RECONSIDERING WHAT WE MEASURE: A WHITE PAPER

Residential Decision-Making and Proposed Standard Questionnaire Items

Study ID SCE0305

Prepared for:

SOUTHERN CALIFORNIA EDISON
&
PACIFIC GAS AND ELECTRIC

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August 2011

ACKNOWLEDGEMENTS

The authors wish to thank a number of people who were very helpful at various stages of this project. Rick Ridge and Ralph Prahl as CPUC Energy Division consultants, Peter Franzese from the Energy Division, Chris Dyson from KEMA, Sharyn Barata from Itron, Brian Smith from PG&E, and Carol Edwards and Brett Close from SCE all bore with us through long conference calls and provided valuable input. Mersiha Spahic of Research Into Action contributed a great deal of research to the effort, and Laurie Lago was extremely helpful in editing and formatting. Special thanks go to Caroline Chen for initiating and guiding the whole project and to many others who gave input along the way.

FOREWORD

For nearly three decades, we've been trying to better understand energy use and energy conservation behavior. This "we" includes academics, government energy planners and regulators, utility companies, non-profit interest groups, and a robust private sector energy efficiency industry. It should be admitted that most of the talk and attention has revolved around energy-using technologies, devices, "measures," or "widgets," as we've come to call them. But from the beginning, *people* have also been part of the story. Technical devices usually don't use energy on their own. People are involved. So a range of questions have been raised about how people use energy, why they save and waste energy, how they think about energy, what can be done to help them "do the right thing," and who should have the right to set the rules about how people use energy.

We've looked at these "people questions," which we're now commonly calling *behavioral issues*, in a variety of ways. Some have focused on the adoption and diffusion of energy-using devices and persons' choices to buy more and less efficient technologies. Others have been more concerned about behavior change – getting people to use less energy by changing unconscious habits and everyday conscious choices of how to use energy. But these are tough questions to ask and we still have only sketchy answers to most of them (although this hasn't stopped strong assertions of knowledge from some quarters and equally strong criticisms from others).

Three decades of interest in people and energy hasn't been driven by idle curiosity. Over that period of time, we have invested as a society billions of dollars in energy efficiency programs, financial incentives (rebates, tax credits, tariffs), and consumer information (bill stuffers, websites, mass media buys, public events). We have scrupulously measured energy use and estimated energy savings. We have collectively accomplished a lot. But much more remains to be done, since the large efficiency "gap" (between what we know is technically possible/economically beneficial and what we actually do) remains vast. It turns out that at the heart of our energy efficiency enterprise is a "people problem" that frustrates the effort to get new devices and habits into place.

But I just said that we'd been working on this for thirty years. Who's been asleep at the switch? Well no one, really. The regulated utility sector, which has been primarily charged with acquiring energy savings, has been limited by regulation from going after savings from behavior change. Regulators, in turn, have been limited by a legal logic of device-centered savings that is part of their basic charter. Efficiency program people have been too busy executing programs to make note of anything but a few "best practices" and consumer satisfaction. Evaluators have been narrowly charged with a focus on programs rather than consumers. Academics have pursued questions through fairly narrow theoretical lenses while operating within disciplinary silos. They also can only afford to study what is funded, and very little behavioral energy research has ever been funded by governments, firms, or NGOs.

So our knowledge of the behavioral bits of the energy puzzle is scattered, fragmentary, and not easy to apply to the concrete problems of how to save energy that are faced by regulators, utilities, program planners, evaluators, and (lest we forget them) energy users. This isn't new news. I first wrote about this situation in 1993. I was not the first or the last to

make the same points. And, given the regulatory frameworks and funding levels, little has changed in twenty years.

To academic researchers, the holy grail of energy consumption and conservation studies is the "integrated model" that can theoretically and analytically represent the widest range of factors that are salient to shifting demands for energy. There have been several attempts to produce such a model and none have proven particularly successful to date. The effort continues, but is faced with the same hurdles of disciplinary narrowness and the disconnect of theoretical models from programs and practice.

This brings us to the present report. The authors are joining the quest for the grail. They aren't there yet, but they have made some notable progress. Drs. Randazzo and Peters are attempting nothing less than a new integrated model of consumer choice that represents not only an advanced theoretical formulation, but also a model that can be applied and tested using real world data on energy use, behavior, and a host of factors influencing both. Much to their credit – and the credit of their sponsors – this work is based upon a careful reading of the existing literature. It is thoughtfully formulated in the structural equation context. The elements of the model are not simply the conceptual categories (e.g., individual variables, social norms, intentions, etc.) used before, but an elaboration of the elements of each and a logical structure relating one to another. It is an ambitious undertaking and an impressive effort.

Is it a true causal model? Probably not. But no one else has yet offered one either. Is it a model of everything – some sort of grand general model of energy use and energy savings? No, and the authors have no intention of proposing such a model. They are careful in their interpretation of earlier work and prior attempts at modeling conservation/efficiency choice. They are careful to circumscribe their goals and they present numerous caveats about what can be hoped for from such a model and what cannot. Is the attitudinal approach the last word in understanding and characterizing energy-related choices? I doubt it. I personally prefer a more social approach. But I cannot fault Randazzo and Peters' strategy of building on the foundations of other attitudinal approaches, recognizing the criticisms and limits to their usefulness, while bringing in a variety of situational and social context/demographic factors that are almost always ignored in previous attitude-behavior models and studies.

I believe that they have moved the ball a good distance in bringing insights from academic consumption and conservation studies to bear on concrete problems of efficiency program design, and bringing our best collective knowledge to date, with all its limitations, into the conversation about how to better understand the "people problem" and the efficiency gap. This is a solid accomplishment in our collective "work in progress" toward understanding and accelerating the adoption of efficiency improvements in homes and businesses.

The report is something that academics should read for a primer on the area and a good view of the state-of-the-art in industry thinking about efficiency choice. And it is a must-read for efficiency program planners and evaluators who want to move their programs onto a more solid theoretical footing and with a better understanding of their clients' and customers' choices and constraints.

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EXECUTIVE SUMMARY

For many years, the energy efficiency industry has used the *Awareness, Knowledge & Attitude* (AKA) framework for thinking about influencing customers' behavior. This refers to the notion that if programs can increase *Awareness* (A) and *Knowledge* (K) about energy efficiency then, they will change *Attitudes* (A) and energy-efficient *Behaviors* (B) will follow. AKA or AKA-B appears frequently in program logic models, program theory, and performance metrics.

Given the importance of that framework, it was important to review it to determine whether it is adequate:

- Does the framework facilitate thinking about and measuring how customers are influenced by energy efficiency programs?
- Does the framework provide adequate guidance to program planners who want to influence customers to engage in more energy-efficient behaviors, including practices and purchases?

These questions imply a focus on intentional behavior change, not unconscious, sudden, or unconsidered changes, and that was our focus in this paper. In addition, it pertains entirely to the residential sector, though this includes homeowners and renters, as well as multifamily property owners and managers.

This paper reviews academic literature in social psychology and related fields, as well as papers and projects from the energy efficiency industry. The paper ends with two new, more complete conceptual frameworks for understanding energy efficiency behavior change (one for homeowners and renters and the second for property owners and managers), and two sets of questionnaire items intended to measure the concepts in the frameworks.

Even though the AKA framework has been in common use for a long time, in actual practice, the industry has been operating under the *Physical-Technical-Economic Model* (PTEM) (Lutzenhizer 2009) for most program design and implementation. The PTEM assumes that "…consumer choices are instrumental, purposeful, rational, and secondary to the devices, machines and appliances that are seen as the actual users of energy." A more appropriate model would take into account the non-rational aspects of the human decision-making process as well.

Another common idea is that providing information will be sufficient to change customer energy behavior. While information can have an effect and is incorporated into the AKA model (specifically the "K" portion), it is generally not enough (Steg 2008). This paper reviews a number of models of behavior and behavior change, but a central one is Fishbein and Ajzen's (1975) *Theory of Planned Behavior* (TPB), as well as stage models, especially the *Trans-theoretical Model* (TTM). The TPB and the TTM models strongly influenced our final recommended models, as did the *Concern, Capacity, and Conditions* (3 Cs) framework (Kunkle, Lutzenhiser & Bender 2004), and observations about habits and decision heuristics (Arbuthnott 2009; Dillahunt et al. 2009; Kunkle, Lutzenhiser & Bender 2004; Steg & Vlek 2009; Wilson & Dowlatabadi 2007).

The model we recommend for use in program planning and measurement in the residential sector is a stage model. We applied results from an existing and unrelated study to the model and found the model to be consistent with the data. We also successfully integrated the model with the segmentation scheme developed independently for the Marketing, Education, and Outreach team (Opinion Dynamics 2009).

The stage model is descriptive only; it does not indicate what causes or influences consumers to make energy efficiency choices. Therefore, we also present a model based on the stages with influences/causes included. This influence model helps the program planner think about where to target interventions. As the title of this paper implies, it is also meant to guide the measurement of consumers' positions relative to the stages and the causes or influences that may have been affected by programs. The model(s) for the property owners and managers are similar and designed for the same purposes.

The paper concludes with suggested questionnaire items to be included in process evaluations in this sector to permit comparison of results across time and programs. These questions address only the stages. Additional questions pertaining to causal influences specific to the program being evaluated should be included and are the responsibility of the evaluator.

Finally, the questionnaire items have not been tested. These tests for validity and reliability will be done as part of two separate process evaluations for the 2010-2012 program cycle.

INTRODUCTION

The purpose of this paper is to identify concepts and questionnaire items that can be used across residential programs to track customer *Awareness*, *Knowledge*, *Attitudes*, and *Behavior* (AKA-B). The AKA framework is our point of departure, as it is the one that has been used by the industry in program theories and in the recently-established Program Performance Metrics (PPMs). While we are using the AKA-B framework, this paper is not an endorsement of this framework as a preferred program theory, or even as an optimum program theory; it is just a framework. The paper is divided into two parts: Part I is concerned with residential customers; Part II addresses multifamily property owners/ managers.

Once the most useful concepts for each market are described, questionnaire items are suggested for general and consistent use. Since the point of the proposed questions is to allow comparisons across programs (and across time), they must be asked at a general level. Questions that are program-specific cannot be used in this way, which has some advantages and disadvantages that we discuss in a later section.

This work began where the 2008 white paper *A Short, Focused Review of the Literature on Attitudes and Behavior in Efforts to Promote Energy-Efficient Behavior* (Randazzo 2008) left off. That effort, focused on the academic research literature on attitudes and behavior published through 2008, asked the question: "Is the AKA-B framework still relevant?" The answer was, yes but with additions and elaboration. The current effort focuses on articles published since then, as well as papers produced in the energy efficiency industry but not published in academic journals. In addition, some papers published in the pre-2008 period were discovered for the first time and were therefore included in this review. This usually happened when a more current article referred to an earlier one or when someone suggested a paper we hadn't found.

A difficult and essential question that arises from the consideration of attitudes, or AKA more generally, is the question: *Attitudes toward what?* or *Awareness of what?* or *Knowledge about what?* The target of the AKA could be specific technologies (usually the focus of innovation diffusion or market transformation efforts), or specific behaviors (e.g., turning off computers or pulling drapes), or programs (e.g., Are you aware of the home energy audit or appliance recycling program?), or energy efficiency in general, or the variety of appliances and technologies available, or the connection between energy efficiency and climate change, or many other possibilities.

In the end, the result of this specific project is questions about something more general than technologies or programs, because the questions are meant to be used across programs and across time. However, since similar issues must be addressed by evaluators of specific programs, and since much of the research literature is based on specific behaviors and products, this paper discusses both general and specific question options. The final recommended questions, however, are general.

PART I: RESIDENTIAL DECISION-MAKING AND PROPOSED STANDARD QUESTIONNAIRE ITEMS

Current Program Approaches to Influencing Customer Behavior

As a matter of context, at least, it is informative to start with the theoretical thinking behind California's energy efficiency programs. An understanding of this is useful as one goes through the research literature on what actually affects energy efficiency behavior and how to accomplish it. One of the literatures surveyed was the industry writing about programs in California currently and historically. The California Institute for Energy and Environment (CIEE) commissioned a series of white papers on the behavioral assumptions underlying energy efficiency programs in California. The most relevant paper for our project was the one completed for the residential sector (Lutzenhizer 2009). Lutzenhizer's paper and others that are related to it (Kunkle, Lutzenhiser & Bender 2004; Wilson & Dowlatabadi 2007) assert that the prevailing model for thinking about affecting residential energy consumption is the *Physical-Technical-Economic Model* (PTEM). A quote from the paper will describe it best:

> In terms of the 'nuts-and-bolts' of the policy frame, a *physical-technical-economic model* (PTEM) has characterized consumer behavior and choice as instrumental, purposeful, rational, and secondary to the devices, machines, and appliances that are seen as the actual *users* of energy. The role of energy efficiency programs is to insert efficiency measures (usually substitute devices) into this PTEM context, providing equivalent 'energy services' at reduced levels of energy demand (ii).

Under this model, consumers are assumed to be entirely rational and intentional, making economically-wise decisions. More importantly, Lutzenhiser observes that the model almost overlooks the consumer, considering him/her only to be the vehicle by which technologies/ products replace older versions in buildings, therefore saving energy. The author further critiques this approach by noting that a head-of-household is the contact and is assumed to have full authority to implement all energy-related decisions for the household. There is rarely a mention of family, roommates, or households.

Lutzenhiser goes on to suggest that energy-using behavior is subject to many influences, including many that are out of the consumer's control. More importantly, the behaviors that are under personal control involve *convenience*, *habit*, *comfort*, *values*, *environmental disposition*, and *the immediate situation*. Lifestyle determines a great deal of energy use and this is *normatively* based (i.e., it is commonly shared with others having a similar lifestyle -- e.g., going to work or to school five days a week, shopping for groceries, etc.).

Current and past programs are almost entirely aimed at providing information and/or incentives, regardless of the theoretical basis being used (Wilson & Dowlatabadi 2007). However, while information is useful and a necessary component of efforts to change behavior, it is rarely sufficient (Steg 2008), as it usually only has modest effects; it is effective mainly when solutions are not costly and not inconvenient, and when it is tailored

to recipients.

Stern (1999) agrees by saying that simple information programs don't change behavior or have only modest effects, even when presented in an optimal way.

Incentives can overcome some barriers, but Lutzenhiser notes that the incentives used in California programs are not calculated based on an economic formula, but are used only as inducements. Incentives have other limitations that will be discussed in more detail later. Lutzenhiser's main points are that the assumptions underlying current programs have been effective mainly because programs have been able to pick "low hanging fruit," which will not be possible over the longer term. Programs will have to be based on a better understanding of actual customer behavior.

The following sections summarize what is currently known about that behavior, its basis, and what can change that behavior. This will be the basis of our recommendations for what to measure to track program success in affecting customer energy efficiency behaviors and their precursors. It should perhaps be explicitly stated here that measuring the precursors to actual behavior change is important in order to know if our programs are making progress, even if energy efficiency behaviors are not yet optimal.

