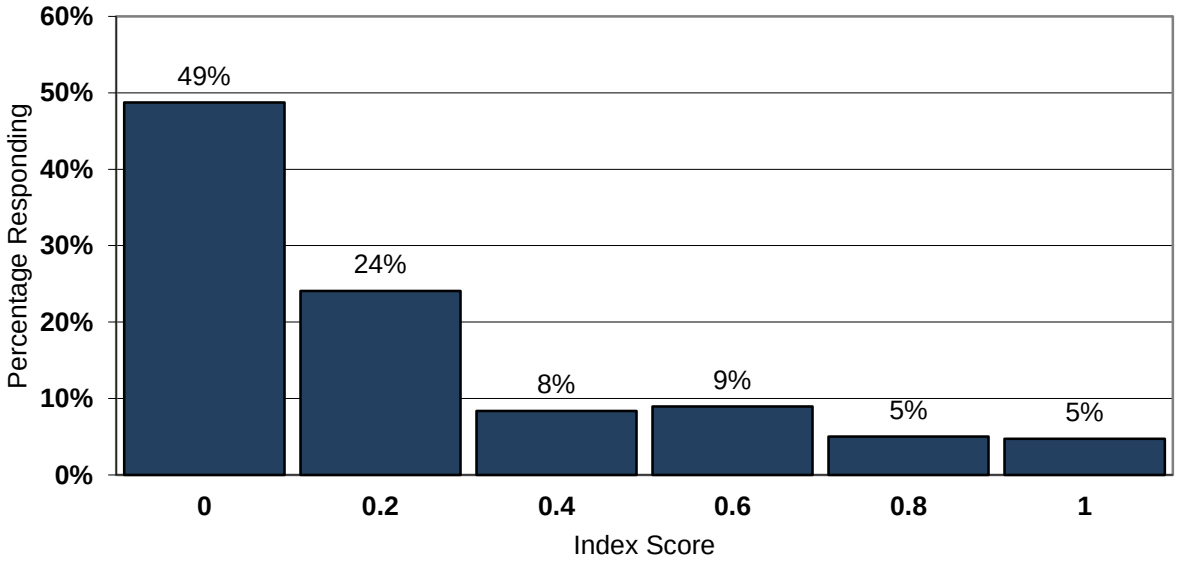
Figure 18. Distribution of Responses to Responsibility Index



Intentions

The index of intention toward energy-efficiency behaviors calculates the proportion of items the respondents say their company will undertake within the next three years. For this research, we asked about 10 behaviors. The mean score on this index was 2.1. Nearly 50% of respondents do not intend to undertake any of the 10 behaviors in the next three years. Figure 19 shows the distribution of responses.

Figure 19. Distribution of Responses to Intention Index



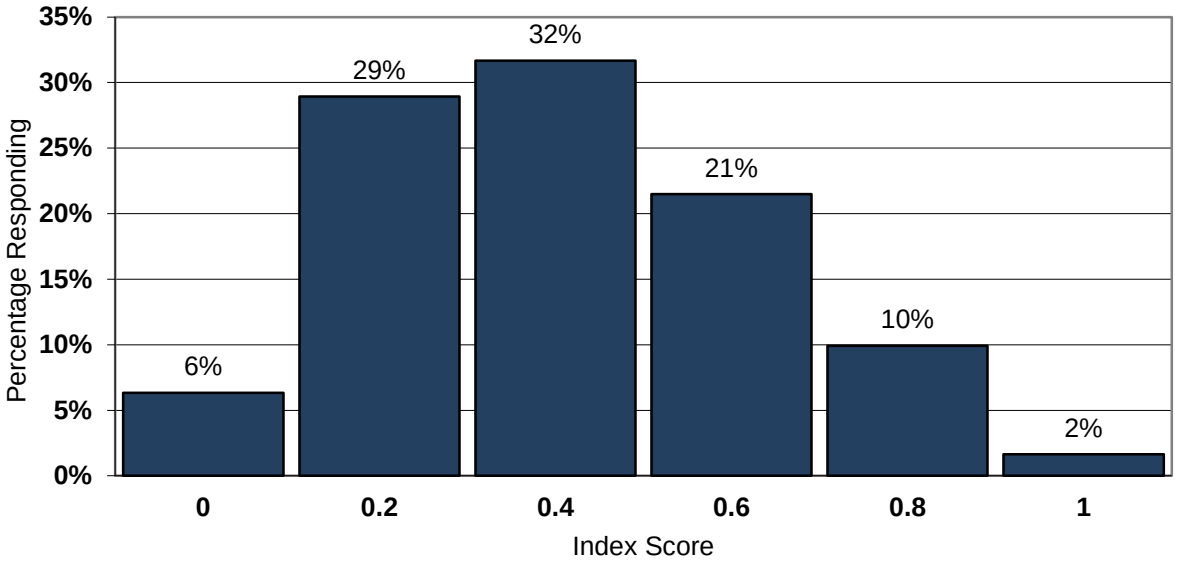
Once again, by summing the number of "yes" answers and dividing by the total number of behaviors asked about (hence, calculating a proportion), we allow for future surveys that would include a different number of items.

We note that the 10 intention items are asked in a prospective sense about the very same behaviors specified in the behavior index. It would seem, therefore, that a test of the relevance of the intention items to the behavior index—to assure they form a relevant scale—would be unnecessary on its face. In fact, four of the individual intention items are not significantly related to the behavior index. We did not remove those items because they include critical energy-efficiency behaviors related to the installation of indoor lighting, appliances or cooling equipment and to conducting audits. This is an initial indication, however, that the intention index is problematic, as measured in this study.

Behavior

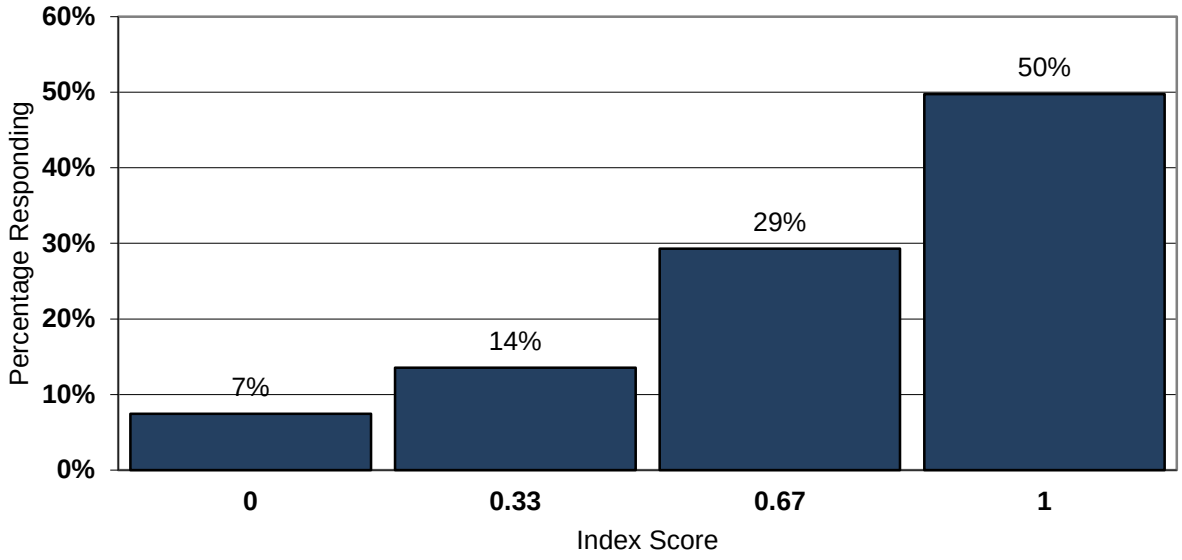
The index of energy-efficient behaviors captures the proportion of a list of possible behaviors that the respondent's company has recently completed or is currently implementing. The list contains the same set of behaviors that form the basis of the intention index. The mean score on this index was 0.37. Since 10 behaviors were presented, this means the respondents had undertaken nearly four actions each. The distribution of scores is relatively symmetric around the mean, as shown in Figure 20.