The Major Extant Theoretical Models That Predict Behavior and Behavior Change

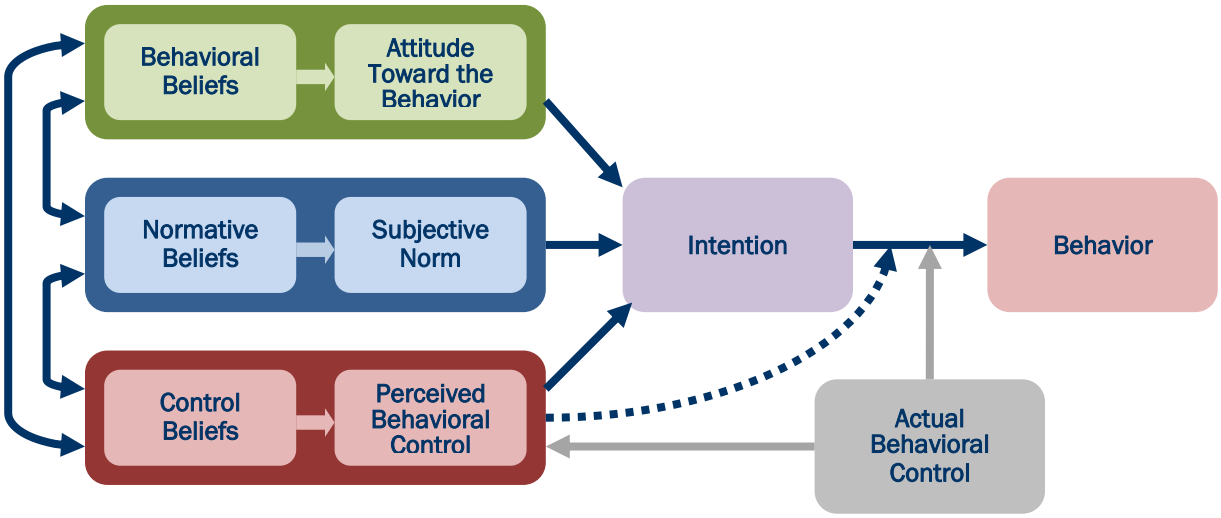
Following is a brief summary of the major theories that form the starting point for a great deal of research on the promotion of desirable behavior (including health behavior, risk behavior, and environmental behavior). The summaries are presented here to refresh the reader's memory from the earlier 2008 paper and to extend the thinking.

Theory of Planned Behavior (TPB)

Fishbein and Ajzen (1975) are the founders of a line of theory and research that focuses on *attitudes* and *subjective norms* in predicting behavior intentions. Attitudes are determined by the magnitude of the value attributed to the attitude target, as well as the probability that the value will be realized. Subjective norms are at the center of the theory and can be thought of as the actor's perception of what the relevant people in his/her life think should be done. In this case, the attitude target would be the behavior under study and could include energy-efficient behavior.

Figure 1 shows a current rendition of this theory (Ajzen 2006). Subjective norms are at the center of the model, with various types of beliefs about the target behaviors feeding into subjective norms and to attitudes, including perceived behavioral control. Behavioral beliefs refer to the beliefs about the outcome of the behavior. In the case of energy efficiency behaviors, this might mean the belief that one's actions, together with many others' actions, will produce the desired outcome.

Figure 1. A Diagram of Ajzen's Theory of Planned Behavior



From Ajzen website, *http://www.people.umass.edu/aizen/tpb.diag.html*, accessed July 22, 2011.

A somewhat related concept is *perceived behavioral control*, which predicts intentions, and together with *actual behavioral control* is seen as affecting the relation between intention and actual behavior. Perceived and actual behavioral control are important concepts to consider in explaining behavior change as a lack of control or self-efficacy, and in approaching a new behavior is key to success in changing. In the case of energy efficiency, an example might be a person oriented to purchasing an energy-efficient product, but who knows that someone else in the household is against it. Thus, the person may feel she/he doesn't have the ability to carry through on the behavior implied by the attitude held about it.

One of the limitations of this theory is the relative absence of the affective (emotional) components of behavior change. This is important in the field of environmental/energy efficiency behaviors because there is often an altruistic facet of these types of actions, even though many of the desired behaviors are easily justified on rational grounds.

Norm Activation Theory

A large body of theorizing and research has been based on *norm activation theory*, beginning with Schwartz (1977). The *norm* in this theory is referred to as a *personal norm*, which emphasizes the emotional aspect of norms, as it refers to the valuing of something such as the environment's well being. Norm activation occurs when a threat to the object of the personal norm is perceived. In this situation, the personal norm is experienced as a moral obligation to protect what is threatened. In the case of personal norms concerning the well-being of the environment, a perceived threat to its well-being would lead to environmentally protective behaviors.

An important element of this line of theory is the ascription of responsibility to the self that is inherent in the activation of a personal norm. Thus, *ascription of responsibility to the self* is an important concept in this theory, reflecting the altruistic element of motivation to take action. The theory has much in common with Ajzen's TPB, but it adds the altruistic component in the use of the concept of ascription of responsibility to the self.

Values, Beliefs, Norms (VBN) Theory

Another theory in the Schwartz tradition is the *Values, Beliefs and Norms* (VBN) theory (Dietz, Fitzgerald & Shwom 2005). In this theory, basic values are seen to influence beliefs about consequences of behaviors toward what is valued (or not). According to this model, behavior is triggered by beliefs about consequences and about personal responsibility for taking action. The most common phrasing for beliefs about consequences is *awareness of consequences* (AC) and it is a commonly-researched concept in the field. Beliefs about personal responsibility, as seen in the Norm Activation model, is equivalent to *ascription of responsibility* (AR), described above. The theorists working in this theoretical framework identify three types of values that are most relevant to environmental behaviors: *humanistic altruism*, *biospheric altruism*, and *egoism* (self-interest).

One of the developments that has emerged from the norm activation and VBN-oriented research is Dunlap and Van Liere's (1978) concept of the *New Environmental Paradigm* (NEP), later modified (Dunlap et al. 2000) to the *New Ecological Paradigm* (also NEP). The NEP is defined against the *Dominant Social Paradigm* (DSP), which is characterized by belief in development, economic growth, science, technology, etc. This paradigm is generally associated with hostility toward environmentalism. In contrast, the NEP represents a "new" worldview that includes a belief in the limits of growth and the preservation of resources and the environment; it takes into account beliefs about the effects human activity have on the biosphere. Naturally, this worldview tends to lead to pro-environmental attitudes, beliefs, and behavior.

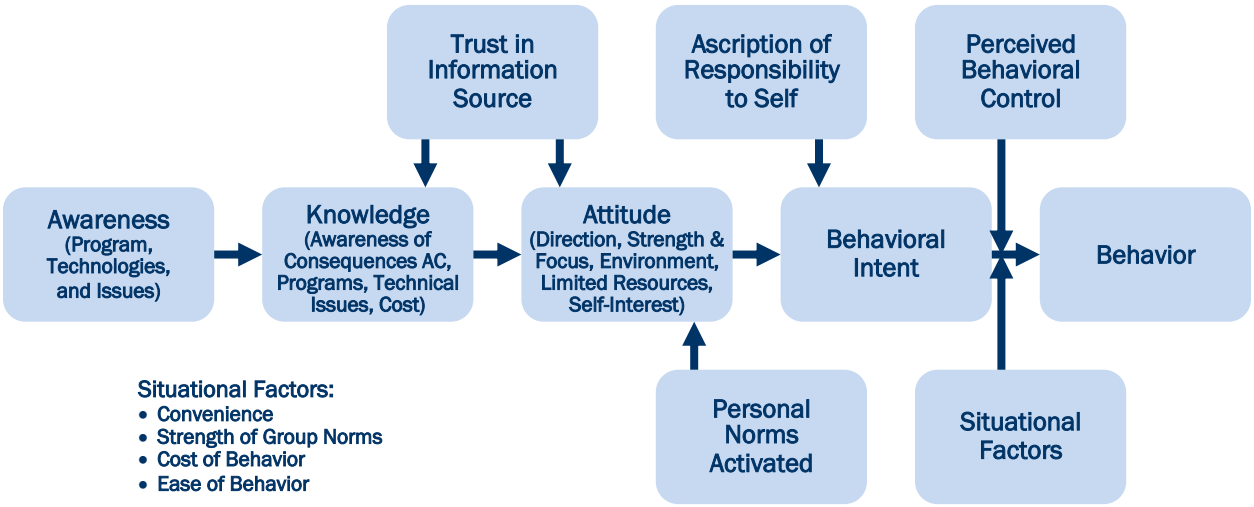
AKA-B Framework

The conceptual framework referred to as AKA or AKA-B isn't properly called a theory, but it has been a fairly useful way to organize thinking about how programs may affect energy efficiency behaviors. The origin of the framework is elusive, but it is in common use in a variety of industries. It assumes that *awareness* of the target behavior or technology is a first step toward adopting the target. This is logical, as a behavior is unlikely if a person is unaware of its possibility. The next step is *knowledge*, which can be seen as awareness taken to a new level of detail. *Attitudes* toward the target can be thought of as following from knowledge, or can be considered something that precedes detailed knowledge. Which direction of action you accept probably depends on how specific the attitude is that you are considering. The more specific the attitude, the later in the process it should go (e.g., attitude toward recycling is quite specific). Very broad attitudes can be almost as basic as values. An example might be attitude toward the environment.

A positive attitude is seen as leading to behavior. This is a very simple model, which is one of its advantages. It helps us to focus on a few concepts central to predicting behavior and targeting its precursors by program interventions. The disadvantage lies also in its simplicity, as it does not stand alone very well in light of the importance of the components identified in the TPB, norm activation, and VBN theories.

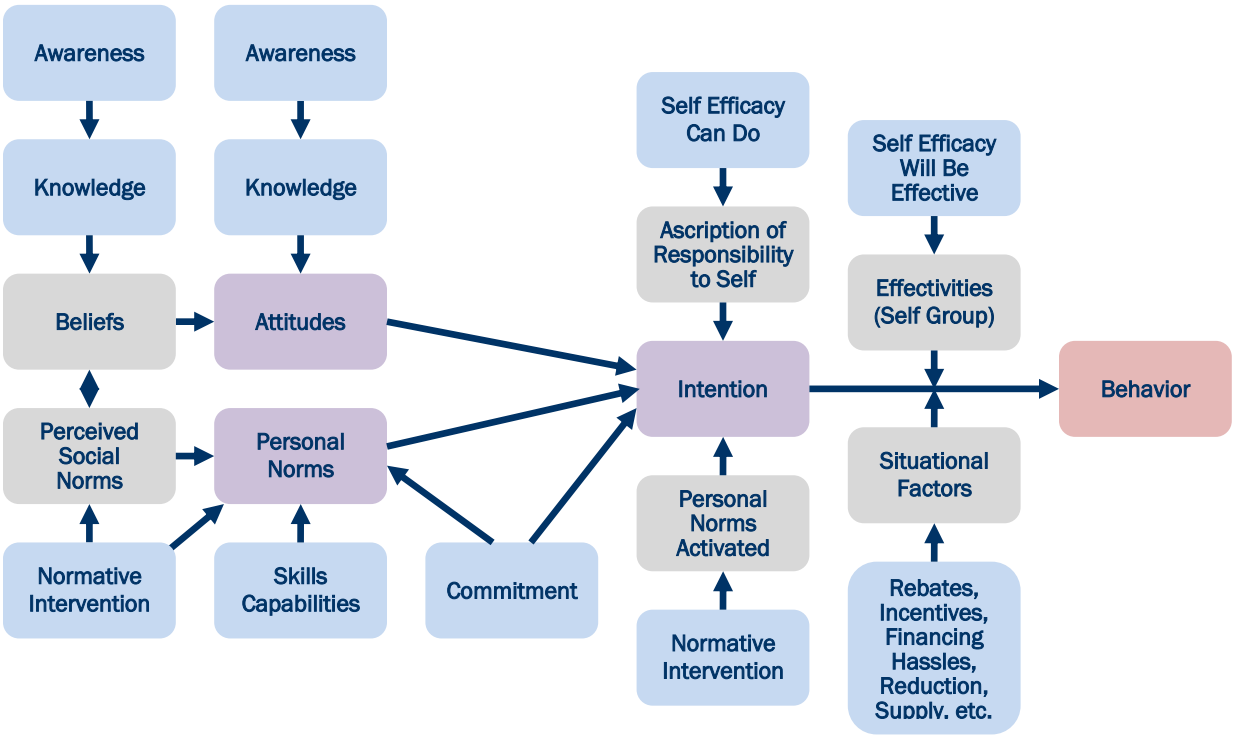
In an effort to incorporate the TPB, the norm activation theory, and the VBN theory with our existing AKA-B framework, a diagram of this integration was presented in the original 2008 white paper. Figure 2 is a reproduction of that model.

Figure 2. A Synthesis of Several Theories on Changing Attitudes and Behaviors



Further elaborations on this model were proposed by Peters (personal communication, 2008), as shown in Figure 3.

Figure 3. A Further Possible Integration of Models (Incorporating AKA-B and TPB)



The blue boxes are possible ways to intervene in the individual thinking process. The beliefs are already in place (since the 1980s, more than 75% of the population believe that energy conservation is good and needs to be supported by the government). The problem is not really beliefs generally, but perhaps beliefs specifically about a behavior.

The lilac boxes are the target areas that are the remaining areas for intervention. Awareness and knowledge are the tools that the AKA model of intervention is arguing for, yet there are other ways to intervene, such as role-playing, commitments, self-efficacy messaging/ training, which can be allocated in different ways.

Psychologists have shown that awareness and knowledge as defined by information and marketing are not the most effective types of intervention, they are just part of the most effective approaches.

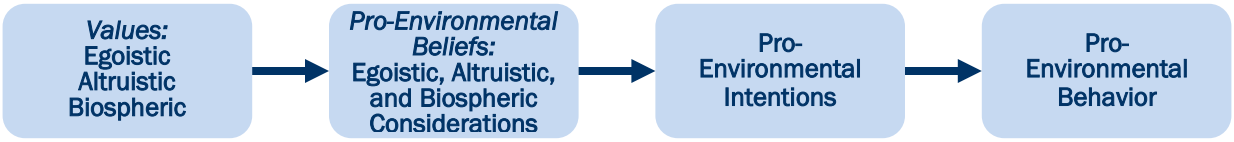
Note that this model shows *awareness*, leading to *knowledge*, leading to *beliefs*, and also leading to *attitudes*. Note too, the addition of the concept of *self-efficacy* to the model in two places. In one place it represents the same idea as *perceived behavioral control* (Figure 1). In another place, it represents *behavioral beliefs* or *the efficacy of oneself* as part of a group action to produce the desired outcome (also Figure 1).

Both concepts are used in multiple ways in the literature. The model, as drawn, also calls attention to potential areas of program intervention.

Values

A model presented by DeGroot and Steg (2009) is much simpler than what we have discussed so far, but is presented here (Figure 4) to show the emphasis on values. The values on which they build their thinking and research are categorized as described in the VBN section: *Egoistic*, *Altruistic*, and *Biospheric*. Of course, the altruistic and biospheric values are most conducive to pro-environmental intentions and behavior.

Figure 4. A Value-Based Theory of Environmental Behavior



This theoretical approach does not suggest that program interventions will change the values that people hold. Rather, it suggests that the values that people already hold can be made more salient and conflicts between values can be reduced by well-designed campaigns. This can lead to more pro-environmental beliefs and considerations, which leads to pro-environmental intentions, and then to behavior. It is also true that pro-environmental behaviors can be promoted by focusing on egoistic values (e.g., saving money). However, the authors point out that this approach leads to short-lived environmental behaviors because when the egoistic gain is gone, the behavior will go too.

Stage Theories

Two major stage theories will be discussed here. They will be discussed in more detail than previous theories, as the latter were already discussed in the earlier white paper (Randazzo 2008), and the stages may become quite important in program design and in measurement of their effects. The first theoretical approach is referred to as the *Trans-Theoretical Model* (TTM) of behavior change and is found most prominently in the literature on changing health-related behaviors (Prochaska & DiClemente 1984). The second stage theory is the *Innovation Diffusion* (ID) theory of adoption of new technologies or other innovations (Rogers 2003).

The importance of stage theories, for our purposes, is that they address, in detail, the issue of readiness to change some kind of behavior. From a program design perspective, understanding the degree of readiness to make a change can be central to messaging and approach (someone who isn't even aware of a need to change or hasn't even thought of it should be approached differently than someone who has thought a lot about it and knows some of the pros and cons of the behavior). From a measurement perspective (our current

one), tracking customers' readiness to adopt energy-efficient behaviors and appliances, and whether readiness has changed as a result of the program, could be very important. In addition, readiness to change is more proximal to behavior than our traditional AKA concepts, making it a better measure of program impact than more distal concepts, since behavior change is the ultimate goal of energy efficiency programs.