Figure 20. Distribution of Responses to Behavior Index



Our second behavior index captures the maintenance component of akAB, which we have relabeled "company policy." This index is the proportion of policies the respondent's company adopts. In this survey, we presented three items. The mean score was 0.73, and fully half of respondents said their company adopted all three policies. The distribution of responses is shown in Figure 21.

Figure 21. Distribution of Responses to Company Policy Index



Summary of Findings for Baseline akAB Estimates

The key issue Cadmus identified with respect to the akAB estimates is significant skewing of responses for some indices, especially the Concern index, where 75% of responses fell within the top three categories in an 11-point scale. These are average ratings across 10 items; hence, most respondents were rating most concerns at the top of the scale. (Note that in an index where all responses are essentially the same, one cannot discriminate between different orientations to behavior.)

The items on the Concern index seem inadequate to tease out the relative importance of the various concerns—or of these concerns as compared to others not listed. The idea of ranking the different concerns to put them in their order of importance may be a way to create additional dispersion across items and discern differences. We know from experience, however, that ranking bundles of items is difficult for respondents in the context of a telephone survey. We can conceive of a study that would disentangle the relative importance of operator concerns, for instance in the context of a choice experiment. However, it is unclear whether this rather intensive exercise would yield a set of items that could be transferred to the typical process evaluation survey—which is a goal of the akAB research.

Some of the other indices are nearly as skewed as the Concern index. Generally, wherever half or more of the responses are at the top of the index in the direction leading toward desired behaviors, there would seem to be little room to gauge improvement over time. In such cases, future refinement of indices may be needed. Nevertheless, we can take the evidence we have and move toward an evaluation of the akAB conceptual scheme.

Evaluating the akAB Conceptual Scheme

To evaluate the akAB conceptual scheme as a way of characterizing relationships between subjective elements and behaviors, Cadmus looked at the model in two ways:

- First, we looked for correlations among the different indices. At a minimum, we expect the indices to be correlated with one another with a relationship in the expected direction. That is, higher awareness correlated with higher concern, higher concern correlated with higher intention, and so on.
- Next, we put the indices into a simple linear-regression model to see whether the akA elements could be used to predict behavior.

Correlation Analysis

Correlation analysis only partially supports the akAB model. Some of the expected relationships are borne out, but other correlations are either not statistically significant or are very weak. A correlation matrix of Pearson's *r* statistics is shown in Table 18.

Table 18. Correlations Among akAB Items

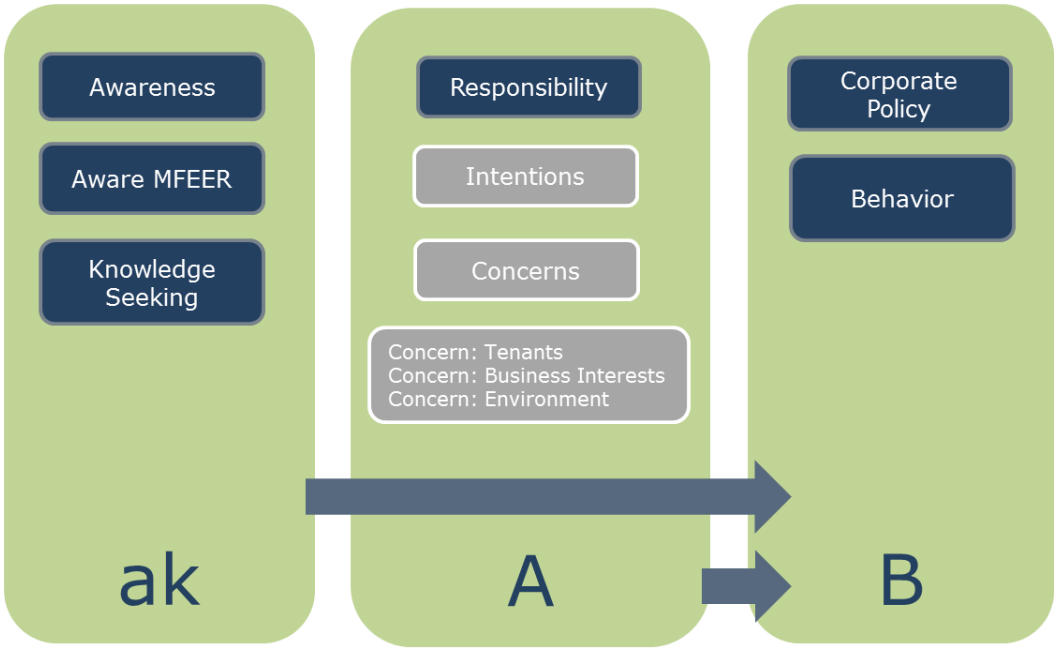
	Knowledge Seeking	Awareness	Aware MFEER	Concern	Responsi-bility	Intention	Company Policy	Behavior
Knowledge Seeking	1.00							
Awareness	0.25	1.00						
Aware MFEER	0.23	0.35	1.00					
Concern	0.06	0.08	0.11	1.00				
Responsibility	0.18	0.11	0.12	0.53	1.00			
Intention	0.10	0.06	0.10	0.34	0.35	1.00		
Company Policy	0.28	0.12	0.21	0.36	0.47	0.22	1.00	
Behavior	0.34	0.32	0.27	0.22	0.34	0.11	0.44	1.00

With the number of cases in our survey data, a correlation above approximately 0.10 is statistically significant. However, with a correlation this low, two indices share only 1% of their variance, indicating a trivial degree of association. We look for correlations above about 0.23 to indicate a marginally meaningful relationship where one variable accounts for at least 5% of variance in the other. Cells above $r = 0.23$ are highlighted in the table.

We note that the ak indices are reasonably well correlated with one another *and* that the attitude items are inter-correlated. However, the correlations between ak and A indices are weak. Behavior is well correlated with all indices except Concern and Intention. This suggests that, while awareness, knowledge, and attitudes are all supported as precursors to behavior, awareness and knowledge—as measured here— are not supported as necessary precursors to the set of attitudes that support behavior.

Based on the correlations observed, the akAB model we have validated looks less like a phase model and more like the independent predictor model shown in Figure 22. Not only does the ak arrow bypass A, but the Intentions and Concerns indices are dimmed to show their weaker relationship with behavior.

Figure 22. akAB Model as Supported by Correlation Analysis



Summary of Findings for the Correlation Analysis of akAB Estimates

We do not conclude from this analysis that, in reality, awareness, and knowledge are unrelated to attitudes or that concerns and intentions are unrelated to behaviors. We already noted that the attitude indices tend to be rather highly skewed and may not be capturing the full variance in decision-maker orientations. Additional refinement of the indices may establish these relationships that are not picked up in our current results. Generally speaking, the akAB conceptual scheme is supported by the evidence to the extent that we have been able to identify a partial set of indices that are correlated with behavior.

A Regression Test of akAB

As a second test of the akAB conceptual scheme, we ran an Ordinary Least Squares regression to determine whether the akA indices can be used to predict behaviors. This is a more robust test of the akAB model than the correlation test, because it isolates the independent effects of the indices on behavior. (That is, the test shows the effect of each index, holding all others constant.) This approach provides indication of how well the indices predict behavior when used in combination.

Table 19 and Table 20 show the results of a regression model with all akA indices entered as independent variables, predicting the respondent's score on the behavior index. The model fits the data well and explains approximately 30% of the variance in the dependent behavior (R^2 = 0.31). However, several of the predictor variables do not fit well within the model: Aware MFEERP, Concern, and Intention. Also, Responsibility is only marginally significant.

Table 19. Regression Fit Statistics

Statistic	Value
F – Value (P-value)	21.36 (<.0001)
R-Square	0.3105

Table 20 highlights in blue the indices that are not significant in the model. We note these indices are skewed, so they offer relatively little discriminating power for that reason. Thus, it is not surprising that they do not perform well.

Table 20. Full Regression Model of akA Indices Predicting Behavior

Variable	Parameter Estimate	Standard Error	T-Statistic	P-Value
Intercept	-0.0076	0.0588	-0.13	0.8972
Knowledge Seeking	0.0356	0.0092	3.87	0.0001
Awareness	0.1576	0.0440	3.58	0.0004
Aware MFEERP	0.0364	0.0346	1.05	0.2930
Concern	0.0053	0.0080	0.66	0.5104
Responsibility	0.0842	0.0460	1.83	0.0682
Intention	-0.0048	0.0382	-0.13	0.8994
Company Policy	0.2051	0.0367	5.59	<0.0001

In developing this analysis, Cadmus evaluated numerous models. To predict behavior as accurately as possible, we used models that examined different versions of akA indicators. Just as the Concern index was not significant in the full model, none of the specific concern indices (tenant, business, and environments) were significant in the model. In addition to the akA indices, some models included outside variables such as property size, tenant socioeconomic status, and decision-making structure. None of these structural variables improved the overall prediction of behavior, nor were they significant in the model.

Our final akAB model contains four independent variables—awareness, knowledge, attitude, and company policy—and a variable we term "green marketing." Table 21 shows the regression fit statistics for the selected model.

Table 21. Regression Fit Statistics

Statistic	Value
F – Value (P-value)	39.57 (<.0001)
R-Square	0.3183

Table 22 shows the parameter values and significance of the final regression model.

Table 22. Final Regression Model of akA Indices Predicting Behavior

Variable	Parameter Estimate	Standard Error	T-Statistic	P-Value	Standardized Estimate
Intercept	-0.0047	0.0337	-0.32	0.7529	0
Knowledge Seeking	0.0303	0.0089	3.84	0.0001	0.1837
Awareness	0.2156	0.0416	5.44	<0.0001	0.2498
Responsibility	0.1170	0.0426	2.38	0.0178	0.1212
Company Policy	0.2238	0.0377	5.80	<0.0001	0.3022

The p-values of the individual parameters in the final model indicate that all of the independent variables are highly significant. Each variable has a positive sign that corresponds to the theory of the akAB model. This means that as any one variable increases by one unit, energy-efficient behavior also increases, holding the effects of the other independent variables constant. Of the akA variables, company policy has the largest impact on behavior, followed by awareness and attitude. This relative impact is indicated by the relative size of these variables' standardized estimate[7].

Company policy, one of the indices we related to behaviors, is itself classed as a behavior in our discussion of akAB. We defined it as an independent variable in our model because this index assesses qualities about individual companies that are indicative of the more specific energy-efficient behaviors encouraged by programs. While our dependent variable measures specific actions a company took, the company policy index measures broader behavioral characteristics of the company.

Summary of Findings for the Regression Analysis of akAB Estimates

Our regression model using akAB indices to predict behavior provides good support for both the indices and the conceptual scheme itself. The final model predicts almost one-third of the variance in the behavior index, using an efficient set of predictor variables. The indices that are insignificant in the model all have measurement problems, as all are skewed to the extent they do not provide much power to discriminate. A caution about our test of akAB, of course, is that we used a proxy concept for knowledge. Additional research would be needed to establish that having knowledge about energy efficiency predicts undertaking energy efficiency behaviors.

Correlates of akAB

Cadmus investigated various structural variables to assess their relationship with akAB, such as:

- The total number of units managed by the company managing the property sampled for the survey;
- The socioeconomic status of tenants at the sample property;

[7] Standardized estimates allow analysts to evaluate the impact and magnitude that each independent variable has on the dependent variable, by putting all variables into standardized form (that is, with a common metric). Once in standardized form, the variables' parameter estimates can be directly compared to each other. The variable with the largest standardized estimate has the largest impact on the dependent variable.

- The structure of decision-making at the company; and
- Past participation in the MFEER program.

When we had tested these variables in the regression model, none had proven significant in predicting behavior. Nevertheless, the structural variables could be invaluable as a way of refining the targeting of messages to receptive audiences or working on reluctant members of the target audience, bringing them closer to the desired awareness, knowledge, and attitude of responsibility. The results can assist in decision-makers in determining what types of companies to target as potential program participants.

Company Size

To test the relative effect of company size on the akA indices, we organized the data into thirds, based on the total number of units managed by the company, as reported by our survey respondents. The groups were defined as:

- Small (fewer than 8 units),
- Medium (more than 8 but fewer than 80), and
- Large (more than 80).

We used an Analysis of Variance (ANOVA) framework to test whether any of the three groups had a mean value significantly different from the others. Our analysis was conducted on each independent variable, and the results (shown in Table 23) indicate that three of the four akAB indices *do* vary by company size.

- The smallest companies were less likely to have sought knowledge about energy efficiency.
- The largest companies were more aware of energy-efficiency programs than were small- and medium-sized companies.
- The largest companies were also the most likely to have company policies conducive to energy efficiency.

Table 23. ANOVA Results and Mean Scores by Size Group

Variable	F-Statistic	P-Value	Small	Medium	Large
Knowledge Seeking	4.53	0.0114	**0.1015***	0.1399	0.1473
Awareness	3.88	0.0214	0.3784	0.3864	**0.4734***
Responsibility	0.66	0.5167	0.7144	0.6860	0.7255
Company Policy	2.79	0.0627	0.7209	0.7059	**0.8059***

*This value has a significantly different mean

In some cases, we ran the analysis with four size categories, as we organized the large category into two parts to separate very large companies (having more than 300 units) from the group having 80 to 300 units.

- For the Awareness index, the pattern of the larger size increasing the index score continued for this very large group.

- For the Company Policy index, however, the relationship did not hold and the very large companies scored lower than the merely large companies.

Socio-Economic Status

Groups defined by the socioeconomic status (SES) of tenants were also tested for differences of means among the akA indicators. SES was ascertained from information provided by the respondent. We asked each respondent the following question:

> *If you had to describe the main type of tenant living at the [ADDRESS] location, would you describe that tenant as:*
>
> - *Having a high income, expecting an elegant, well-planned apartment with the best amenities, security, and location* ***[High SES]*** (9% of respondents)
> - *Having a middle-income, expecting an apartment that has mid-range amenities, neither luxury nor low-budget.* ***[Middle SES]*** (64% of respondents)
> - *Having a lower income, cost being a dominant consideration, possibly needing Section Eight housing or other low-income housing assistance such as HUD funded programs* [**Low SES]** (27% of respondents)

Based on responses we classified tenants into the three categories and conducted an ANOVA test on the difference in means between the three groups for each of the akA indices. None of the ANOVA models indicated significant difference in mean scores.

Decision-Making Structure

We asked survey respondents a series of questions designed to investigate the structure of decision-making at the property they manage, related to capital improvements required for energy-efficiency upgrades. First, we asked who usually makes decisions.

> *When you want to make improvements in the rental units or to the property itself at the [ADDRESS] location, or when you purchase new equipment at that site, are you usually the only person involved in the decision or are others involved?*
>
> - *Only person (61% of respondents)*
> - *Others involved (39% of respondents)*

Even among respondents who both own and manage the property, 25% reported they were not the only person involved in decision-making.