Trans-Theoretical Model (TTM)

The current TTM thinking suggests five stages that describe the process by which people make a change in their behavior: *Precontemplation*, *Contemplation*, *Preparation*, *Action*, and *Maintenance*.

- Precontemplation. In this stage, the person has no intention of changing their behavior. They may be unaware of the desirable change, or only vaguely aware. People in this stage can benefit from interventions that raise their awareness.
- Contemplation. In this stage, the person is aware that there is a problem with how they are behaving (or not behaving) and are seriously thinking about making a change. Here they are considering the pros and cons of a new behavior pattern, and the pros probably outweigh the cons. They just aren't ready yet.
- Preparation. People in this stage intend to take action in the next month and have probably made an attempt in the past year, but have gone back to their original state. However, they still intend to make the change. These people can probably use encouragement and further motivation.
- Action. Individuals in this stage have modified their behavior, experiences, or environment in order to succeed in the change and have maintained the new behavior for a relatively short period of time. They are putting effort into the new behavior. These people may benefit from reinforcement and recognition of the behavior.
- Maintenance. This is a consolidation stage, but effort is still required and people may relapse into the precontemplation stage. Further reinforcement and motivation to maintain the behavior may be called for here.

Researchers have found that people do not usually go smoothly through each stage. There are usually slips back into prior stages.

There is a substantial literature on efforts to help people with addictive behaviors and those who need to lose weight or start exercise programs. Meta-analyses have shown that interventions tailored to stage-of-change are more effective than those not tailored; the same is true for tailoring to other individual factors (Noar, Benac & Harris 2007; Velicer & Prochaska 2008). Research on this issue specifically addressing energy-efficient behaviors could focus first on defining stages and then on determining what interventions were most effective for what stages. However, it is probably safe to say that readiness to change is common to all domains of behavior as a critical concept defining where a person or a group is in the process of change.

Another concept that is part of this theory is *Decisional Balance*. This concept reflects the current thinking of the individual in terms of weighing the pros and cons of changing. As contemplation of change progresses, the pros increasingly outweigh the cons, changing the decisional balance. This could also be similar to the concept of *attitude ambivalence*, which

is defined as a respondent having high scores on both positive and negative attitudes about a target behavior.

Innovation Diffusion

The most current version of this theory is described by Rogers (2003) after having first introduced it in 1962. The theory has been very well applied to our industry by John Reed and colleagues (Reed, Jordon & Vine 2007). It is another stage theory that is focused on the process of adopting innovations, which are generally technologies, but it could also be applied to behaviors of other kinds. Clearly, adopting innovations could apply to both energy-efficient technologies and behaviors. This theory addresses two levels of the adoption process: *the individual* and *the aggregate*. The latter level describes the speed and progress of adoption in a group or society.

It is the individual level that is of most interest to our current purpose. We are interested in knowing how and when individuals make the decision to adopt an innovation. Knowing this would allow us to track where individuals or households are in the process and when and why they move from one stage to the other. Actors can be placed into one of the following stages: *Awareness*, *Persuasion or Information*, *Decision*, *Implementation*, or *Confirmation*.

- Awareness. A person can be shown to be in at least this stage by asking the question: *Have you heard of the innovation?* A person in this stage can't be expected to take immediate action if it is proposed.
- Persuasion or Information. The critical question for this stage is: *Have you tried to find information about the innovation or talked with friends or colleagues about it?* People in this stage are likely to benefit most by information and arguments for adoption.
- Decision. A person in this stage has decided to adopt. A critical question for placement in this stage would be: *Have you decided to try the innovation?* Perhaps the most effective strategy for this person would be to provide concrete ideas on next steps to implement the decision.
- Implementation. If a person answers "yes" to the question *Have you actually purchased, used or installed the innovation?* he/she is legitimately in this stage. For our purposes, in order to include changes in energy efficiency behaviors, the question would need to be modified to accommodate the long list of relevant behaviors.
- Confirmation. In this stage, the adopter has tried the innovation and is able to decide whether the innovation will meet the household's needs. This can be established by asking: *Have you decided to continue or considered continuing to use the innovation?* For someone at this stage, a very beneficial piece of information could be feedback about the effects of having adopted. In the energy efficiency world, this would likely involve showing them the effect of the innovation on their energy consumption.

Reed, Jordan, and Vine (2007, 2-4) point out that it is essential to target interventions to the stage of the person or group:

> "For example, if awareness is high but program activities are oriented to awareness rather than persuasion or implementation, the program may not be effective."

From a measurement perspective, this indicates the importance of determining in what stage the population segment or individual is and the ability to track changes.

Steg (2008) suggested three potential ways the information could be tailored to individuals or households:

1. *Based on motivation:* environment or money
2. Relevance to household situation: appliances or characteristics
3. *Stage of change:* ready to change versus haven't considered it before

Rogers (2003) also identified population segments, or types of people or organizations, based on their innovation adoption receptivity. He showed estimated percentages of actors in each type or segment: *Innovators* (2.5%), *Early Adopters* (13.5%), *Early Majority* (34%), *Late Majority* (34%), and *Laggards* (16%). Of course, these percentages are likely to be somewhat different depending on the arena of the innovation.

A further note on stage theories of energy efficiency behavior adoption: In this industry, one should be mindful of the political dimension involved in motivating people to adopt or not adopt energy efficiency measures. This observation would apply to both stage theories described here. For example, the awareness or precontemplation stages may not adequately characterize those who are *not* contemplating changing their behaviors at least partially because of their views on the environment, climate change, etc.

The 3 Cs Framework

The 3 Cs framework – *Concern*, *Capacity*, and *Conditions* – represents another useful way to understand households' energy efficiency behavior (Kunkle, Lutzenhiser & Bender 2004). In this framework, conservation and energy efficiency adoption depends on a combination of three factors: 1) Level of concern; 2) his/her capacity to act; and 3) the conditions (including constraints) surrounding the action.

- Concern. This category includes a broad variety of concepts that are by now familiar: awareness of consequences, ascription of responsibility to self, personal norms, normative beliefs, concerns about cost, and many others. The authors indicate that concern must be present for actions to occur. They also state that concern depends on the perception of the problem as real and that it is important enough to warrant attention. It is also important to link the consumer's concern with particular solutions that are realistic for them. The measurement of the level of concern is familiar territory and there are many questionnaire items that have been developed for this.
- Capacity. A person's possibility to make energy-efficient choices is partly determined by his/her capacity to do so. Included in the list of capacities is: knowledge of product possibilities, ownership of target appliances, having cash or access to credit, etc., where purchasing energy-efficient products is the target area. However, behavioral changes are subject to limits on capacity as well. These changes are more likely when there is a history or a plan for saving energy in place (in the form of intentions, knowledge, and former habits or practices). A consumer's capacity to act is present only if his/her personal action is perceived to be possible (perceived behavior control and self efficacy).

Measurement efforts would tap into the extent to which customers felt they had the capacity to act, based on the various dimensions of capacity.

- **Conditions**. A major component of this category is constraints – such as lack of time, competing claims on attention, uncertainty about length of residence in a dwelling, and the constraints of existing housing and technology (e.g., whether it can be improved, what will fit, and when it needs to be replaced). These factors are important in understanding why consumers do and don't act to use energy more efficiently, but are not things that programs can change. Their most important part in the effort to change behavior is to be aware of them and to target programs differently depending on the customer's situation. Some aspects of this category are important to certain measurement issues, such as assessing the potential for future energy savings in a territory, but may not be essential to tracking the effects of intervention programs, except possibly to show different outcomes by different conditions households face.

Another way that constraints might be brought into measurement issues is in the way that questionnaire items are framed. As noted above, Lutzenhiser (2009) points out our implicit assumption that individual heads of households act without restraint and have authority to use or conserve energy as they see fit. This is clearly an incorrect assumption, as various members of any household will act with some combination of independence and constraint imposed by other members. It would be wise to frame questionnaire items in a way that takes this into account.

Habits and Heuristics

It has frequently been observed that in spite of the pattern of our energy efficiency programs over many years, energy use behaviors are not entirely, or even primarily, rational choices that we make (Aarts & Dijksterhuis 2000; Lutzenhiser 2009; McKenzie-Mohr 2000; Steg 2008, Steg & Vlek 2009; Wilson & Dowlatabadi 2007). Habits figure prominently in the determinants of energy use behavior (Arbuthnott 2009; Dillahunt et al. 2009; Kunkle, Lutzenhiser & Bender 2004; Steg & Vlek 2009; Wilson & Dowlatabadi 2007).

Habits are very important inhibitors of behavior change. Owens and Driffill (2008) say that psychological variables can have an effect only when stronger forces, such as habits, are not present. Similarly, Arbuthnott (2009) asserts that habits are very important in inhibiting behavior change and therefore one-time behaviors can be more easily affected than habitual ones. Kunkle, Lutzenhiser, and Bender (2004) observe that behaviors aren't just turned on and off like measures. Diligence and habits fluctuate. When concern is raised for some reason (e.g., an energy crisis or rising energy costs), strategies to keep energy use low will be executed diligently; at other times, behavior may be lax. During the times of concern, the highest level of diligence is set and can be invoked again as an alternative habit, and could possibly be used as a benchmark for measuring future or current behavior.

What are habits? Steg and Vlek (2009) point out that they are not a reflection of frequency, but of a pattern being triggered by an association between a goal and what has been done to meet that goal in the past. Measurement of habits means asking about how choices are made, not about frequency. Habitual behavior is about automated cognitive processing. For Wilson and Dowlatabadi (2007), a set of habits can be thought of as a strategy to manage energy use and whether the execution is diligent or lax, it will always involve comfort.

Given the importance of habits and the barriers that they represent, how can they be changed and can we measure that? Steg and Vlek (2009, 312) say that:

> Habitual behaviour may involve misperceptions and selective attention: people tend to focus on information that confirms their choices, and neglect information that is not in line with their habitual behaviour. In general, habits are reconsidered only when the context changes significantly.

Further, they say that habits can change if temporary changes are enforced. The implication is that an information intervention could be made that focuses on misperceptions and selective attention, changing how people view their habitual behaviors. Or people can be jolted out of a habit so they can see it was based on incorrect beliefs or assumptions; then, when a temporary change occurs, an intervention of reinforcement could be effective in making the temporary change permanent. Another observation Steg and Vlek (2009) make is that intervention strategies should be targeted to the factors that are relevant to a targeted specific behavior. Thus, if the behavior is largely attitude-driven, then the information intervention can focus on changing attitudes; if it is a matter of habit, those common habits can be targeted, etc.

The purpose of this paper is not to suggest interventions, so that will not be pursued further. The point is that habits are a major barrier that can probably be broken only when their importance is recognized and interventions are deliberately focused on them. More to our point, however, measurement of how people have and have not changed their habits, how they intend to change them, and whether they intend to, is important.

Habits are examples of decision heuristics, but there are many others that can be identified and made the focus of program design and measurement. Heuristics are shortcuts to decision-making. Since individuals do not make energy-related decisions in an entirely rational manner, and because they typically don't have the time or energy to gather all relevant information on each energy decision, they rely on heuristics of various kinds to make the decisions more manageable. Habit is one. Wilson and Dowlatabadi (2007) list others. Among them are:

1. Anchoring
2. Satisficing
3. Recognition/familiarity
4. Elimination (e.g., of one or two of the most expensive choices)
5. Availability
6. Emotions, especially for risk of loss

Most of these decision heuristics are self-explanatory or are quite familiar. Two are worth discussing in a bit more detail.

Anchoring is a process where the consumer can focus on one option as a kind of default or one to which all other choices are compared. ENERGY STAR® is a strong potential anchor-point, and this can and has been a basis for measurement of consumer awareness. Similarly, making certain symbols very familiar can take advantage of the recognition/familiarity heuristic.

Availability is another potential focal point and perceived availability is measurable (although in measuring perceived availability, questionnaire items must take into account that consumers don't know what they don't know). These are just a few examples of how programs might use what is known about non-rational consumer decision-making and where the results can be measured.

Benefits and Limits of Information to Consumers

As stated earlier, Wilson and Dowlatabadi (2007) find the use of information/knowledge as a central feature of energy efficiency programs, whatever the theoretical basis being used. The assumption is that information affects behavior. But information available to consumers is rarely sufficient to make a truly rational choice. In work that builds on Geller and colleagues' 1980s work (Geller et al. 1982), McKenzie-Mohr (2000) says the same and notes that this is because program planners assume that enhancing knowledge of an issue will encourage the development of attitudes, and this will lead to behavior change. He cites literature (Costanzo et al. 1986) that shows little or no impact on behavior. He also notes that advertising is good at changing the brands we choose, but not at promoting new behavior, because the latter is more complex.

It should also be said that one area where information campaigns are effective is raising public awareness and improving understanding of issues (Aronson & Gonzales 1990; Costanzo et al. 1986; Yates & Aronson 1983). Since awareness is a necessary first step to changing behavior in any theoretical approach, this is an important statement and argues against abandoning information campaigns. Another finding that points to the potential usefulness of information strategies was reported by Attari, Dekay, Davidson, and deBruin (2010), who found that public perceptions of what uses energy and how to save it were very far off. Respondents made small errors in estimating energy use and savings on low-energy-use activities, and large errors about high energy-use activities. Clearly, information campaigns could improve this situation.

Other ways in which information campaigns can be very useful are those where information on awareness of consequences is given and then connected to behavior (personal responsibility). Showing people how to do the right thing specifically and concretely will help people act on their biospheric values (De Groot & Steg 2009). Steg (1999) adds that when information strategies are used, they generally have modest effects; but when they do have an impact on behavior, it is when solutions are not costly and not inconvenient, and when the information is tailored to recipients.

Stern (1999) makes a more extensive list of factors, that are grounded in the work of Geller et al. (1982), which can improve the chances of information strategies having some (modest) effects on behavior. These include if the information:

1. Is presented where it can be immediately used and when results can be immediately validated (e.g., energy savings)
2. Is modeled by people similar to the target audience
3. Comes from a trusted source
4. Is accompanied by a request for a public commitment to act accordingly
5. Reminds people that there are norms supporting the desired behavior

He also agrees with others cited above that information, even when delivered well, will still not work when there are large contextual constraints or when the behavior has high costs or inconvenience.

Explaining Behavior Change as Opposed to Explaining Behavior

The most prominent theories explaining altruistic and other kinds of behavior – like health behaviors, risk behaviors, etc, described above – were not all formulated to explain behavior *change*. The obvious exception to this is the stage theories described. However, there has been theory and research on behavior change, such as sustainable behavior, of which energy efficiency is one example. Arbuthnott (2009) reviews the literature on the topic and cites Sheeran (2002) as finding, in a meta-analysis, that medium to large changes in intentions is associated with only a small to medium change in behavior. However, her own review reveals that intention specificity predicts change better than general intentions or attitudes. Likewise, concreteness of plans to change predicts increased behavior change. Finally, she cites Brucks and van Lange (2007) as showing that the belief that our actions will affect the larger outcome for the benefit of the common good affects whether we will engage in those behaviors. In other words, people need to see that there are improvements due to everyone's actions. We will change our behavior if we think others are doing the same and it will affect the target of our concern.

In a different research area (changes in health-related behaviors), Skar, Sniehotta, Araujo-Soares, and Molloy (2008) focused some research very specifically on distinguishing between predicting behavior versus behavior change. They found that the combination (i.e., an interaction effect) of perceived behavioral control plus future intentions predicted actual change, as did intention certainty and attitude congruence (the alignment of cognitive and affective elements of attitudes). They note also that although they did not detect it in their own study, other researchers have found that lack of attitude ambivalence predicts behavior change. Attitude ambivalence is a situation where a person has approximately equal positive and negative attitudes regarding the attitude target. With such ambivalence, the likelihood of behavior change is reduced and correspondingly, when there is no ambivalence (i.e., when the pros outweigh the cons), the likelihood is enhanced.