To identify who else was involved *and* level of cost at which others would have to be involved, we investigated the 39% of respondents who required others to make decisions. Neither the basic dichotomy nor refinements of it created a variable that was significantly related to most of the akA indicators. The exception is that awareness is significantly related to whether the decision-maker must involve others—that is, those who must involve others scoring higher on the Awareness index.[8]

[8] Mean *Awareness* score for those who must involve others = 0.46; mean score for those who do not need to involve others = 0.36. (N = 358, F = 8.77, p = 0.0033)

Differences Between MFEER Participants and Nonparticipants

If akA are predictors of behavior related to energy efficiency, then we would expect program participation to be in the set of behaviors that is correlated with those predictors. By combining the general population survey with results of the MFEER participant survey (which included nearly all of the akA items), we were able to test that hypothesis.

Table 24 shows the result of t-tests conducted on the akA variables between program participants and nonparticipants. The results show there are significant differences in mean scores between program participants and nonparticipants with respect to knowledge, responsibility, and company policy. In each case, program participants have a higher mean score than nonparticipants. The average awareness score is not significantly different between the two groups.

Table 24. Difference of Means Test for akA Indices Comparing MFEER Participants and Nonparticipants

Variable	Mean Participant	Mean Nonparticipant	T-statistic	P-value
Awareness	0.4068	0.3987	-0.41	0.6794
Knowledge Seeking	0.1799	0.1193	-5.79	<.0001
Responsibility	0.8234	0.6943	-6.41	<.0001
Company Policy	2.503	1.99	-7.32	<.0001

Summary of Findings for the Correlates of akA Indices

The investigation of correlates of the akA indices has yielded mixed results, which are summarized in Table 25.

Table 25. Summary of Correlates of the akA Indices

Correlate	Awareness	Knowledge	Responsibility	Company Policy
Company Size	+	+		+
Tenant SES				
Decision-Making	+			
MFEER Participation		+	+	+

- Larger companies score higher, on average, on the Awareness, Knowledge-seeking, and Company Policy indices. This finding generally supports a conjecture that operators of larger companies tend to be more sophisticated about the value of energy-efficiency upgrades. The differences between size groupings are not dramatic, however, even where they are statistically significant. Also, in the course of our larger research effort, we encountered examples running counter to this tendency, with some larger managers not seeing value for their business energy efficiency and small managers who were deeply committed to the value proposition.

- MFEER participants score higher on Knowledge seeking, Responsibility, and Company Policy indices than nonparticipants. Failure to obtain this result would have called the entire akAB scheme into question, since program participation is the very type of behavior akAB is intended to predict. The finding that program participants did not score significantly higher than nonparticipants on Awareness may reflect the role of contractor

outreach efforts in the recruitment of participants, which operate independent of broader informational campaigns.

- We had anticipated that decision-making structure might be an important explanatory variable in relation to akAB. Our data do not support that view. It is perhaps less surprising that decision-making was found to be unrelated to akA than to behavior itself. The decision to undertake the desired behaviors apparently gets made no less frequently when the ultimate power to decide is shared than when it is unilateral. Only greater Awareness is more likely to be found among those who share their power to decide about efficiency investments.

- It would be plausible to suppose that operators with tenants of high SES tenants would be more attuned than average to the advantages of energy efficiency because their tenants, being better educated on average, would require it. A contrary supposition might be that operators with tenants of lower SES tenants would be more attuned to those advantages because their low-income tenants would be more sensitive to reduced utility bills and other benefits. In qualitative research for the process evaluation of MFEER, we found some indications in each direction. In our survey of the general population of property operators, it may be that the two tendencies cancelled each other out, because we found no significant differences in index scores based on the SES of tenants.

MULTIFAMILY PROGRAM PERFORMANCE METRICS

As noted in the introduction, the IOUs have sponsored the current research with a goal of developing standard measurements of awareness, knowledge, attitudes, and behaviors in the multifamily property operator sector. The California Public Utilities Commission (CPUC) has indicated that an increase in akA is a condition that favors desired behavioral outcomes and market transformation. Because market transformation is an important goal of the energy-efficiency programs funded by the California IOUs, the CPUC has required that energy-efficiency programs develop Program Performance Metrics (PPMs) related to akAB.

Desirable Qualities of Program Performance Metrics

Before proposing a set of metrics based on the multifamily operator research, Cadmus offers some observations about the general qualities these metrics should meet. We think the PPMs should have the following characteristics to serve as effective indicators of both akAB (which has been our focus to this point) *and* as a measurement of program performance.

Recommended PPM Characteristics

Robust Measurement Properties

The metrics should be constructed in such a way so that they are robust. This means they should be reliable from one administration to another and, hence, produce stable results over time.

If measurement results in the future are essentially incomparable to current results (for instance, because the underlying meaning of the item has changed), the metric is unsuccessful. This is a significant challenge for time periods of more than a few years, as technologies and program designs change and information sources are in flux. One approach to making indices more robust over time is to design the metrics so that some of the item references can be adapted to changing circumstances while the overall structure of the item remains the same. That is how we conceive of the Awareness and Knowledge indices, where the objects of awareness and sources of information mentioned could change over time and yet a reasonable degree of continuity would be preserved.

Good Indicator of Program-Desired Behaviors

At a minimum, the metrics should be correlated with the behaviors they are intended to promote. More than correlation, however, there should also be at least face-value validity to the argument that they are not mere indirect indicators but, as the conceptual scheme proposes, are related in a causal way to the desired behaviors.

We have spent the majority of this report investigating the extent to which the akA indices exhibit these two qualities. There is a third quality PPMs should have, if they are to be considered indicators of program performance: they can be influenced by programs.

Can Be Influenced by Programs

If a metric is to be considered a program performance metric, it should relate to something under the direct or indirect control of a program. In this report, we cannot resolve the issue of what can or cannot be influenced by programs directed to the multifamily operator sector. However, in

making recommendations about metrics, we believe it is important to keep this quality in mind and not to recommend indices that very clearly would be difficult for programs to effect change upon. We do not believe our research establishes whether any of the indictors can be directly influenced by programs. We do develop conjectures about this in our discussion below, however.

Possible Metrics

Based on the discussion of desirable qualities, Cadmus proposes that a modified Knowledge index, the Responsibility index, and the Company Policy could be adopted as possible PPMs. Table 26 summarizes the aKA items that are candidates for PPMs, with our recommended indices highlighted. Note that we are not proposing Awareness as a PPM, for reasons discussed below.

Table 26. Summary of Possible PPMs

		Score		
Index	Item	General Population	Participant	Nonparticipant
Awareness	ENERGY STAR MOST EFFICIENT	0.40	0.41	0.40
	Energy Upgrade California			
	Top Ten			
	ENERGY STAR			
	Flex Your Power			
Knowledge Seeking*	Has looked for information	0.66	0.79	0.61
Responsibility*	Reduce greenhouse gasses	0.70	0.79	0.69
	Reduce energy costs			
	Protect the environment			
Company Policy*	Considers energy efficiency when deciding to make improvements	0.74	0.86	0.70
	Takes steps to make sure the property is operating as energy efficiently as possible			
	Improvements considered part of keeping tenants comfortable			

* Significant difference between participants and non-participants $p < 0.05$

Awareness

Awareness, which is well correlated with behavior, performed well in our regression model. There is good face validity for asserting that a person who is aware of more energy-efficiency programs is more attuned to the issues and, thus, more likely to undertake the desired set of behaviors.

It would seem likely that the list of programs asked about for this index would change over time *and* that the implications of not knowing about one or more items would not be constant. We proposed averaging to deal with the possibility that some references would be added or dropped over time. Thus, the index is the proportion of programs the respondent is aware of, not the

number of programs. Nevertheless, we would not expect the significance of awareness of the different programs to remain constant over time, undermining its robustness as a PPM.

A second problem with awareness is that there is no significant difference in the average score of program participants and nonparticipants. If contact with the program is not related to this index, it seems unlikely the program can influence it. Indeed, it would seem less than efficient for programs to expend resources promoting programs other than their own.

Thus, although awareness fits well within the akAB framework, it does not seem suitable as a PPM.

Knowledge

Knowledge-seeking is also well correlated with behavior, and it performed well in our regression model. Again, there is good face validity for asserting that people who seek information about energy-efficiency programs are more likely to act on the information they receives.

We constructed the Knowledge-seeking index as a quantitative index by counting the number of sources a person had consulted. We also tested a simpler binary index that captures— without counting sources—whether or not information has been sought at all. In our regression model, this binary version of the Knowledge index performed nearly as well as the other. Because it is desirable that PPMs be efficient in the number of items used, would suffice as a PPM.

We believe knowledge-seeking is something programs can reasonably be expected to promote by increasing awareness through outreach to customers. Thus, we tentatively recommend it as a PPM.

Responsibility

Responsibility is the average rate of agreement across three items that measure whether companies take responsibility for energy efficiency. An important feature of this index is that it focuses on the company's responsibility and not on the individual's. While answering for an organization is a different and probably more difficult cognitive task than answering for oneself, the item tries to assess the true nature of the barrier, which is at the company level.

This index performs slightly less well than knowledge in the correlation and regression analyses, but it still firmly supports the akAB scheme. We note that this item is rather skewed, with most respondents agreeing to most responsibility items. Some refinement of the items might increase the dispersion of responses and strengthen this index.

It would seem that the sense of responsibility for energy efficiency would be a significant challenge for programs to influence. Certainly, a marketing campaign could attempt to influence company culture in this way; however, that would be outside of the normal course of activity for programs such as MFEER. Nevertheless, because of its good showing within the akAB scheme and the face validity that responsibility is related to behavior, we tentatively recommend the Responsibility index as a PPM. We present recommendations below about how PPMs should be handled while the capacity of programs to influence them is uncertain.

Company Policy

The Company Policy index reflects the average rate at which companies adopt three policies favorable to energy-efficiency behaviors. This index has the best empirical relationship with behavior, and the causal relationship has high face validity.

We see two reasons for concern about using company policy as a PPM.

- First, as currently designed, there is rather little room for improvement on this metric, since the average score is already 0.74 out of a maximum 1.0. This is not greatly different than responsibility, but it underscores the need for headroom in the PPMs, because there is ample headroom in the behaviors they are intended to predict.
- Secondly, even more so than for responsibility, we see little opportunity for programs to affect this index.

Indeed, the primary way the "maintenance" component (that is, company policy that extends and institutionalizes the decision-making process) of the akAB framework is supposed to work is as a follow-on from discrete energy-efficiency behaviors. Thus, it is those discrete energy-efficiency behaviors of the very type promoted by programs that would be the prime lever for programs to influence policy. This, in essence, reverses the relationship between behavior and PPM: behavior causes PPM not PPM causes behavior. This may be totally acceptable if company policy is seen as a more immediate effect of market transformation. If it is to serve that purpose, however, it should better reflect the current, relatively untransformed state of the market. That is, the value should not be so close to maximum.

We recommend that items for a Company Policy index be refined in an attempt to achieve greater variance among responses.

RECOMMENDATIONS

In this section we conclude by making recommendation derived from the findings of Cadmus' research.

Combine akAB Research with Additional Research into Decision-making

As noted in the introduction to this report, within the context of a business, as in the case of multifamily property operation, the role of awareness, knowledge, and attitudes in decision-making may be attenuated by complexities that are not found among household decisions. While, Cadmus' research supports the view that akA is related to the behaviors promoted by energy-efficiency programs, we have not established the relative importance of these subjective elements compared to structural imperatives and constraints imposed by the nature of decision-making in this sector. We recommend combining additional akAB research with more research into the structure of decision-making at the business level.

Establish Three Standard Indicators for Future Tracking

In the previous section we recommended three indicators, Knowledge-Seeking, Responsibility, and Company Policy. By standard indicators we mean that these should be standard items in multifamily sector research. Standardization of these indices will help ensure that measurements are repeated and provide a basis for establishing norms and trends. As part of this process, it is important that measurements be made both of program participants and of nonparticipants to establish norms and trends for both groups.

Clarify the Intended Application of PPMs Related to akAB

It is not clear to Cadmus how PPMs are intended to be used to evaluate the performance of programs. For instance, we do not know to whom they will be applied. If program participants are measured for Knowledge and Responsibility, what would be the significance of a rising score over time? Would it mean that the programs are better targeting participants who are relatively easy to bring into the program? That might be a good outcome; but, it might be an even better outcome to bring in participants that actually have *lower* scores on the PPMs, because such a program would be converting more difficult customers.

Alternatively, the PPMs could be applied to the general population of customers. Here, the meaning of a rising PPM is easier to understand and seems more closely aligned with the intention to identify indicators of market transformation. In this case, however, the PPM would seem less an indicator of program performance. At least, it would not be obvious how credit for changing PPM values would be apportioned to programs compared to other societal factors. Certainly, if two or more programs are serving a single sector, it would be difficult to apportion credit for changing PPMs between the two programs.

Develop akAB PPMs that are More Specific to Programs

The ambition to develop akAB items that would apply generally to the multifamily sector is somewhat at odds with setting a goal that programs should influence those metrics. Instead of

establishing very general indicators as PPMs, the metrics should be more tailored to the specific context of the program. The difficulty we described in establishing a metric related *knowledge*—which led us to knowledge-seeking as a proxy—is symptomatic of this problem. If programs are to be held accountable for changing the level of knowledge in the target market, the knowledge should be directly related to the offering of the program. Perhaps respondent-discriminating items for a narrowly focused knowledge index could be developed. Similarly, awareness of *energy efficiency* among decision-makers is much less within the control of the program than awareness of the energy efficiency offerings of the program.

APPENDIX A. DEVELOPING THE SAMPLE FRAME

Cadmus designed the sample for this research around a list of customer accounts provided by each utility. Our general notes about the process are these:

- For each utility we had two kinds of accounts: residential customer accounts and common area meter accounts.
- From the residential customer accounts we identified properties, defined by a unique service street address.
- We identified management entities identified by a unique business name and billing address. In some cases, more than one business was located at the same address.
- We were able to match 75% of SCE common meters and 73% of PGE common meters to one or more residential accounts.
- Only 30% of SCE's residential unit records and 58% of PGE's residential unit records could be matched to a common area meter account.

Although this approach provided a frame of ample size for drawing a sample, it almost certainly underrepresented very small properties that do not have a common meter.

Table 27. Summary of Sample Frame

Type of Record	Definition	PGE	SCE
Multifamily residential customer accounts	Unique account ID	1,267,503	1,117,225
	Unique ZIP + street + number + unit (service)	1,267,503	1,110,563
	Unique ZIP + street + number (service)	450,422	327,927
Common area meter accounts	Unique account ID	97,110	57,544
	Unique name + billing ZIP + billing street address	59,631	30,017
	Unique billing ZIP + billing street address	46,662	25,784
Matches	Common Meter	43,416	22,554
	Units	731,621	327,650

APPENDIX B. WEIGHTING METHODS

Unlike a residential survey, where post-weighting of data can be used to adjust the survey response to known population distributions, for business sampling there are fewer population data sources that can be used. Cadmus applied a single weight for the analysis of the general population survey.

Median Rent

Sampling was done with equal quotas for three strata defined by the median rent paid in a given location. Locations were defined as US Census Bureau Public Use Microdata Areas (PUMAs). A rent stratum represented similar median rent paid for a two-bedroom apartment, within a PUMA. The 2009 ACS data for California provided information on the median rent paid in each area. We calculated terciles to divide PUMAs into three equal groups, representing low, medium, and high rent. Working from a list of ZIP codes served by each utility we identified PUMAs within each territory. We calculated the median household rent paid in each area, then calculated rent terciles within each utility's territory. Although this approach should have been, in effect, self-weighting, we did detect a distribution across the strata that deviated from the population. To control for the effect of this stratification on the sample we applied an inverse proportion weight to adjust for the true percentage of customers.