In our thinking about measuring behavior change in the area of energy efficiency, we would be wise to give special attention to intention certainty, self-efficacy or perceived behavioral control, and attitude ambivalence. Attitude congruence merits attention too, but it would be more complicated to measure.

The Elephant in the Room: Behaviors

We now return to the question posed at the beginning of this paper: *Attitudes toward what?* More specifically, What target behavior(s) do we want to measure progress toward? If we are interested in understanding the stages (e.g., TTM or Innovation Diffusion) traversed toward a change in behavior, what is that behavior? Some options are:

1. Adoption of energy-efficient technologies/products
2. Changing the choices made in everyday living that affect energy consumption

3. Participation in more IOU programs

As is already established, the target behavior must not be program-specific, but rather a more general behavior. All of the above can be framed in sufficiently general terms, so any of them would be appropriate, but choices must be made.

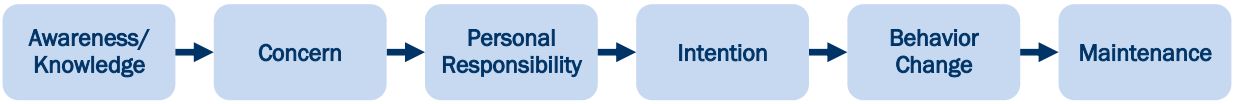
A Synthesizing Model to Inform Measurement and Program Design

The ultimate goal of developing questionnaire items that can be used consistently across residential programs and that will provide meaningful information about program success in influencing residents requires substantial understanding of how people's attitudes and behavior are changed. This paper, so far, has described academic and industry theory and research in this area. Multiple theories have received good empirical support. Each has some unique features, but uses concepts common to others as well, as would be expected as researchers gather more evidence about what the critical components of behavior change are. There should be some convergence of concepts if theories are describing reality.

A Stage Model of Behavior Change

Focusing on behavior change implies thinking about the process by which the change occurs. This fact is reflected in the stage theories that have been presented. We have found that integrating the concepts common to multiple theories with the idea of stages provides a fruitful approach to building a model of change that fits our industry and our purposes. The model in Figure 5 is the result of that effort. This is a model of deliberate or planned change.

Figure 5. A Stage Model of Behavior Change



The model we describe here is a general one, meaning that each stage can accommodate multiple types and levels of content. Awareness can refer to awareness of many things, depending on who is using the model for what purpose. The same is true for the other stages as well. Obviously, behavior is a general category and therefore the model can be used for describing changes in behaviors of many types.

An example that is particularly pertinent for the present purpose is categories of motivation for change. There are at least two types of motivations for change that could be described by these general stages. One motivation could be called *environmental* and the other called *financial*. In other words, customers could be inspired to change their behavior based on environmental considerations, and others could be completely indifferent or even hostile to environmental issues, but be motivated by financial issues. The latter could be divided into those who have little or no money and are worried about their energy bills, and those who have money, but prefer not to waste it on inefficient equipment. We might think of other motivations as well, but these two categories will suffice to facilitate explication of the

model. We will refer to the two main categories as *environmental* and *non-environmental* motivations.

Awareness

Before a person can deliberately change a behavior, there must be some awareness of the possibility and/or the benefits of change. The change could be the adoption of a new technology, the curtailment of excessive energy use, or many other behaviors. For those potentially motivated by environmental issues, *awareness* might refer to awareness of the connection between energy use and the environment. It could also refer to awareness of ways of ameliorating the effects of energy use. For those more likely to be motivated by financial considerations, *awareness* could refer to awareness of energy-efficient technologies or awareness of the cost of the customer's own energy-use issues.

In the AKA-B framework, *awareness* and *knowledge* are separate. In this proposed framework, they are combined. It is always difficult to distinguish between awareness and knowledge; it is just a matter of degree. In the proposed framework, degrees of awareness are acknowledged and can be affected by programs.

Concern

Our use of this term corresponds to several similar terms used in the literature. It certainly includes the *Concern* of the three Cs framework. It also encompasses the idea of personal norms found in the VBN framework. These are concerns of the altruistic or biospheric types. However, we also mean it to include self-interest concerns, such as concern about high utility bills. When it is the latter, it has implications for the progress through the remaining stages, as is discussed later.

Personal Responsibility

The idea of *responsibility* here is essentially the same as ascription of responsibility to self. It is the next step in moving toward desired behaviors. Concern isn't enough, as we have seen over the decades where most people are concerned about the environment but do not take corrective action in their personal lives.

Intention

Intention is the last step before behavior, but one can be stuck there. Even intention to change behaviors does not guarantee a real change. Intention certainty should also be considered and measured within this concept, as that has been shown to predict behavior *change* beyond just behavior (Skar et al. 2008).

Behavior Change

The behaviors we are talking about here are, of course, energy efficiency behaviors, but they can be conceived at different levels. At the most general level, they can be classified into:

1. Energy-using habits
2. Decisions in purchasing equipment that affects energy use

These categories can be used in thinking about overarching targets and effects of programs. They can also be thought of in terms of the diligence of the habits, especially energy-using habits.

More specific programs can be concerned with and target more specific versions, such as targeting a particular habit like where the thermostat is set. Or a specific type of appliance choice can be targeted, or the decision to recycle appliances.

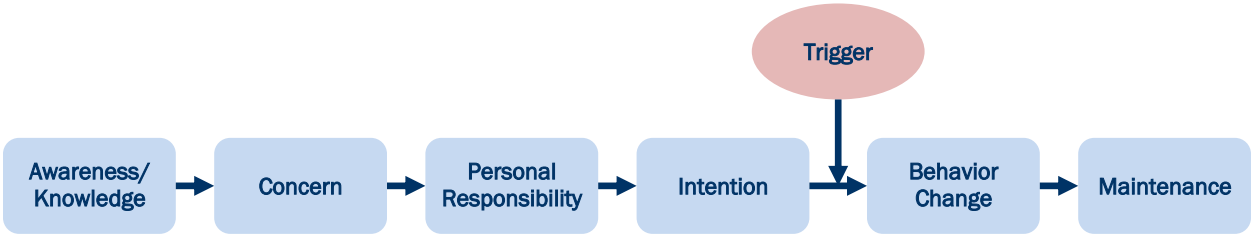
Maintenance

A behavior or habit may be affected (i.e., changed) on a specific occasion, but whether it is maintained is also important and has to be considered if deep and lasting energy efficiency behaviors are desired; or, as Lutzenhiser would phrase it, if we want to go beyond picking the low hanging fruit. Getting people to permanently alter their behavior has to be targeted strategically – it can't be assumed.

Triggers

We have imported the notion of triggers from the *Fogg Behavior Model* (Fogg 2011). Triggers can move a person from one stage to the other – most importantly, from *Intention* to *Behavior Change*. Figure 6 shows the stage model with a trigger pointing to the arrow between *Intention* and *Behavior*. This reflects the potential power of some event to help the customer bridge the gap between intention to change behavior and actually changing it. The event can be accidental or by design. Rebates and audits could be considered triggers for taking action, but there may be other possibilities yet to be tried.

Figure 6. Stage Model with Trigger



Segmentation

The stages of this framework can also be conceived as segments. Segments of the population can occupy a particular stage and therefore be amenable to some types of interventions and less so for others. For example, if a person has high awareness, there is no point in targeting him or her with an awareness campaign. On the other hand, if the person or household is indifferent to the issues, or has taken a position against them (e.g., climate change deniers) there isn't much point in suggesting they take personal responsibility. Thus, programs can target different segments differently. More will be said about segments in a later section of this paper.

Measurement

Each stage of this framework is amenable to measurement at a general or a specific level. It is meant to facilitate measurement of progress through stages, as well as to provide a way

of thinking through program theories. We also hope that the framework inspires thinking about what interventions might encourage maintenance beyond just triggering a one-time behavior.

Exploring the Model

Applying the Model to the *Going Green* Data

We considered it useful to bring some general population data to bear on the stages as defined in the model to see if the model worked with data. Yankelovich (Bersoff 2008) does an annual national survey on green attitudes and behaviors, called *Going Green*. Because the survey is not oriented to energy efficiency, its applicability to the model is slightly removed; but since environmental issues and energy efficiency are related, it is still instructive to see where the country is, as portrayed by our model, which should apply to green attitudes as well. We didn't find questions relating to *intention*, *behavior*, or *maintenance* in a usable form, so this exercise is limited to *awareness*, *concern*, and *responsibility*.

Following are the questionnaire items that were categorized into the model:

1. The environmental problems we face today demand immediate corrective action
2. Severity of today's environmental problems
3. Personally concerned with environmental issues
4. Wilderness places are important to preserve, even if nobody ever goes there
5. People are obligated to protect the environment for future generations
6. I consider myself to be environmentally conscious
7. I have made it a top priority in my life to live a more sustainable lifestyle
8. I feel personal responsibility to commit my time and money to help solve the environmental problems that we face today
9. Climate naturally varies over time, so any change we're seeing now is just part of a natural cycle

Table 1 shows what percentage of the population answered each of nine questions in a way that reflects their attitudes toward the environmental issues of our day. Only one question was identified that seems to address *Awareness* (and knowledge/belief) about climate change specifically. The responses seem to indicate that 74% of the population believes that the climate change recorded in recent decades is not just natural variation (the question was phrased in the opposite direction, yielding 26% agreement).

The items that could place respondents in the stage of *Concern* about the environment range in agreement between 41% and 64%, as one would expect, somewhat lower than the percentage occupying the prior stage, which only asks for awareness or knowledge.

Similarly, responses to questions about personal responsibility place between 22% and 37% in that stage. This is a smaller group, as we would anticipate for a more advanced stage.

It is encouraging to see that data similar in content to our own field can be fit into our model with sensible results. Some of the questions from this survey could be modified to be specifically aimed at energy efficiency rather than the more general environmental theme.

Table 1. Mapping of Yankelovich 2008 *Going Green* Survey Results Into Model Stages

Stage	Abbreviated Item, Percent,* and (Item Number)
Awareness (& knowledge) of Environmental Issues	Climate change now just natural variation: 26% (q9) (This translates to 74% having the knowledge that climate change is being caused by human behavior)
Concern About Environment	Problems demand action: 51% (q1) Severity of problems: 49% (q2) Wilderness important to preserve: 64% (q4) People obligated to protect environment: 61% (q5) Personally concerned with environmental issues: 41% (q3)
Responsibility	I am environmentally conscious: 37% (q6) Sustainability top priority: 28% (q7) I feel personal responsibility to solve: 22% (q8)
Intention	NA
Behavior	NA

Source: Yankelovich *2008 Going Green 2*

* Chose 8-10 on an 11-pt scale

To summarize, when not everyone is expected to get to the final stage, we would generally assume that there would be more people in the earlier stages than in the later ones. This small analysis demonstrates that this tends to be true for green or environmental attitudes at least. There is no reason to think it would be different for energy efficiency.

Mapping the ME&O Segments onto the Stage Model

In this section we map the segmentation scheme developed by Opinion Dynamics Corporation (ODC) for the CPUC in December 2009 (ODC 2009). The mapping was undertaken to try to integrate the multiple current efforts at strategizing about whom to approach, with what messaging, through what channels. The stage model that we have proposed can be enriched by integrating it with other work. The results of this effort are shown in Table 2.

The mapping of the ODC segmentation scheme onto the proposed stage model is not precise, as the questionnaire on which the segmentation was based was not aiming to fill our model cells. The weakest classification was for *Awareness*, as the information provided from the segmentation analysis did not ask that specifically. The *Awareness* categorization was based mainly on inference from the *Concern* and *Responsibility* positions. However, the overall mapping is probably not far off, even for the *Awareness* category. It is good enough for this discussion.

Table 2 shows an interesting pattern of results. One segment (*Leading Achievers*) is high on all model stages and one (*Disconnected*) is low on all of them. The other segment groups show various combinations of highs, mediums, and lows on the stages. The differences among those three segments are due largely to the two different types of *Concern* that are

contained in that stage: concern about the environment/energy efficiency; or concern about money. Further, there are two types of money issues: low-income people who have very little and must conserve (without buying new equipment); and those who have money, but think in the long-term and choose to purchase energy-efficient equipment, taking advantage of IOU rebates and offers. These differences seem to account for how the stage boxes are populated in various patterns.

Table 2. ODC Segmentation Scheme Mapped Onto the Stage Model

Segment	Awareness of Energy Efficiency Connection to Environment	Concern (Energy Efficiency or Financial)	Responsibility	Intention	Behavior
Leading Achievers (22%)	High	Energy Efficiency: High	High	High	High
Practical Spenders (18%)	Low (more to energy independence)	Probably Financial (but not due to lack of money)	Low	Medium	Medium
Striving Believers (25%)	Medium	Energy Efficiency: High	Medium	High	Purchases: Some Practices: High
Thrifty Conservers (21%)	Medium	Energy Efficiency: Low Financial: High	Low	Low	Purchases: Low Practices: High
Disconnected (15%)	Low	Low	Low	Low	Low

Following are very brief descriptions of each of the five segments, how they fit into the proposed stage model, and what strategies are implied for reaching them and moving them along to increased energy efficiency behaviors.

- **Leading Achievers** are already convinced and doing a lot. Addressing them may be preaching to the choir. Alternatively, the authors of the segmentation report suggest addressing them as colleagues in messaging, treating them as evangelists. They could also be directed to new sources of information to facilitate taking further actions toward the net-zero energy goal. They don't need to be reminded of the environmental impacts of energy use. They need additional, specific, information.
- **Practical Spenders** are not very aware of the consequences of using a lot of energy and are not concerned about those consequences. They purchase a lot of energy-efficient equipment, so may be interested in the money-saving aspects of this purchasing, but not because they are thrifty or lack money, but likely because it saves money in the long-run

to purchase energy-efficient equipment. One approach to this group would be to try to increase their awareness of the consequences of high energy use so that they would be moved to do more. The other approach, suggested in the segmentation report, is more pragmatic: direct them to further IOU programs and offers (they already use some of them) and focus on life-style enhancing benefits of saving energy.

- **Striving Believers** have some understanding of the issues, but could be moved further along that path. The connection between energy efficiency and the environment could be made clearer to them, as they already care about the environment. The segmentation report notes that this group is young and they should be reached by using "…interactive media formats with innovative and information-driven communications tools to educate this group and enhance the relevance of household energy use." Also suggested is to engage them "…in peer-driven and socially visible energy reduction efforts that enhance the social capital of saving energy." These people are somewhat informed and concerned, but are young and very busy. Approaching them in formats preferred by the young with messaging that reinforces the connection between energy use and the environment would seem appropriate.
- **Thrifty Conservers** have high potential for movement, but face many barriers to that movement. They have some awareness of the issues and they engage in energy-saving practices, but they are not concerned about energy efficiency and the environment, and are not altruistically inclined. They tend to have fairly low incomes, but are not the lowest income group. Efforts could be directed toward increasing their awareness and appealing to the concerns that arise from that awareness. Alternatively, as the segmentation report suggests: "Move Thrifty Conservers by addressing product and lifestyle barriers to energy efficiency adoption." Also, "Engage Thrifty Conservers through IOU and traditional media outreach that reduces perceptions that energy-efficient options are inferior, more costly, or more difficult to adopt than standard options."
- **The Disconnected** group has the highest percentage of low-income customers (62%) and has little education. They are low in awareness, concern, and responsibility in the area of energy efficiency. They tend to be renters and Latino or African American. Clearly, they are already targeted by direct install programs and could be encouraged to engage in more no-cost and low-cost behaviors. Some in this group may be reachable through information about the connection between energy use and the environment, and the benefit of conserving energy to later generations. This observation is based on research on low-income customers reported by Dillahunt et al. (2009). They found that this group was motivated by habit, spirituality, and concern for future generations. Barriers include lack of feedback about energy use, lack of control over other people and infrastructure, lack of money for up-front investments, and safety (e.g., using lights for safety, not hanging clothes outside for fear of theft). These observations imply that at least some of this group could be swayed by appeals to concern for future generations.