Table 28. Stratum Weights Applied to the Data

	PG&E	SCE
High Rent	0.667334	1.095770
Medium Rent	2.042484	0.656168
Low Rent	0.988240	1.773993

The weights indicate that we over-represented medium rent households among SCE's customers and underrepresented them among PG&E's customers.

We note that analysis of the data with and without the weights made no difference to our results, underscoring a finding of the research that tenant SES plays no significant role in these attributes of decision-makers. For instance, the regression models run with and without weights had trivial differences in parameter values and p-values.

Company Size

For some analyses we weighted data by company size. For this, we applied inverse probability weights, equal to the number of units managed by each respondent's company. Conceptually, it is as if each respondent were in the dataset once for each unit managed. Thus, a respondent whose company manages four units would receive half the weight of a respondent whose company manages eight units, and 1/1000 the weight of a respondent whose company manages 4,000 units. Because these are extremely unequal weights, the results must be interpreted with caution. For instance, using the weighted data, the respondents from the four largest companies count more heavily than respondents from the smallest 339 (out of 362!) companies. Thus, in using the weighted data the random error around the largest operators' responses is greatly increased relative to error around the others.

APPENDIX C. SURVEY INSTRUMENT

SCE/PG&E Multifamily Energy Efficiency Rebate Program

General Population Multifamily Property Owner/Manager Survey

March 20, 2012

A. Introduction

A1. Hello, my name is **[INTERVIEWER NAME]** from Marketing Excellence, and I'm calling on behalf of [**SOUTHERN CALIFORNIA EDISON/PACIFIC GAS & ELECTRIC]**, your local electric utility. [**SOUTHERN CALIFORNIA EDISON/PACIFIC GAS & ELECTRIC]** is conducting an important statewide study that will guide the energy efficiency services they offer in the multifamily rental market. May I speak with the person who makes decisions about building and equipment upgrades to the property and rental units at **[SERVICE ADDRESS FROM SAMPLE]?**

a. Yes, speaking to the decision maker
b. Yes, call transferred to someone else **[REINTRODUCE]**
c. Yes, but at a different number **[RECORD NAME AND NUMBER; THANK AND TERMINATE]**
d. No **[THANK AND TERMINATE]**

A1a. Is the property at [ADDRESS] a rental property where the tenants pay rent to the owner or to a management company, or is the property a condominium, where the tenants own their units and pay a fee for the upkeep of the building and grounds?

a. Rental property **[CONTINUE]**
b. Condominium **[THANK AND TERMINATE]**

A2. Just to double-check, you would be the person to decide if building or equipment upgrades are made to the property and rental units at **[SERVICE ADDRESS]?**

a. Yes

b. No – May I please speak to that person? **[REINTRODUCE]**

A3. To compensate you for your time to complete this interview, we are offering a $50 incentive. We can send this incentive to you or, if you prefer, it can be donated on your behalf to the American Red Cross. Which option would you prefer?

a. Myself

b. The American Red Cross

[**IF NEEDED:** Let me assure you, I'm not selling anything. Your responses are confidential.]

[IF NEEDED: This survey should take about 20 minutes of your time. Is there a better time for us to speak with you?] **[SET UP A CALL BACK APPOINTMENT]**

[**Why are you conducting this study?:** This statewide study will guide the design of SCE/PGE's energy efficiency services for multifamily owners and property managers.]

[**Concern about the call or study:** If you would like to talk with someone from **[Southern California Edison/ PG&E]** about this study, feel free to call Caroline Chen at SCE at 619-423-1512, and Andy Fessel at PG&E at 415-973-6236.]

[**If respondent says they have already filled out/completed a survey**] say: Thank you very much for your help with that survey. This is a separate study and we hope you will agree to take part. You will receive a $50 incentive for your personal use or as a donation to the American Red Cross.]

B. Responsibility

First I'd like to know a little more about you and your company.

B1. Does your company own the property at **[ADDRESS]**, manage it, or does your company both own and manage it?

a. Owns only – does not manage

b. Manages only – does not own

c. Owns and manages properties

-98. (DON'T KNOW) **[TERMINATE POLITELY]**

-99. (REFUSED) **[TERMINATE POLITELY]**

B2. And what is the best way to describe your role at your company? Are you the. . .? **[READ LIST]**

a. Property owner
b. Property manager
c. Both property owner and manager
d. Maintenance or facilities supervisor
e. Other

B2a. **[SPECIFY]**

-98. (DON'T KNOW)

-99. (REFUSED)

B3. How long have you, yourself, managed/owned this particular property?

[RECORD MONTHS] ***[RANGE 1-99]***

[RECORD YEARS]

B4. How many years have you been in the business of owning, managing, or maintaining multifamily properties?

[RECORD YEARS] ***[RANGE 1-99]***

B5. How many units does your company operate at the **[ADDRESS]** location? And by operate I mean either own or manage.

[RECORD NUMBER OF UNITS] ***[RANGE 1-9999]***

B6. About what percentage of those units turn over each year, that is, one tenant moves out and another moves in, where there is an opportunity to make repairs?

[RECORD PERCENTAGE] ***[RANGE 0-100]***

B7. Over the course of a year, about what percentage of occupied units do you or someone from your company need to go into to make repairs?

[RECORD PERCENTAGE] ***[RANGE 0-100]***

B8. How many additional units does your company operate at other locations besides **[ADDRESS]**?

[RECORD NUMBER OF UNITS] ***[RANGE 1-9999]***

-97. Only one property/No Other Units/properties

B9. If you had to describe the main type of tenant living at the **[ADDRESS]** location, would you describe that tenant as: **[SINGLE RESPONSE]**

a. Having a high income, expecting an elegant, well-planned apartment with the best amenities, security, and location **[High Income]**

b. Having a middle-income, expecting an apartment that has mid-range amenities, neither luxury nor low-budget. **[Middle Income]**

c. Having a lower income, cost being a dominant consideration, possibly needing Section Eight housing or other low income housing assistance such as HUD funded programs [**Low Income]**

d. Other

-98. (DON'T KNOW)

-99. (REFUSED)

B10. When you want to make improvements in the rental units or to the property itself at the **[ADDRESS]** location, or when you purchase new equipment at that site, are you usually the only person involved in the decision or are others involved?

a. Only person

b. Others involved

c. Depends [DO NOT READ]

-98. (DON'T KNOW)

-99. (REFUSED) **[TERMINATE POLITELY]**

B11. ***[IF B8=b or c]*** Who else is involved? [ALLOW MULTIPLE RESPONSES]

a. **[SPECIFY]**

B12. ***[IF B8= c]*** In what circumstances does that person get involved?

a. **[SPECIFY]**

B13. ***[IF B8=b or c]*** Just to be sure we understand: who makes the final decision for purchases that cost less than $1,500? PROBE AS NECESSARY: What is that person's job title?

a. **[SPECIFY]**

B14. ***[IF B8=b or c]*** Who makes the final decision for purchases that cost $1,500 or more? PROBE AS NECESSARY: What is that person's job title?

a. **[SPECIFY]**

B14a. ***[IF B8=b or c]*** Who makes the final decision for purchases that cost $10,000 or more? PROBE AS NECESSARY: What is that person's job title?

a. **[SPECIFY]**

B15. If a decision was made to install new lighting fixtures in common areas of the property at this location, who would be *most likely* to do the work?

a. Yourself
b. An employee of your company other than yourself
c. A maintenance company with whom you have a contract
d. A contractor with whom you have an ongoing relationship but no contract
d. A contractor selected for this work who you do not have an ongoing relationship with
f. Other [SPECIFY]

-98. (DON'T KNOW)

-99. (REFUSED)

B16. Now thinking about a decision to replace heating or air conditioning equipment at this location, who would be *most likely* to do the work?

a. Yourself
b. An employee of your company other than yourself
c. A maintenance company with whom you have a contract
d. A contractor with whom you have an ongoing relationship but no contract
d. A contractor selected for this work who you do not have an ongoing relationship with
f. Other [SPECIFY]

-98. (DON'T KNOW)

-99. (REFUSED)

B17. If a decision was made to replace windows or add insulation at this location, who would be *most likely* to do the work?

a. Yourself
b. An employee of your company other than yourself
c. A company other than your own with whom you have a contract
d. A contractor with whom you have an ongoing relationship but no contract
d. A contractor selected for this work who you do not have an ongoing relationship with
f. Other [SPECIFY]

-98. (DON'T KNOW)

-99. (REFUSED)

B18. One last question on decisions: if a decision was made to replace a water heater at this location, who would be *most likely* to do the work?

a. Yourself

b. An employee of your company other than yourself

c. A company other than your own with whom you have a contract

d. A contractor with whom you have an ongoing relationship but no contract

d. A contractor selected for this work who you do not have an ongoing relationship with

f. Other [SPECIFY]

-98. (DON'T KNOW)

-99. (REFUSED)

B19. When appliances are replaced at this location, are those purchased:

a. From an appliance or home improvement store

c. Through a supplier with whom you have a purchasing agreement

d. Some other way [SPECIFY]

-98. (DON'T KNOW)

-99. (REFUSED)

C. Awareness

Now I'd like to find out more about your experience with energy efficiency.

C1. Have you ever looked for information or help on how to make your rental property more energy-efficient, such as looking for information on high efficiency appliances, lighting, or insulation?

a. Yes

b. No ***[SKIP TO C3]***

-98. (DON'T KNOW) ***[SKIP TO C3]***

-99. (REFUSED) ***[SKIP TO C3]***

C2. ***[IF C1=1]*** When looking for information or help on how to make your rental property more energy efficient, what sources have you used? **[Do not read. Accept multiple responses.]**

a. Internal maintenance staff
b. Our regular installation contractor
c. An outside installation contractor we may hire or consult with occasionally
d. Equipment distributors/ wholesalers
e. Equipment manufacturers
f. Equipment dealers/ retailers
g. Apartment/trade associations (presentations and newsletters)
h. Our electric or gas utility representative
i. Our electric or gas utility website
j. Our own research on the Internet
k. Retailer salesperson referral (on floor of retail store)
l. Other

C2a. **[SPECIFY]**

-98. (DON'T KNOW)
-99. (REFUSED)

C3. Using a scale of 0 to 10 where 0 agree not at all and 10 means agree strongly, how much do you agree with each of the following statements? **[RECORD RATING: -98= DON'T KNOW, -99= REFUSED]**

a. Use of energy has a negative impact on the environment
b. Using energy efficient appliances and equipment results in sizeable savings on energy bills

C4. Using a scale of 0 to 10 where 0 means Not at all Important and 10 means Very Important, how important are these factors in motivating you to make improvements to your property? **[RANDOMIZE THE ORDER] [RECORD RATING FOR EACH]**

a. Attracting tenants 1
b. Retaining tenants and keeping them happy 2
c. Needing to replace equipment 3
d. Saving energy 4
e. Reducing owner operating costs 5
f. Reducing tenant utility costs 6
g. Demonstrating your properties are well maintained 7
h. Making the property safer for the tenants 8
i. Increasing the value of your property 9
j. Increasing the rent value 10
k. Doing the right thing for the environment or being greener 11
l. Meeting code requirements 12
m. Receiving free lighting or rebates to lower the cost of new equipment 13

C5. Using a 0 to 10 scale where 0 means Not at all Important, and 10 means Very Important, how important is it to **your tenants** that your company has **high efficiency versions of** these types of equipment in your buildings and units? **[RECORD RATING; -96= N/A FOR THOSE WHO DO NOT OFFER THE EQUIPMENT]**

a. Lighting in common areas
b. Lighting in units
c. Washing machines
d. Refrigerators
e. Heating systems
f. Air conditioners and other cooling systems

-98. (DON'T KNOW)
-99. (REFUSED)

C6. Which of the following labels or programs for energy efficiency have you heard of? **[RECORD RESPONSE: 1=YES, 2= NO]**

a. ENERGY STAR
b. ENERGY STAR MOST EFFICIENT
c. Consumer Elect
d. Flex Your Power
e. Top Ten
f. Energy Upgrade California

C7. Are you aware that [SCE/PG&E] offers multifamily property owners and managers rebates and incentives for installing high efficiency equipment and other energy efficiency upgrades through its Multifamily Energy Efficiency Rebate Program?

a. Yes
b. No ***[SKIP TO C16]***

-98. (DON'T KNOW)
-99. (REFUSED)

C8. How did you hear about the multifamily program? **[DO NOT READ; SELECT ALL THAT APPLY]**

a. Contractor contacted me
b. I contacted a contractor and he/she mentioned the program
c. Tenant told me
d. Heard through an apartment/ landlord/professional association
e. Heard through other property managers/owners
f. Utility bill insert
g. Utility television ad
h. Newspaper/Periodical ad
i. Utility website
j. Utility employee, account representative, customer service representative
k. Program brochure
l. Other

C8a. **[SPECIFY]**

-98. (DON'T KNOW)
-99. (REFUSED)

C9. On a scale of 0 to 10 with 0 being not at all familiar and 10 being very familiar, how familiar are you with the rebates and services that the Multifamily Energy Efficiency Rebate Program offers?

0 1 2 3 4 5 6 7 8 9 10 -98 (DON'T KNOW) - 99 (REFUSED)

[IF C9 < 5 Go To C16]

C10.Have you or your company received information about **[SCE/PG&E]**'s Multifamily Energy Efficiency Rebate Program?

a. Yes

b. No ***[SKIP TO C16]***

-98. (DON'T KNOW)

-99. (REFUSED)

C11.Has your company considered participating in this program?

a. Yes

b. No ***[SKIP TO C16]***

-98. (DON'T KNOW)

-99. (REFUSED)

C12.Has your company completed paperwork to receive benefits through the program for the property at [**ADDRESS**]?

a. Yes

b. No ***[SKIP TO C16]***

-98. (DON'T KNOW)

-99. (REFUSED)

C13.Has your company had measures installed or received a rebate from **[SCE/PG&E]**'s Multifamily Energy Efficiency Rebate Program for the property at [**ADDRESS**]?

a. Yes

b. No ***[SKIP TO D1]***

-98. (DON'T KNOW)

-99. (REFUSED)

C14. **[IF C11 = 1]** Overall, how satisfied are you with the products and services you received through (SCE's/PG&E's) Multifamily Program, using a scale of 0 to 10 with 0 meaning not at all satisfied and 10 meaning very satisfied?

0 1 2 3 4 5 6 7 8 9 10 -98 (DON'T KNOW) - 99 (REFUSED)

C15. Why do you give that rating? ***[SKIP TO D1]***

C16. The Multifamily Energy Efficiency Rebate Program offers property owners and managers of two or more units incentives to install energy efficiency improvements in lighting, HVAC, insulation, and windows for both common areas and rental units. Lighting changes are provided at little or no cost. Rebates are available for high efficiency dual pane windows, ceiling fans, wall insulation, water heaters, air conditioners and heat pumps, refrigerators, washing machines, and pool pumps. Based on this information, how interested would you be in participating in the Multifamily Energy Efficiency Rebate Program? Please use a scale of 0 to 10, where 0 means you are not at all interested and 10 means you are very interested.