Some conclusions that may be drawn from this mapping effort are:

1. The stage model is quite compatible with the segmentation scheme; and
2. Different approaches are implied by the various groups, whether defined by stages, or segments, or both.

Adding Causal Factors to the Model

As is generally true of stage models, this one is descriptive; it does not imply causal connections between the stages. It is a simple model that has general applicability within the field of energy efficiency. However, it is not difficult to add causal factors to the model to facilitate further thinking about measurement, as well as program design. Such a model helps us:

1. Understand how and why people change their behavior
2. See the process by which it occurs
3. Identify the points in the process where the process may be influenced
4. Pinpoint measurements to catch points of movement in the process

Figure 7 shows the causal connections that explain the movement of customers through the stages. The next two sections describe that model. The first thing to notice about the model in Figure 7 is the horizontal axis that is the stage model (see Figure 5); it is unchanged. We have simply added psychological, social, and economic factors to it. While the arrows between the stages (shown in rectangles) are not meant to be causal, the arrows from the ovals are. However, we do not mean the term *causal* to indicate that the concept in the oval is both necessary and sufficient (the classical definition of *cause*) to produce the outcome at the end of the arrow. We mean that these factors influence, in a positive direction, the factors at the ends of the arrows. The ovals can be thought of as the mechanisms through which people can pass through the stages. They also represent the ways in which people can be halted at a particular stage, if the "right" influences are not present. It should be noted that all of the relationships described in the sections below have been researched and supported empirically. They are not just simply theoretical ideas.

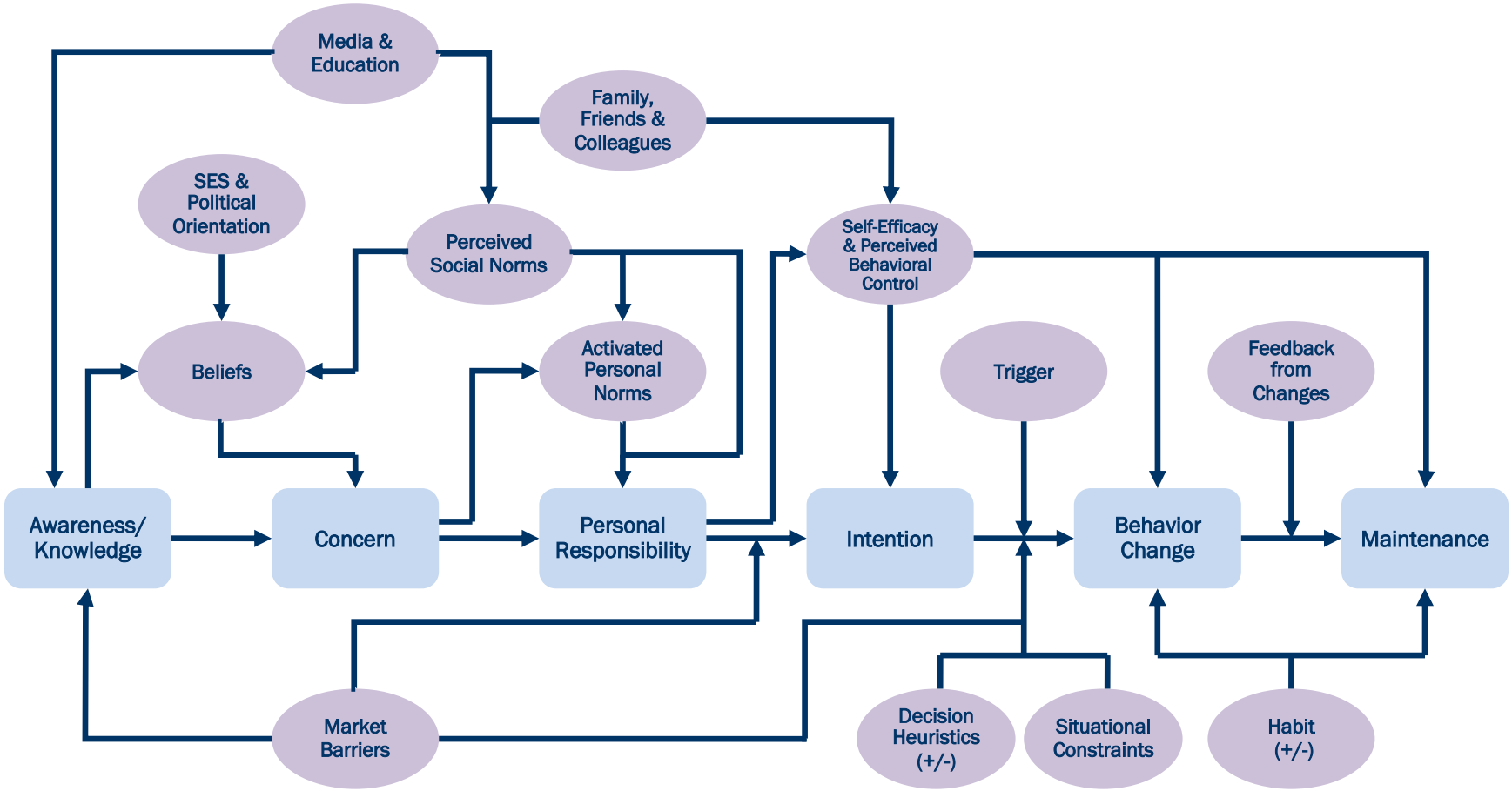
We will start with one example, people who may be motivated by environmental issues, and then illustrate how the model would work for those more financially motivated.

The Model as Applied to Environmental Motivations

The process starts with *Awareness*, which goes to *Beliefs*, which goes to *Concern*. In this example, *Awareness* is about such things as awareness of the claim that there is a connection between energy consumption and environmental damage or climate change (as well as such things as the technologies that can reduce energy consumption). Concern would be the next step and in our example it would mean that the person is not only aware of the claimed connection, but is concerned about it. It is worth reiterating that *Awareness* will not automatically result in *Concern*. Looking at the factor of *Beliefs*, we can see that the model predicts that if a person is aware of the connection and has beliefs such as a cognitive belief in the science that makes the claim of climate change, for example, this will lead to concern about the environment. On the other hand, if the belief in the science is absent, the person will not move to the stage of *Concern* or to any other stage after that.

The model also indicates two influences on *Awareness*: *Media* and *Market Barriers*. Mass media – whether occurring naturally in media programming, magazines, or news, etc., or by program design – will have an impact on the level of awareness that a person has about energy and the environment, as well as relevant technologies. *Market Barriers*, by definition, describe a lack of awareness focusing on pertinent technologies available in the market.

Figure 7. Stage Model with Causal Factors Integrated



Beliefs, in turn, are influenced by such background characteristics as *SES and Political Orientation* and much more that cannot be represented in this type of model. They are also influenced by *Perceived Social Norms* (i.e., what we perceive others think and do about the same issues). *Perceived Social Norms*, in turn, are influenced by *Media and Education* programs, and the positions and behavior of *Family, Friends, and Colleagues*.

The next stage in the model is *Personal Responsibility*. The move from *Concern* to *Personal Responsibility* will involve *Perceived Social Norms* (and all the things than influence that) and *Activated Personal Norms*. Personal norms are what we *ourselves* believe are the right behaviors in a given situation. However, we may not act on our personal norms unless they are "activated." The activation of personal norms occurs when something we value strongly is perceived to be under threat. In our example, this could be the environment. If a person places a high value on the environment and perceives it to be under threat (in our example, by too much energy consumption), her personal norms will be activated. So, if a person has a personal norm of conserving energy, that norm will be activated by a perception that the environment is threatened by consumption.

Concern can be followed by an *Intention* to change one's energy behavior, but as in earlier stage transitions, it need not necessarily follow. An important factor that can intervene either positively or negatively is *Self Efficacy & Perceived Behavioral Control*. One may feel a personal responsibility to make a difference in the impact of energy consumption on the environment, but feel helpless to do so. This could be because of not knowing what to do, or not feeling able to afford it, or simply by not being the person in the household who purchases light bulbs. It could also be because others in the household will not cooperate with conservation or energy efficiency efforts. So, if there is self efficacy and/or perceived behavioral control, *Personal Responsibility* is likely to transition to *Intention* (i.e., intention to change one's energy-consumption behavior). Note the fact that the attitudes and behaviors of *Family, Friends, and Colleagues* will have an influence on *Self Efficacy*. This is also the place to point out that *Market Barriers* can impede the transition from *Personal Responsibility* to *Intention*. If there are significant market barriers experienced by the consumer, the formation of an intention to change may not occur simply from lack of exposure to technologies that would help to form the intention.

Even when a consumer has the intention to change energy-consumption behaviors, this does not lead inexorably to actual change. Intentions can founder on the rocks of market barriers or on our own inertia. We may be ripe for change, but are too busy to plan a change and carry it out, since our energy behavior is so tied to habit. Thus, *Habit* is a negative predictor of *Behavior* Change. What is known as *Decision Heuristics* is another negative predictor, or factor that can inhibit the transition from *Intention* to *Behavior Change*. We do not always make rational decisions about purchases of energy-consuming equipment, as demonstrated by the shortcuts (decision heuristics) we all sometimes use to make complex decisions. Habit, of course, is a decision heuristic, as it keeps us from having to make a new decision every time we make a purchase or engage in a behavior pattern. Other heuristics are the use of anchors to which we compare alternatives, or choosing the most familiar option, or eliminating the most expensive and the least expensive. These approaches often don't result in the most beneficial choice and can keep a person from making the most energy-efficient one.

On the positive side (i.e., facilitating the transition from *Intention* to *Behavior Change*), are *Triggers*. An example of a trigger from the *Fogg Behavioral Model* is the *Facebook* practice of sending an email to members who have not been on their *Facebook* page for a long time, inviting them to come back and make contact with friends. In the energy efficiency field, a trigger could be an instant rebate or point-of-sale program that makes it easy to make the "right" decision.

The final transition point in the stage model is between *Behavior Change* and *Maintenance.* Even if a person tries a different behavior, it may or may not be maintained. Whether it is or not may depend on whether it has been possible to form a new habit in a short time. Perhaps more importantly, it will depend on the feedback one receives from the new behavior. If there is a noticeable drop in energy consumption, the behavior is more likely to be maintained. There could be other types of feedback as well that could facilitate or hinder the maintenance of a new behavior. There isn't adequate space to explore all the possibilities for this or other concepts in this model.

The Model as Applied to Financial Motivations

The proposed model is applicable to a variety of different motivational paths to behavior change. Some people may be most concerned about finances because they have low or moderate income. This may be the motivational base for any potential behavior change. Such a person may be aware of some ways to conserve energy, but not others. This configuration of awareness will place her at a certain level within the *Awareness* stage (i.e., it could be improved). The level of awareness could be influenced by *Market Barriers* and by the *Media or Education* efforts. An increased level of *Awareness* can be elevated to *Concern* by a high energy bill and by the *Belief* that it is higher than that experienced by others in the neighborhood or that others like *Family, Friends, or Colleagues* experience. Some of the same factors that lead to *Concern* (*Perceived Social Norms* and *Family, Friends, and Colleagues*' experiences) may also lead to taking *Personal Responsibility* for lowering the bill by reducing energy use.

The one thing that is different in applying the model to a financial motivation, compared to an environmental motivation, is that *Activated Personal Norms* are not involved. Activated personal norms result from a perceived threat to a basic value. The desire to save money may not fall into that category, although one could possibly conceive of a low-income person perceiving a threat to economic survival.

The movement from *Personal Responsibility* for taking action to forming the *Intention* to do so will be affected by *Market Barriers* and *Self-Efficacy & Perceived Behavioral Control* in much the same ways that were described for environmental motivations. In fact, the rest of the stages of the model proceed in the same way as they did for environmental motivations, as do the factors affecting them.

As seen in the analysis of segments in an earlier section, there is a segment of the population that is not very concerned about the environment and may even be hostile to the idea that we should modify our behavior to reduce environmental impacts. Members of this segment may have substantial resources and are moved through the stages based on the desire to use their financial resources efficiently. People with this source of motivation may have various levels of *Awareness* of opportunities to achieve energy efficiency to avoid

wasting money over the long term. That awareness is affected by the same factors that affect other segments as described above.

When *Awareness* of opportunities to save energy costs is raised and *Beliefs* in the availability of new options is present (affected by *Perceived Social Norms*), members of this group may move to the *Concern* stage. That is, they are concerned that they are spending more money on energy than they should. The same factors that move these consumers to *Concern* may also move them to the stage of taking *Personal Responsibility* for making a change. *Activated Personal Norms* is even less likely to be present or necessary for this group than for the low-income group. In this group, as well as the lower-income group, the movement from *Personal Responsibility* to *Intention* and beyond is the same as for the environmentally motivated.

Summary of Proposed Model Characteristics

The central model proposed here is a stage model. It attempts to describe the process by which people move to make deliberate changes in their behavior and is oriented to the type of behavior our industry is trying to produce: *energy efficiency behaviors*. It was designed to be general so that it could inform the thinking about many types of energy efficiency programs that could be targeted at many different segments of IOU customers. It is intended to be flexible enough to apply to many situations, and to be specific enough to be helpful in planning and evaluating individual programs, as well as program portfolios.

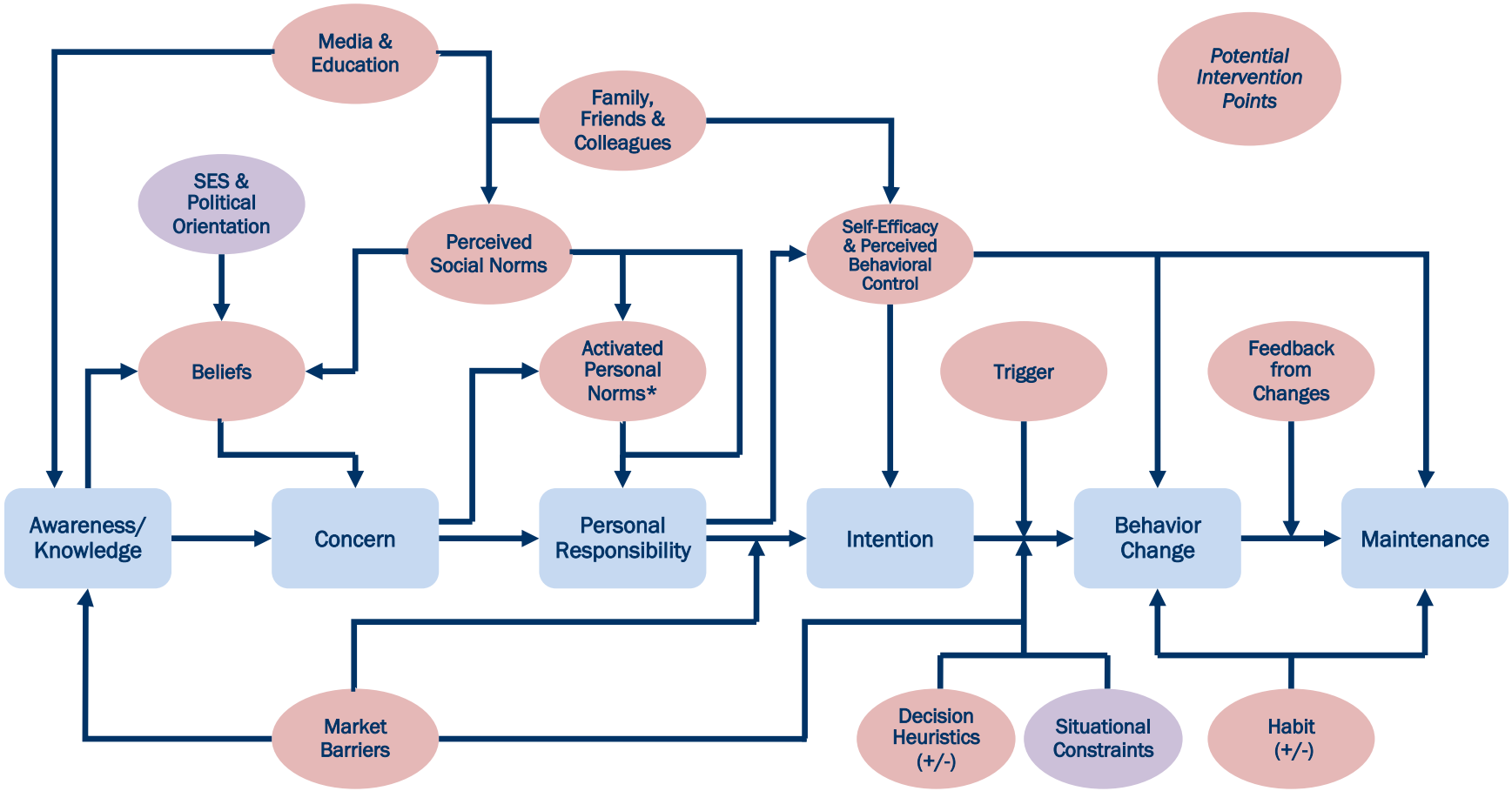
Potential Intervention Points

Figure 8 reproduces the same model from Figure 7, but with potential energy efficiency program intervention points highlighted. It is easy to see that all but two causal factors identified in the model represent potential intervention points. As an example, *Media* can be used to raise *Awareness*, which is one of the best uses of information campaigns. It can also be used to influence *Perceived Social Norms* and *Beliefs*. Programs can be directed at increasing *Self Efficacy* and *Perceived Behavioral Control* by giving people solutions to problems they have in figuring out how to put their desires about their own energy efficiency behaviors into effect. Providing easy paths to changing practice habits or to purchasing habits can make use of what we know about consumers' habitual behavior patterns. Programs like ENERGY STAR® can take advantage of what we know about decision heuristics to help people substitute a beneficial heuristic for a less effective one.