0 1 2 3 4 5 6 7 8 9 10 -98 (DON'T KNOW) - 99 (REFUSED)

C17. Why did you choose that rating?

D. Intention/Behavior/Maintenance

Now we want to ask about past and future energy saving activities your company may have taken at the [ADDRESS] location, or may be planning to take.

D1. For each of the following specific energy saving actions at the [ADDRESS] location, has your company already taken that action, is your company currently taking it, or is your comapny planning to take that action **within the next three years**? **[CODE TO SKIP ACTIONS TAKEN THROUGH PROGRAM] [-97= NOT APPLICABLE]**

Behaviors/ investments	D1_1. Has your company/Is your company …	D1_2. [IF D1_1=2] Does your company plan to… in the next three years
a. Install/ed/ing energy efficient lighting for common areas/outdoors 2	1. Yes 2. No	1. Yes 2. No
b. Install/ed/ing energy efficient cooling equipment for common areas 3	1. Yes 2. No	1. Yes 2. No
c. Install/ed/ing energy efficient heating in property 4	1. Yes 2. No	1. Yes 2. No
d. Install/ed/ing more energy efficient clothes washers for the common area 5	1. Yes 2. No	1. Yes 2. No
e. Increas/ed/ing the energy efficiency of the property shell, such as putting in insulation 6	1. Yes 2. No	1. Yes 2. No
f. Had a whole property energy audit performed by a building professional 7	1. Yes 2. No	1. Yes 2. No
g. Increas/ed/ing the energy efficiency of appliances in tenant units 8	1. Yes 2. No	1. Yes 2. No
h. Install/ed/ing more energy efficient lighting in tenant units 9	1. Yes 2. No	1. Yes 2. No
i. Market/ed/ing your properties as being energy efficient 10	1. Yes 2. No	1. Yes 2. No
j. Provide/ed/ing prospective tenants the average electric and gas bills for units before they rent 11	1. Yes 2. No	1. Yes 2. No

D2. ***[IF ANY D1_2=1]*** For any of the improvements that your company is planning to make in the next three years, and given what you know about the program, how likely is your company to apply for rebates and assistance from **[Southern California Edison/Pacific Gas**

and Electric] Multifamily Program**?** **Please use a scale of 0 to 10 where 0 = not at all likely and 10 = very likely.**

0 1 2 3 4 5 6 7 8 9 10 -98 (DON'T KNOW) - 99 (REFUSED)

D3. ***[IF ANY D1_2=2]*** For the areas where your company is not planning to make energy efficiency improvements over the next three years, can you please tell me the reasons your company is unlikely to make those improvements? **[ALLOW MULTIPLE RESPONSES; DO NOT READ] REFINE PROBES**

a. Already did all cost-effective energy efficient improvements
b. Unaware of/unable to identify measures
c. Tenants pay their own utility bills
d. Lack maintenance staff to install measures
e. Lack of time/not a priority
f. Financial limitations
g. Lack of information on energy savings or costs
h. Question reliability of energy efficient equipment
i. Energy savings estimates for equipment are unreliable
j. Fuel prices were low
k. New to property
l. Timing
m. Technology unavailable
n. Replacing on an as-needed basis
o. It isn't necessary
p. Other

D3c. **[SPECIFY]**

-98. DON'T KNOW

-99. REFUSED

D4. Would you say your company always, often, sometimes, or never consider energy efficiency when deciding to make improvements for your property(ies) that would affect its/their energy use? This might include the efficiency level of appliances and lighting or changes to doors, windows and the building's insulation.

a. Always consider

b. Often

c. Sometimes

d. Never consider

-98. (DON'T KNOW)

-99. (REFUSED)

D5. And, as a routine part of your company's property maintenance, does your company take steps to make sure the property is operating as energy efficiently as possible – such as changing furnace filters or weatherstripping doorways --?

a. Yes

b. No

-98. (DON'T KNOW)

-99. (REFUSED)

D5A. IF YES: What steps do you take?

D6. Are energy efficiency HVAC and building improvements considered part of keeping your tenants comfortable?

a. Yes

b. No

-98. (DON'T KNOW)

-99. (REFUSED)

E. Site Characteristics and Efficiency Views

Finally I'd like to know more about the specific property you own or manage at [Address], and then some general views on energy efficiency.

E1. What percent of the units in the property at **[ADDRESS]** use a central heating system?

[RECORD RESPONSE]

-98. (DON'T KNOW)

-99. (REFUSED) **[TERMINATE POLITELY]**

E2. What percent of units at that property at use a central cooling system?

[RECORD RESPONSE]

-98. (DON'T KNOW)

-99. (REFUSED)

E3. What percent of units use a central hot water system?

[RECORD RESPONSE]

-98. (DON'T KNOW)

-99. (REFUSED)

E4. What percent of your tenants pay for their own electric bills?

[RECORD RESPONSE]

-98. (DON'T KNOW)

-99. (REFUSED)

E5. What percent of your tenants pay for their own water bills?

[RECORD RESPONSE]

-98. (DON'T KNOW)

-99. (REFUSED)

E6. What percent of the tenants at this property have natural gas?

[RECORD RESPONSE]

-97. Not Applicable

-98. (DON'T KNOW)

-99. (REFUSED)

E1. **[If E1 > 0]** What is the primary fuel used to heat the units at this property?

a. electricity

b. gas

c. other

-98. (DON'T KNOW)

-99. (REFUSED) **[TERMINATE POLITELY]**

E7. ***[IF E6 > 0]*** Among tenants who have natural gas service, do they pay their own natural gas bills or is that included in the rent?

a. Pay

b. Included

-98. (DON'T KNOW)

-99. (REFUSED)

E8. Does your organization have an energy policy – such as formal or informal rules about buying equipment that has a certain level of energy efficiency?

a. Yes

b. No

-98. (DON'T KNOW)

-99. (REFUSED)

E9. Does your company have a person who, as part of their job responsibilities, is charged with managing energy use at your property(ies)?

a. Yes

b. No

-98. (DON'T KNOW)

-99. (REFUSED)

E10. Do you specifically market your property as a green building?

a. Yes

b. No

-98. (DON'T KNOW)

-99. (REFUSED)

E11. Finally, please rate how (**Owner or owner rep**: you, as the owner [or owner - representative]) (**Property manager:** the owners**)** of the property at **[SERVICE ADDRESS FROM SAMPLE]** view using energy at that property. Using a scale from 0 to 10, where 0 means do not at all agree and 10 means strongly agree, how much do (you) (the owners) agree with each of these statements? **[RECORD RATING: -98= DON'T KNOW, -99= REFUSED]**

a. (I/We/They) feel a responsibility to decrease the energy use at this property in order to protect the environment.

b. (I/We/They) feel a responsibility to decrease energy use at this property in order to reduce greenhouse gasses.

c. (I/We/They) feel a responsibility to decrease energy use at this property in order to reduce energy costs.

That's all the questions I have. Thank you for your time and insights today.

F. Closing

F1. ***[IF A5=1; OTHERWISE SKIP TO F3]*** As I mentioned earlier, we are going to mail you a $50 incentive check as a thank you for completing this questionnaire. To which name and address would you prefer we mail the incentive check?

[RECORD NAME AND ADDRESS]

F2. Is **[NAME AND ADDRESS FROM F1]** correct?

a. Yes

b. No ***[GO BACK AND CAPTURE ADDRESS AGAIN IN F1]***

F3. Do you have any other comments?

a. Yes

A3a. **[SPECIFY]**

b. No

-99. (REFUSED)

[TO ALL RESPONDENTS] Thank you for your taking the time to give us your views. [SOUTHERN CALIFORNIA EDISON/ PG&E] will use the results of these interviews to improve their multifamily programs.