Finally, as noted earlier, we already have programs that act as *Triggers*, moving people from *Intention* to *Behavior*, such as rebate and audit programs. There could certainly be others as well. This was just the briefest overview of the potential for using this model for program design.

Program designs that were couched in the terms of this model could allow evaluation designs that trace program impacts at specific stages, tracking movement between them. For some programs this would involve tracking the general population in a program area (e.g., media campaigns) and for others it would involve tracking the movement of program participants. The point is, that both the programs and the measurements of their effects would be targeted in specific ways. This would improve the chances of correct attribution of program effects compared to past efforts that have had to take a more general approach.

Figure 8. Integrated Model with Potential Intervention Points Highlighted



Recommended Questions – Homeowners/ Renters

The survey will screen for a household decision-maker about energy use and equipment purchases – renters/owners, age, and other quotas will be set. Typically, we will randomize questions with multiples. The original source of each question is noted to inform decisions about potential modifications.

Awareness/Knowledge

1. I am going to read a few statements regarding things people can do to save energy. Using a scale from 1 to 7 where 1 means *None*, and 7 means *A lot*, Please tell me how much energy is saved by each (SRBI+New).
    a. Replacing an old refrigerator with an ENERGY STAR refrigerator
    b. Replacing all of the incandescent light bulbs in your home with compact fluorescent bulbs
    c. Replacing your traditional TV with an LED TV
    d. Getting rid of the extra refrigerator or freezer in the garage
    e. Weatherization of the home (dual pane windows, caulking, weather stripping, etc)
    f. Insulation of the ceiling
    g. Using an ENERGY STAR room air conditioner rather than a standard model

2. Which of the following labels or programs for energy efficiency have you heard of (New)? [Interviewer: code 1 for *Yes*, and 0 for *No*]:
    a. ENERGY STAR
    b. Tier 2 ENERGY STAR
    c. Most Efficient
    d. Consumer Elect
    e. Engage 360
    f. Top Ten
    g. Energy Upgrade California

3. Using a scale of 1 to 7, where 1 means *Not at all available* and 7 means *Very available*, How available have you found energy-efficient versions of products of the following types (New):
    a. Lighting
    b. Heating
    c. Air conditioning
    d. Electronics (e.g. televisions, computers)

4. Using a scale of 1 to 7 where 1 means *Not at all aware* and 7 means *Very aware*, How aware are you of your utility's programs to help you save energy? (New)

5. Using a scale from 1 to 7, where 1 means *A lot less*, and 7 means *A lot more*, Compared to other consumers, how much do you think you know about saving energy in your home?

6. Please rate how much you agree or disagree with the following descriptions of what energy efficiency means to your household. 1 means you *Completely disagree* and 7 means you *Completely agree* with the statement
    a. Energy Efficiency means getting more for every energy dollar we spend
    b. Energy efficiency means our energy bills go down
    c. Energy efficiency means making sacrifices in how we use energy
    d. Energy efficiency means doing more with less
    e. Energy efficiency makes products cost more

Concern

1. I'm going to read a list of several reasons why people might change their daily actions to save energy. Using a 1 to 7 scale where 1 means *Not at all important*, and 7 means *Very important,* please tell me how important each is in motivating you to change you daily actions (New).
    a. Saving money
    b. Health
    c. Protecting the environment
    d. For the benefit of future generations
    e. Reducing our dependence of foreign oil
    f. Helping California lead the way on saving energy
    g. Desire to maintain comfort level in the home
    h. Reducing air pollution

2. I'm going to read a few statements now. Using a scale of 1 to 7 where 1 means *Completely disagree*, and 7 means *Completely agree*, please tell me how much you agree or disagree with each
    a. I sometimes worry whether there is enough money to pay my energy bill (SRBI)
    b. I worry that the cost of energy for my home will increase (SRBI)
    c. I am very concerned about the environmental effects of electricity generating power plants (OAP)
    d. It is very important for me to find ways to control my energy costs (OAP)
    e. It is very important to me to purchase appliances that cost me less to use over the long term (New)
    f. It is our social responsibility not to waste energy (New)
    g. I worry about our country having enough energy supplies (New)

Personal Responsibility

1. Using a scale of 1 to 7 scale where 1 means *Completely disagree*, and 7 means *Completely agree,* please indicate how strongly you agree or disagree with the following statements.
    a. I do not feel responsible for conserving energy because my personal contribution is small (ODC)
    b. It is the responsibility of the government, not individuals, to make sure we have enough energy resources (ODC)

c. I do not feel personal responsibility to decrease my energy use to help reduce greenhouse gases (ODC+New)
d. The amount of energy I use today has an impact on future generations (SRBI)
e. I feel guilty if I use too much energy (New)
f. I believe I have a personal responsibility to improve the environment by using energy-efficient appliances (New)
g. I believe I have a responsibility to reduce my use of appliances (New)
h. I believe I have a responsibility to contribute to reducing our dependence on foreign oil (New)
i. I don't feel I need to do more because my home is already energy-efficient (New)

Behavior and Behavior Intention

1. Now I'm going to read a list of energy-saving actions one could take (New). I will ask you first if you currently take these actions, and then I will ask if you intend to do it in the future. [randomize actions] [Interviewer code 1 for *Yes*, 2 for *No*, and 3 for *Maybe* {for intention only}]:

One-time or infrequent actions:

a. Purchase ENERGY STAR-certified products
b. Install programmable thermostats
c. Install/use ceiling fans
d. Install/use room air conditioners
e. Install ceiling insulation
f. Use full loads for dishes and laundry
g. Close heating/cooling ducts in seldom used rooms
h. Install an attic vent
i. Seal heating and cooling ducts
j. Turn temperature down on water heater

Frequent actions:

a. Turn off lights when not in use
b. Using sleep features on my computer
c. Unplug appliances and equipment when not using them
d. Use energy-efficient practices at work
e. Visit my utility website for tips
f. Change heating/cooling system filters several times per year
g. Purchase and install compact fluorescent lamps (CFLs)
h. Perform annual maintenance on heating and cooling systems
i. Set programmable thermostats to different temperatures for different times of the day

2. Using a scale of 1 to 7 where 1 means *Completely disagree*, and 7 means *Completely agree*, how much do you agree or disagree with these statements:
    a. I intend to do more to save energy by my everyday practices around the house (New)
    b. I intend to do more to save energy by the purchases I make (New)
    c. I intend to participate in more utility energy efficiency programs (New)
    d. I intend to do more to save energy in my everyday activities at the place where I work (New)

3. For each of the statements I am going to read, please tell us which answer is most correct for your household. The choices are: *I/we do not do this* [Interviewer code 1], *I/we have done this for a long time and continue in the same way* [Interviewer code 2], or *I/we have done this more over the last year* [Interviewer code 3] [Interviewer: use "I" if only one person in household and "we" if more than one in household]:
    a. Watch our energy habits to be sure we are not wasting energy (New)
    b. Check to see if any utility programs could help save energy through purchases or new habits (New)
    c. Specifically look for energy-efficient versions of products (New)
    d. Consider energy efficiency as very important when purchasing appliances or electronic equipment (New)
    e. Respond to utility mailers to participate in energy efficiency programs (New)
    f. Only purchase energy efficiency versions of products

Situational Constraints

1. What are some of the obstacles that you currently face in trying to save energy in your home? (SRBI) [Interviewer: Code 1 for *Chosen*, 0 for *Not chosen*]:
    a. Cooperation of others in the home
    b. Construction of the home (cathedral ceilings, multiple floors, skylights, etc)
    c. Cost/first cost of energy-efficient equipment/repairs
    d. Time it takes to recover costs of energy-efficient equipment/repairs
    e. Desire to maintain comfort level in the home
    f. Age of home
    g. Lack of time
    h. Don't know what to do
    i. Don't know where to get information
    j. Family medical needs
    k. We have personal circumstances that require that we use more energy than we would use otherwise
    l. Other _____

Demographic Characteristics

RESIDENCE TYPE [programs addressing multifamily residents may need additional categories, but please construct categories that allow them to be coded into these groups afterward]

1. Which of the following types of housing units would you say best describes your home? Is it a . . .
    a. Single-family detached house
    b. Single-family attached house (townhouse, row house, excluding duplex)
    c. Duplex
    d. Apartment building with 2-4 units,
    e. Apartment building with 5 or more units
    f. Mobile home, house trailer
    g. Other (describe)

OWN/RENT

2. Do you or members of your household own this home or do you rent?
    a. Own/Buying
    b. Rent / Lease
    c. Occupied without payment of rent
    d. Other

NUMBER OF RESIDENTS

3. Including yourself, how many children and adults normally live in this household on a full time basis? (Do not include anyone who is just visiting or children who may be away at college or in the military.) Include all members of your household whether or not they are related to you.
    a. Enter the number _____
    b. How many of these residents are under 5 years of age _____
    c. How many of these residents are between 5 and 18? _____
    d. How many of these residents are 70 or older? _____

OCCUPANCY

4. In general, is the home occupied during the day time hours on weekdays?
    a. Yes, usually
    b. No, not usually

AGE

5. How old are you / the head of the household? [DO NOT READ; RECORD ACTUAL AGE OR CIRCLE APPROPRIATE AGE CATEGORY]
    a. Under 25 years
    b. 25 to 34 years
    c. 35 to 44 years
    d. 45 to 54 years
    e. 55 to 59 years
    f. 60 to 64 years
    g. 65 years or over
    h. Don't know
    i. Refused

EDUCATION

6. What is the highest level of education you / the head of the household have completed? [read choices, accept only one response]
    a. Less than 9th grade
    b. 9th to 12th grade, no diploma
    c. High school graduate (includes equivalency)
    d. Some college, no degree
    e. Associates degree
    f. Bachelors degree
    g. Graduate or professional degree
    h. Refused

LANGUAGE

7. Is English the primary language spoken in your home? 1 means *Yes*, 0 means No, 8 means *DK or Unsure*

SIZE OF HOME

8. How many bedrooms do you have in your home? [If a one room efficiency or studio apartment, bedrooms=0]

    Enter the number: _____

SQUARE FOOTAGE

9. Your home's size is–please stop me when I get to the appropriate category:
    a. Less than 1,400 sq.ft.
    b. Between 1,400 and 2,499 sq.ft.
    c. Between 2,500 sq.ft. and 3,499 sq.ft.
    d. Between 3,500 sq.ft. and 4,999 sq.ft.
    e. Over 5,000 sq.ft.
    f. Don't know

AGE OF DWELLING [(Ask for single family only]

10. During what decade was your home constructed? Please stop me when I get to the appropriate category.
    a. 1930s or before
    b. 1940s
    c. 1950s
    d. 1960s
    e. 1970s
    f. 1980s
    g. 1990s
    h. 2000 or after
    i. Don't know

EMPLOYMENT

11. How would you describe your/ the householder's employment status? Would you say
    a. Employed full-time,
    b. Self Employed full-time
    c. Employed part-time
    d. Self Employed part-time
    e. Temporarily unemployed
    f. Not employed
    g. Retired
    h. Don't know
    i. Refused

INCOME

12. Please tell me which category best describes the total combined income in the past 12 months of all members of your household from all sources– wages, interest, alimony, Social Security, and so forth – before taxes and deductions. Please stop me when I get to the right category.
    a. Less than $9,999
    b. $10,000 to $14,999
    c. $15,000 to $19,999
    d. $20,000 to $29,999
    e. $30,000 to $39,999
    f. $40,000 to $49,999
    g. $50,000 to $74,999
    h. $75,000 to $99,999
    i. More than $100,000
    j. Don't know
    k. Refused

ETHNICITY

13. What is your ethnicity? [MULTIPLE RESPONSE, ALLOW UP TO 5 RESPONSES]
    a. White
    b. Black or African American
    c. American Indian or Alaska Native
    d. Asian Indian
    e. Chinese
    f. Japanese
    g. Korean
    h. Vietnamese
    i. Filipino
    j. Other Asian
    k. Native Hawaiian
    l. Guamanian or Chamorro
    m. Samoan

n. Other Pacific Islander
o. Other, Specify

14. Are you of Hispanic or Latino descent?

1. Yes
2. No

GENDER

15. [Gender by observation (1=Female, 2=Male)]

COMPUTERS

16. Do you have a computer in your home? [1=Yes, 0=No]

17. [Drop if no to 14] Is your computer linked with the Internet? [1=Yes, 0=No]

18. [Ask all] Do you currently have Internet access at home or work? [1=Yes, 0=No]

19. [If COMPUTER=Yes] Altogether, how many hours each week is (are all) your personal computer (computers) at home turned on? Is it (Are they) turned on . . .

a. Less than 2 hours per week,
b. 2 to 15 hours per week,
c. 16 to 40 hours per week, or
d. More than 40 hours per week but not on all the time
e. Is it (are they) turned on all the time?

CELL PHONE

20. Finally, we'd like to know about your household's use of cell phones. Does your household use . . .

a. Landline phone only (not including Internet phone)
b. Landline and cell phone
c. Cell phone only
d. Some other combination_____
e. Don't know

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PART II: MULTIFAMILY OWNERS'/MANAGERS' DECISION-MAKING AND PROPOSED STANDARD QUESTIONNAIRE ITEMS

Introduction

Our interest in this document is in understanding business decisions made by multifamily property owners and managers concerning investments in energy efficiency projects and equipment. These market actors work in the residential sector, but are business people. Thus, some characteristics of residential customers, as well as some characteristics typical of businesses, are relevant to their decisions. In this section we will focus on the business aspects of their decisions. Specifically, we want to know how energy efficiency fits into their decision processes and how that can be influenced by utility programs. This document does not characterize the entire investment decision process in businesses, or even in the multifamily sector. We want to understand enough about the decision process to be able to generate appropriate questionnaire items that can be used to track the success of utility energy efficiency programs in influencing these actors to pursue energy efficiency.

Few articles and papers published outside of the energy efficiency industry itself address business decisions about energy efficiency. There are more on green behavior, environmentally friendly behavior, or socially responsible behavior. In order to have a more complete view of our topic, the search was widened to include all of these categories as they are highly related to our narrower one.

Rationality in Business Decision-Making

Businesses are generally perceived to make rational decisions based on economic considerations. It logically follows that all energy efficiency investments that are financially beneficial would be adopted. This has been shown to be false by numerous authors and researchers (DeCanio 1993; DeCanio & Watkins 1998; Lutzenhiser 2009; Sullivan 2009), and is the reason that an understanding of the decision-making process and a model of it are necessary. As further evidence of this fact, Sullivan (2009) observes that decision-makers in business use different decision heuristics, depending on the situation.

Primary Factors in Energy Efficiency Decisions – All Businesses

Structural and Financial Investment Factors

Appearing in multiple articles, papers, and in our own experience, economic factors are important, even if they don't explain everything. Chief among them is payback period, which is often set at two years (DeCanio 1993). Another economic factor is the depreciation of equipment for tax purposes, which constrains capital investment decisions by the potential

tax implications. Further, less rational drivers of decisions are discussed below. Masurel (2007) also makes the point that important factors in making energy efficiency investments include: cost savings; the existence of other, more attractive investment opportunities; and the limited availability of capital.

Sullivan (2009) points out a number of barriers to rational decision-making when it comes to investments in energy efficiency. They are:

1. Split incentives (operating costs and benefits accrue to tenant, while initial purchase costs accrue to owner)
2. Limited capital
3. Market power (manufacturers/distributors taking up all the shelf space to protect market share)
4. Regulatory distortions
5. Transaction costs (probably the biggest factor)
6. Inseparability of product features

He also points out that decision-making units are typically not individuals, but groups of various kinds or multiple individuals in hierarchical processes. Decisions made by organizations are affected by a wide variety of social processes and are heavily influenced by the behaviors, attitudes, and values of their leaders. However, there are a number of common decision-making styles in organizations. Here is a list, most of which are self-explanatory:

1. Consensus
2. Autocratic (probably most influenced by the leader)
3. Formulaic (probably most rational)
4. Bureaucratic
5. Chaotic (decisions are made by committees comprised of representatives of several departments) – unlike the bureaucratic process, this process is intended to form a virtual consensus among the representatives…this style is very common, subject to huge influences by individuals and department representatives, and is highly unpredictable (Sullivan 2009)

Sullivan (2009), in his review of the literature, also discusses some of the biggest influences on business decisions about energy efficiency. The first is the hierarchy of authority or management policies that influence adoption rates and the review process that is used in a company to make these types of decisions. Specifically, a big factor is whether the organization has annual energy efficiency goals, or whether there are reserves and budgets established for funding energy efficiency investments. Also important are how high ROI hurdle rates are set. Often they are set much higher than would be the case for other investments because of uncertainty about the financial performance of the investment.

As implied by the discussion above, Sullivan (2009) argues that the size and organizational form of the business is critical to understanding decisions about energy efficiency. Small businesses tend not to have resources to invest and, in addition, energy is usually a small

percentage of their operating costs. These two factors are extremely important in business decisions about energy.

Finally, Sullivan (2009) cites a hierarchy of organizational needs:

1. Health and safety requirements
2. Regulatory compliance
3. Corporate improvement initiatives (e.g., zero defects, six sigma, greenhouse gas reduction, energy efficiency, etc.)
4. Maintenance
5. Productivity

This hierarchy is generally well understood by members of a company. Moving energy efficiency into the hierarchy by putting it into facility maintenance or capital investments profoundly affects energy efficiency adoptions. As many authors point out, a potential investment in energy efficiency always has to be compared to other possible investments in terms of costs and benefits. Often, energy efficiency is not even included in any part of the hierarchy.

DeCanio (1993), in writing about the fact that business decisions are not usually made by individuals and that companies do not behave as individuals, indicates that this fact usually results in compromises, which yield suboptimal results. Part of the problem, though, is the short-term horizons that frequently drive business decisions.

Other authors (Tate, Dooley & Ellram 2011) point to implementation costs and institutional relationships as major drivers of decisions to adopt environmental practices. They also argue that decisions about green or energy efficiency behavior are highly influenced by corporate culture or the attitudes and values of leaders. Additionally, Peters, Way, and Seratt (1996) show that because of the uncertainties that businesses feel about the economic benefits of energy efficiency projects, non-energy benefits may be a better selling-point (e.g., comfort) and, in addition, projects have a much better chance of being implemented if there is a project champion. The project champion generally takes the project up to the point of involvement of senior management, where the risks and rewards are weighed before a final decision is made. Clearly, the issues just discussed are relevant only for quite large businesses. The issue of the size of businesses will be discussed later.

Image and Reputational Factors

Tate, Dooley, and Ellram (2011) also write that the most commonly discussed driver of environmental practices is the risk associated with a company's reputation. In other words, if a business is concerned about the perception of it by its potential buyers or renters, getting a reputation for irresponsible behavior toward the environment will be felt as a problem, and this will be a driver of decisions in this area. Nikolaeva and Bicho (2011) elaborate on this further by alluding to the fact that competitive and media pressures are major drivers of the adoption of social responsibility practices. This is relevant to firms whose business identity is tied to socially responsible behavior. Other firms are not sensitive to these issues in that they do not tie their identities to green behavior and don't believe they need to.

Howard-Grenville, Nash, and Coglianese (2008) write at length about what drives firms to care about their environmental reputations. They agree with Tate et al. that firms care about being seen as environmentally friendly when they care about external pressures. They further say that individuals in firms generally shape whether the firm (or facility) interprets external pressures as a problem. They observe that plant-level variables are more important than corporate-level variables in predicting environmental behavior. They list five key internal factors that drive decisions to be seen as environmentally friendly:

1. Managerial incentives
2. Organizational culture (i.e., *how* things are done)
3. Organizational identity (i.e., what kind of company we are – green or not)
4. Organizational self monitoring (i.e., the choices an organization makes about how it portrays its actions to outsiders and whether it is sensitive to outside opinions)
5. Personal affiliations (i.e., individual members' professional experiences, education and training, and personal interests and values)

Masurel (2007) writes about small- to medium-size enterprises (SMEs) and their reputation for being behind in adopting environmental measures. The article does not argue against this statement, but provides reasons for it. SMEs:

1. Cannot use scaled-down versions of solutions devised by large organizations
2. Have decreased capacity and feasibility to act
3. Have limited time available for owners to undertake discretionary business activities
4. Experience less environmental information available to them
5. Are closer to consumers and more flexible (the only obviously positive factor)
6. Have less environmental visibility or exposure
7. Believe they have only a small absolute environmental impact
8. Have greater diversity
9. Feel less consumer demand for environmental improvements
10. Lack an organizational network that supports environmental activities

Factors Specific to Multifamily Property Owners and Managers

As with any industry, the multifamily sector is not homogeneous (Oh et al. 2002). Some properties are managed by their owners and others by outside firms. Some owner/managers have only one property, while others have many large properties. So there are differences by the relationship between owners and managers, and by size. Of course, differences go deeper than these two factors. There are different management styles as well. Some owners, even when there is a management company, are deeply involved in decision-making, while others are not.

Oh et al. (2002) describes differences in decision-making by property size. Managers of small properties typically respond to equipment on an as-needed basis, which means that they aren't oriented to long-term investments that require capital outlays. There is generally a single decision-maker, which makes them more efficient in making the decisions, though this may be outweighed by the lack of resources available to make energy efficiency changes. They argue that in the mid-sized segment, the owner is often involved, but there is generally a secondary decision-maker as well.

The point that equipment tends to be replaced only when broken is not, of course, restricted to small operators. KEMA (2007) reported that 94% of contractors participating in a multifamily energy efficiency program agreed that building managers only replace central boilers or water heaters when they break.

The large operator segment frequently operates in multiple cities and has a more complicated decision-making process. The advantage of dealing with one management company or one owner of many sites, from a program perspective, may be that if the owner or manager is convinced of the benefits of energy efficiency, actions can have larger impacts. However, Reed and Riggert (2005) identify centralized decision-making in this segment as a barrier. This point is further supported by KEMA (2006) in their evaluation of the 2004-05 Partnership for Energy Affordability in Multi-Family Housing Programs. They found that the multiple levels of decision-making in such organizations are a barrier to installation of energy-efficient equipment.

The large operator segment more often than others targets higher-end markets (Oh et al. 2002), which also makes this group a better prospect for including energy efficiency as a benefit for their clientele. Operators of large and multiple properties will also have more capital to work with for energy efficiency projects. However, there are always competing projects for investment and energy is generally a low priority or not even considered. And, of course, any discussion of energy-related decision-making in the multifamily sector has to include the issue of split incentives. Individual-metered multifamily operations are the classic case of that market barrier; if owners/managers invest in energy-efficient measures in apartments, they bear the first cost, while tenants receive the benefits of reduced operating costs.

Like any business, however, if more customers or better customers can be attracted by offering energy efficiency as a selling point, then energy efficiency will become more attractive to the owners. This point is made empirically by KEMA (2009) in their evaluation of Southern California Edison's 2006-08 Multifamily Energy Efficiency Rebate program. Specifically, the most cited reason for owners/managers to install energy-efficient equipment was that they wanted to reduce energy costs for the tenants to make it easier for them to pay rent or to improve tenant satisfaction. However, this does not mean that the split incentive barrier was no longer an issue. We have to keep in mind the fact that this result came from a sample of participants where that barrier was overcome. A sample of nonparticipants might provide a different picture – one where the split incentives barrier is still strong.

In their study, *Baseline Market Research Wisconsin Focus on Energy*, Xenergy, inc., Energy Center of Wisconsin, Opinion Dynamics Corporation, Prahl & Associates, and TecMRKT Works (2002), in addition to first cost, point to the high importance of perceived reliability,

expected equipment life, and ease of maintenance in operator decisions about buying energy-using equipment. They also note the importance of return on investment, which is a major factor in any business investment decision. These are all the rational bases of decisions that we argue are not the full picture, but are important parts.

Dedolph (2009) reiterates the importance of financial constraints in the multifamily sector, but adds the lack of time as a constraint for multifamily operators. Another factor is brought into the portrayal of this segment's thinking about energy efficiency: 35% of those surveyed in Wisconsin expressed a lack of interest in energy efficiency because they believed that their buildings were already energy-efficient. Owners' top priorities, as represented by survey results are:

1. Maintaining high occupancy rates
2. Keeping up with building maintenance
3. Keeping up with administrative paperwork

The last item may account for the lack of time felt by operators that was noted in the same study. The first item, maintaining high occupancy rates, may represent the best opportunity to persuade operators to install energy-efficient equipment in units.

Summerford and Leshin (2010) describe the segments within the multifamily sector in similar terms to what we have discussed so far. However, they add another factor, which is the complicated, multi-layered financing involved in affordable housing complexes. A multiplicity of lenders and investors typically have approval rights on any additional borrowing an owner wants to undertake, which would, of course, include energy efficiency investments. They indicate that owners are reluctant to undertake holistic energy efficiency upgrades unless the funding is provided with very favorable terms and the process is streamlined. However, the amount of the loans serviceable with energy savings, in most instances, is not sufficient to cover all of the costs of the upgrade. In contrast to the idea that the energy efficiency opportunities are in the high-end market, Bloom, Freeman, Bender, and Parker (2002) make the argument, based on a case study, that the financial structure of low-income housing can make energy efficiency upgrades financially viable. This conclusion is based on two factors: 1) low-interest financing that is available specifically for low-income projects; and 2) caps on rent and utility allowances that allow renters and owners to share in energy efficiency cost-saving benefits.

Summerford and McCollum (2008) describe the conditions under which energy efficiency upgrades are most likely in the multifamily sector. The opportunities lie in the sale of properties, when equipment is being replaced, or in conjunction with a rehabilitation effort, which generally takes place every 10 to 15 years, or longer. It is only at these times that envelope improvements are likely to be considered. However, the authors say that energy efficiency is not usually a consideration at these times, and that the least costly options are taken because the lifecycle costs and the energy savings impacts are not thought through.

Summary of Literature Reviewed

While the multifamily owner/manager sector is quite different from other businesses in some respects, it is composed of businesses that make decisions on both rational/ economic and non-rational bases. The rational factors include return on investment (ROI),

the availability of capital, and competing investment projects. Part of ROI thinking is uncertainty about whether the energy efficiency investments will actually produce the promised savings. The usual list of market barriers (e.g., information and hassle barriers) can be counted among the non-rational factors, as can complex business decision-making structures and their non-rational practices and outcomes.

While environmental and energy efficiency factors have a personal component in that corporate leaders' personal values can have an effect on whether their businesses focus on energy efficiency, they are not seen as factors that would overcome economic issues. The larger role of environmental friendliness and the related aspects of that category, such as energy efficiency, are much more likely to be oriented to one of two concerns:

1. Meeting customer needs and demands
2. Presenting an image of environmental friendliness to the public or to stakeholders

In the case of multifamily owners/managers, the second concern is more likely to take the form of presenting an image of energy efficiency in order to maintain high occupancy rates and attract good tenants. These two types of concerns seem to form the basis for considering energy efficiency issues beyond motivations or concern for energy cost reduction.

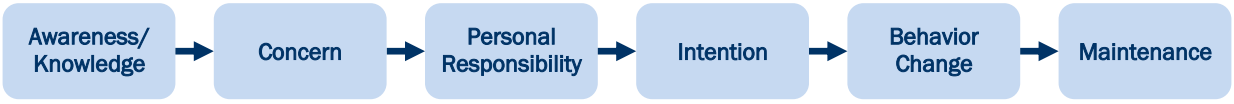
However, the process of decision-making is also important, and an important factor is whether or not any given energy efficiency project has a champion within the company. This person will have an investment in the decision to implement the project and is important to the ability to get such projects completed. Alternatively, owners and/or managers can be contracted with maintenance or service firms that are committed to energy efficiency. In this case, energy efficiency projects and their benefits can come to the attention of these decision-makers through that source.

One of the things that this review makes clear is that there are a number of structural and cultural factors that impact all decisions, including energy-related ones. These may be thought of as analogous to the situational factors that are so important to understanding residential end-user decisions on energy efficiency. Most situational factors are not very amenable to IOU program influence, but they have to be taken into account in predicting or understanding any business decision. Some of these (e.g., corporate culture) could be amenable to IOU program influence.

Models for Understanding Energy Efficiency Decisions by Multifamily Owners/Managers

The literature described above supports a conceptual model of multifamily owner/manager decisions about energy efficiency. The model we suggest uses concepts very similar to the residential end-user model shown in the prior chapter focusing on residential end-users. That model is a stage model and is repeated here in its basic form in Figure 9.

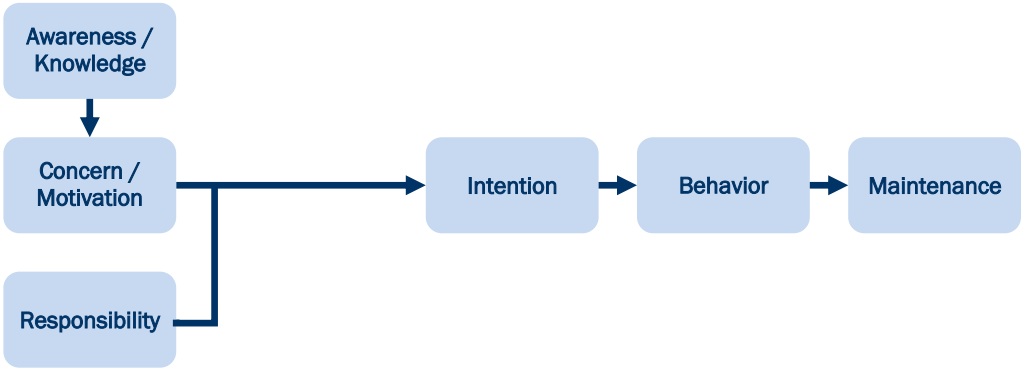
Figure 9. Stage Model of Residential End-Users' Progress Toward Changing Energy Efficiency Behaviors



The model we propose for multifamily owners and managers takes a slightly different form. It is still a stage model and uses very similar concepts as the homeowner/renter model, with slight modifications.

The multifamily owners and managers model places *Concern* and *Responsibility* in the same position in the sequence (see Figure 10) as for the homeowner/renter model. *Awareness* is still seen as the beginning of the process, and can be followed by *Concern* (or motivation) and *Responsibility*. In other words, it is still true that until a decision-maker or influencer is aware of energy efficiency possibilities and benefits availability, there is not likely to be concern or motivation to make a change in equipment or processes for energy efficiency, and no one is likely to take responsibility to undertake energy efficiency projects.

Figure 10. Basic Model of Businesses' Energy-Related Decisions



When *Awareness/Knowledge*, *Concern/Motivation*, and *Responsibility* are all present, the possibility exists that the organization or someone in it will form the *Intention* to undertake one or more energy efficiency projects, either in the common areas or in tenant units. That intention may result in *Behavior* (actually doing the project), and after that, the only issue is whether the change is maintained: *Will energy efficiency projects continue to be initiated? Will the servicing and equipment upkeep essential to continuing efficiency continue? Will energy-efficient tenant appliances continue to be purchased?*

As noted earlier, the *Awareness/Knowledge* concept in the business context is likely to be about the benefits of energy efficiency, the availability of energy-efficient products, and the reliability of those products. Concern may be about the company image of energy efficiency (which includes an impression of a well-maintained facility) or it may be about reducing operating costs. It can be about attracting tenants to an apartment or a condominium complex. It just has to be something that motivates making an investment in energy efficiency (thus, we have added *Motivation* to *Concern* in the model).

Responsibility in this model refers to someone or a group within the company that takes responsibility for initiating and following through on potential energy efficiency projects. *Responsibility* could also refer to the presence of a company function for addressing energy

issues and goals. It could be related to reducing operating costs for the multifamily building. All of these sub-categories of *Awareness/Knowledge*, *Concern/Motivation*, and *Responsibility* can, of course, be carried through the rest of the model concepts.

Figure 11 is an elaborated version of the model, showing influences on the concepts and relations shown in the basic model. Starting with *Awareness* and *Knowledge*, the key influences are market barriers, especially *Information and Hassle Barriers*, which will have a negative effect on *Awareness* and *Knowledge*.

The influences on the concept of *Concern/Motivation* are whether and how much a company is focused on its image, in this case, an image of energy efficiency and good maintenance, targeting tenant characteristics such as income level, tenant demands (especially concerning environment and energy efficiency), and the split incentives barrier. Where this barrier is operating, *Motivation* may never form.

The possibility that someone in the company would take *Responsibility* for initiating and/or carrying out energy efficiency projects is likely influenced by whether there is a champion in the company for these issues. It can also be influenced by a dedicated service contractor, someone on the outside who is knowledgeable and committed to energy efficiency, and can show people on staff what is available and what the benefits are.

When there is *Awareness/Knowledge*, *Concern/Motivation*, and *Responsibility*, there may be a progression to an *Intention* within the company to make a decision for an energy efficiency project. However, that progression can be derailed or its probability reduced under certain conditions. Those conditions include:

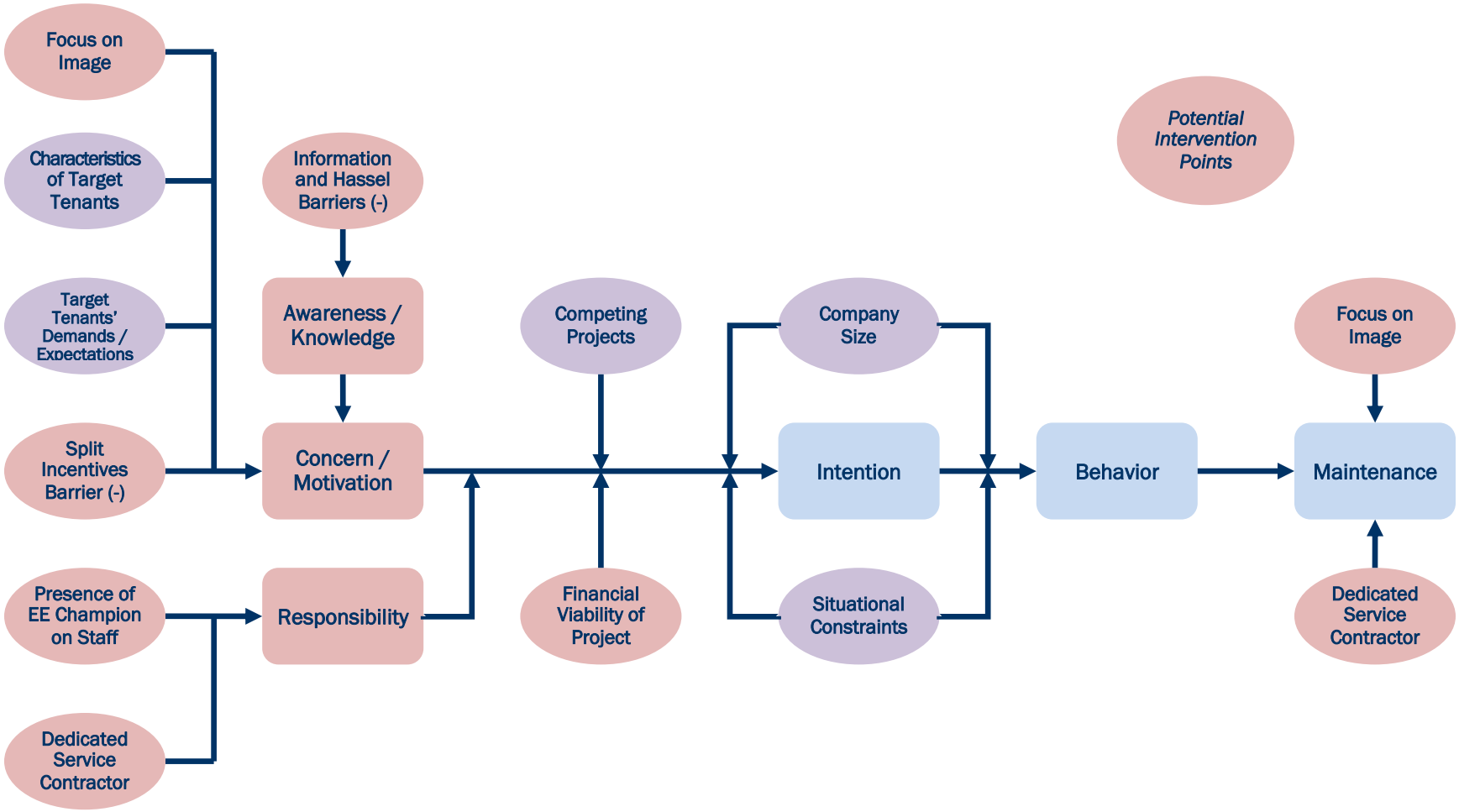
1. Its financial viability (including tax implications related to equipment depreciation)
2. The existence of competing projects or investments
3. The size and culture of the company
4. Other situational factors like building age, loan structure, and others

Similarly, if there is an intention by someone or some group in the company to move ahead to action (*Behavior*), this may or may not happen, depending again, on company size, and associated decision complexity, as described in the literature review.

Finally, at least two factors are likely to contribute to maintenance of energy efficiency behaviors: the continuing focus of the company on their image; and the policies and the presence of a dedicated service contractor or dedicated staff.

As a point of clarification, the reader will note that some arrows go from a factor in an oval to a concept in a rectangle, while others point to other arrows. When the arrow points to a concept directly, it means that that concept is influenced by the factor described in the oval. When the arrow points from an oval to another arrow, it refers to the fact that the factor has an influence on the *relationship* between two other concepts. An example is the relationship between *Intention* and *Behavior*, which "states" that *Intention* will naturally lead to *Behavior*, but that relationship can be stopped short by situational constraints or decision process complexities associated with large organizations that may keep that progression from occurring. As was true in the homeowner/renter model, highlighted areas are most likely susceptible to program interventions.

Figure 11. Elaborated Model of Multifamily Owners'/Managers' Energy-Related Decisions



Recommended Questions – Multifamily Property Owners/Managers

The identification of the best respondent for this survey will be critical. The instrument is targeted to owner/management company representatives who make decisions about improvements to the multifamily properties – such as maintaining or replacing heating equipment, replacing laundry equipment, replacing roofs. This is not targeted to a facility or a facility manager. The original source of each question is noted to inform decisions about potential modifications.

Use these for screening and adjusting questions.

1. Does your company own, or manage multifamily properties?
    a. Owns only – does not manage
    b. Manages only – does not own
    c. Owns and manages
        i. (adjust questions to be own only, manage only, or own and manage)
        ii. For those that own and manage need to include, where appropriate, questions as to whether they treat the properties they own and manage differently from those they only manage)

2. What is the Number of Properties that you own/manage?
    a. One (if just one adjust questions to be about one property)
    b. 2 to 5
    c. 6 to 10
    d. 11 to 20
    e. More than 20
    f. Currently Unoccupied
    g. DK

Awareness/Knowledge

1. I am now going to read a few statements regarding things multifamily property owners can do to save energy. Please tell me how much energy is saved by each (SRBI+New), using a scale from 1 to 7 where 1 means *None*, and 7 means *A Lot*.
    a. Replacing old refrigerators with ENERGY STAR models
    b. Replacing all of the old fluorescent lights with new T-8 or T-9 florescent lamps and fixtures
    c. Adding ceiling Insulation
    d. Replacing an older standard model central air conditioner with an ENERGY STAR model
    e. Replacing an older standard model room air conditioners with an ENERGY STAR model
    f. Adding and using timer on pool heating equipment

2. (New) Are you aware of … 1 means *Yes*, and 0 means *No*
    a. utility programs designed to help you identify energy-saving improvements for your property (IES)
    b. utility rebates or incentives that you can get for energy-efficient improvements to multi-family properties like yours

3. (New) Which of the following labels or programs for energy efficiency have you heard of? 1 means *Yes*, and 0 means *No*:
    a. ENERGY STAR
    b. Tier 2 ENERGY STAR
    c. Most Efficient
    d. Consumer Elect
    e. Engage 360
    f. Top Ten
    g. Energy Upgrade California

4. Compared to other multifamily property owners and managers, how much do you think you know about saving energy at your properties? Please use a scale of 1 to 7, where 1 is *A lot less than other property owners/managers* and 7 is *A lot more*.

5. Have you sought information on energy-efficient models when replacing energy using equipment? [1=Yes/2=No]

6. Please rate how difficult it is for your company to find information about how the properties you own/manager can become more energy-efficient. Please use a scale from 1 to 7 where 1 means *Very difficult*, and 7 means *Very easy.*

7. How confident are you that you can identify energy-efficient models in the following equipment categories? 1 means *Not at all confident* 7 means *Fully confident* that you can identify the energy efficient model of:
    a. Laundry equipment
    b. Refrigerators
    c. Heating systems
    d. Cooling systems
    e. Lighting for hallways
    f. Lighting for bathrooms
    g. Lighting for kitchens
    h. Lighting for living areas
    i. Outdoor lighting

Concern/Motivation

1. Using a 1 to 7 scale where 1 means *Not at all helpful*, and 7 means *Very helpful* , how helpful do you think energy efficiency purchases are for :
    a. Attracting and retaining tenants
    b. Reducing operating costs
    c. Demonstrating that your properties are well maintained
    d. Increasing the value of your assets
    e. Meeting code requirements
    f. (for assisted housing units) meeting requirements for supplemental funding

2. Using a 1 to 7 scale where 1 means *Not at all important*, and 7 means *Extremely important*, how important is it to your tenants that you have ***energy efficient versions*** of the following: (include NA for those who do not offer the equipment)
    a. Lighting systems in the hall ways
    b. Laundry equipment
    c. Refrigerators in the dwelling units
    d. Heating systems in the dwelling units
    e. Cooling systems in the dwelling units

Responsibility

1. Is there a person or a committee in your company (owner or manager) that is responsible for managing energy use in your company or complex? [1=Yes/2=No]

2. What level of support do you have from your management to make energy efficiency improvements in company properties? Please use the 1 to 7 scale with 1 being *Very unsupportive* and 7 being *Very supportive*.

3. Which of the following describes your company: where 1 means *Does not at all describe your company* and 7 means *Definitely describes your company:*
    a. Our company is not concerned about saving energy because our contribution is small
    b. It is the government's responsibility, not our companies, to insure we have adequate energy resources for businesses to operate
    c. Our company considers it our responsibility to decrease energy use to insure there are adequate energy resources
    d. Our company considers it our responsibility to decrease energy use to help reduce greenhouse gases.
    e. The amount of energy our company uses today has an impact on future generations
    f. It is socially responsible for our company to limit the use of electricity by our properties
    g. I feel guilty if my company uses too much energy
    h. Our company has a responsibility to improve the environment by using energy-efficient appliances in our properties
    i. Our company has a responsibility to contribute to reducing our countries dependence on foreign oil

j. Our company does not need to do more because our properties are already energy-efficient
k. Our company has done all we can afford to do to make my home more energy efficient
l. I prefer to spend my money on something other than making my home more energy efficient

Intention/Behavior

[By asking about current behavior and then intentions about each, we: 1. Save some interview time, 2. Get a measure of current behavior, 3. Get a measure of intention even if behavior not current, and 4. If both doing currently and intent to do it in the future, this is a measure of maintenance.]

1. I am going to read a short list of actions that your company might take in energy-efficient behaviors or investments. First, I will ask you whether you are currently doing each, then I will ask if you intend to in the future. [1=Yes/0=No]
    a. Invest in energy-efficient lighting for common areas
    b. Invest in energy-efficient cooling equipment for the common areas
    c. Invest in energy-efficient heating equipment for common areas
    d. Invest in energy efficiency laundry equipment for common areas
    e. Increase energy efficiency of the building envelope – such as insulating the attic
    f. Increase the energy efficiency of appliances in the tenant units
    g. Increase the energy efficiency of lighting in the tenant units
    h. Market your properties as energy-efficient
    i. Provide prospective tenants the average electrical and gas bills for dwelling units in your properties

Maintenance

Other measures that have implications for maintenance: [1=Yes/0=No]

1. Is energy efficiency a routine part of your building maintenance activities?
2. Is energy efficiency ever considered when thinking of improvement initiatives for your properties?
3. Is energy efficiency considered part of the solution for the health and comfort of tenants?
4. Does your company have an energy policy?

Firmographics

1. Is your company independent, or part of a larger company?
    a. Independent
    b. Part of a larger company
    c. Don't know
    d. Refused
    e. Other (specify)

2. What is your position or title?
    a. Owner of property
    b. Property/leasing manager/associate
    c. Senior property manager
    d. Maintenance supervisor
    e. Senior/regional maintenance supervisor
    f. Purchasing manager

3. How long have you been with this company?

4. How many years has your company been in the business of owning, managing, or maintaining multifamily properties? _____

5. About how many units are in the properties, your company owns/manages? _____

A few questions about how your properties are heated and cooled

1. What percent of your properties have a central system that provides **heating** to all units?
    a. _____
    b. DK

2. What percent of your properties have a central system that provides **cooling** to all units?
    a. _____
    b. DK

3. What percent of your properties have a central system that provides **hot water** to all units?
    a. _____
    b. DK

4. What percent of the tenants in your properties are responsible for paying their own electric and gas utility bills as compared to having the rates included in the rent or HOA fees?
    a. Tenants/residents pay their own bills %_____
    b. Utilities are included in the rent/HOA fees _%_____
    c. Tenants/residents pay some utilities while others are included in the rent/HOA fees %_____
    d. Other [specify] %_____

5. What percent of your properties have individually metered **electricity** for the dwelling

6. What percent of your properties have individually metered **natural gas** for the dwelling units

A few questions about tenant targeting

1. Do you accept families with children in your properties? Yes No DK

2. Do you target tenants interested in green buildings? Yes No

3. What income levels do you target for renting your properties do you target high end income, middle range or low end?
    a. High end,
    b. mid-range,
    c. low income
    d. DK
    e. Refused

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