Moving Beyond Awareness: Using Segmentation to Drive a Movement

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ABSTRACT

The state of California is tasked with one of the world's most aggressive energy-saving goals: saving 16,000 gigawatts of electricity and 620 million therms of natural gas by 2020[1]. To meet this challenge, the state must consider not only engineering options, but also marketing options that deal with moving residential customers to pursuing efficiency and conservation behaviors. To effectively motivate California residents, the California Public Utilities Commission (CPUC) commissioned Opinion Dynamics to conduct a comprehensive, statewide segmentation study to inform a marketing and outreach campaign aimed at closing the gap between consumer awareness and action. This paper discusses the methodology for the segmentation work, briefly touches on the statistical techniques used to generate a robust segmentation scheme, and provides insight into the process of effective, actionable segmentation studies so that our methods and knowledge gained are available to other state and utility efforts. The paper moves beyond segmentation studies as descriptive, using them as an actionable and forward-looking tool for change.

Introduction

We conducted this segmentation research to support the CPUC's efforts to assist in the development of a marketing and outreach strategy for the Statewide Marketing, Education and Outreach program. We used the following overarching criteria to develop our segmentation scheme:

1. Represent California's diversity -- geographically, demographically, politically, and attitudinally.

2. Provide detailed insight into the barriers, motivations, and attitudes that inform *daily* energy use practices and energy efficiency purchases.

3. Differentiate groups based on behaviors, not attitudes alone, to determine the current behavioral trends for each segment *and* provide insight into each segment's potential to increase energy-saving behaviors.

4. Provide sufficient demographic[2] and psychographic distinction to identify and target the segments in IOU and other databases and within the population for strategic program and marketing and outreach intervention.

In the next section, we provide our methods for developing the final segmentation approach relying on

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[1] Source: California's Long Term Energy Efficiency Strategic Plan, p. 3. California Public Utilities Commission. September 2008. http://www.californiaenergyefficiency.com/docs/EEStrategicPlan.pdf

[2] This includes regional distinction.

the aforementioned criteria.

Segmentation Methodology

Segmenting consumers to represent the California energy efficiency marketplace presented unique challenges. Previous surveys conducted by Opinion Dynamics in California found that most consumers agree in the abstract that energy efficiency matters and is important. However, the ethnographic research we recently completed in California indicates that the depth of knowledge, understanding, and personal concern for energy efficiency and conservation varies widely among customers. Therefore, we had to determine awareness, attitudes and barriers[3] that were distinct and varied enough to effectively differentiate the population into knowable and characterized groups. Findings from Opinion Dynamics research on the effects attributable to the Flex Your Power (FYP) campaign (Dougherty, Randazzo & Wellner 2009) found that the beliefs of Californians do not always align with their actions. The findings from this previous research spurred us to incorporate behaviors into the segmentation scheme as well as attitudes.

To develop the preliminary survey instrument, the Opinion Dynamics team:
- Carried out extensive primary and secondary research, drawing on a library of energy-focused segmentation studies. This effort was necessary to determine questions around motivations and barriers that captured a wide range of belief systems and that were not limited to typically drawn-on green motivations.
- Consulted the behavior change literature to understand what matters to behaviors and energy use (McLain ID Consulting, Deborah Laurel and Associates, & KVD Research Consulting 2008). Each of the constructs included in our original survey instrument – e.g. awareness of consequences, personal responsibility, and so on – were drawn from the behavior change literature.
- Drew upon previous research conducted by Opinion Dynamics on marketing and outreach's effects on behavior change. For example, in our structural equation modeling (SEM) effort, where we isolated and measured the effect of FYP advertisements on the purchase of CFLs, and the intention to purchase them, the findings point to the importance of barriers (specifically, not liking the product) on CFL purchase behavior. We also found that predictors with the lowest impact on purchases include the attitudes of concern both for energy efficiency and global warming.
- Drew upon our ethnographic research on energy-saving practices and purchases conducted throughout the state of California. It provided insights that allowed us to effectively differentiate populations that originally seemed very similar in motivations and behaviors. It also increased our understanding that barriers played a much larger role than attitudes in practicing energy efficiency behavior.

Drawing on these resources, our team developed a preliminary survey instrument. The survey explored attitudes and barriers toward taking energy efficiency and conservation actions with the aim of identifying barriers to be eliminated and providing better motivations to action. The survey also contained questions about current behaviors. Furthermore, the survey included demographics, media habits, and standard psychographics to allow the CPUC to effectively find the segments in the population. This preliminary survey allowed us to test a large battery of questions and then focus in on the best ones for this effort.

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[3] We use the term "attitudes" as shorthand to represent motivations and social influences.

We pre-tested the survey instrument with a sample a bit over 100 customers to ensure that:

- The attitudes, barriers and behavior variables that were selected for the final analysis did not have major problems with skewness[4] or were amenable to transformations. Where skew was a problem, we dropped the questions or reformulated to reduce skew. If a variable is highly skewed then you are determining how people are the same, not different from each other, with the exception of identifying extremes. [5]

- That we were measuring the attitudes and barriers concepts in the most efficient way possible. We did this by performing scaling analysis[6] on all of the original concepts in the survey, allowing us to determine which questions we needed to include in our final survey to measure the key attributes we were seeking to measure.

- Our concepts did not hang together to the point of redundancy. To test this, we performed principle components analysis (PCA) on the revised list of questions, which allowed us to see whether the components formed new, more general attitude scales. For instance, the survey we developed so we could utilize the statistical technique of Structural Equation Modeling (SEM) had shown that barriers tend to be quite correlated so that if one is not inclined toward a behavior, many reasons exist. If this were the case, then the original barriers concepts would form more general scales.

- The attitude and barriers scales predicted actual behaviors. This process involved two separate regression analyses with behavior as the dependent variable.

We modified the preliminary survey instrument based on the results of the pre-test. We chose to conduct a telephone survey with English-speaking California residents aged 18 years and over. We drew the sample using a random digit dial (RDD) methodology. To ensure that the sample was representative of English-speaking Californians on certain variables[7], our team controlled the number of respondents filling the following groups: ethnicity, age, homeownership, IOU territory, and income. We conducted 752 interviews.

Our team then used a multi-method segmentation approach to identify the best segmentation scheme. We took two broad approaches to segmentation. The first broad approach involved the use of cluster analysis (here known as the "cluster analysis approach to segmentation"). The second main approach, known more generally as response-based segmentation[8], involved the use of CART (Classification and Regression Trees) analysis.[9] Cluster analysis is used to identify groups of people with similar characteristics. In contrast, response-based segmentation involves a predictive model to determine the characteristics of people most likely to take an action or fall into a category, and in contrast to the

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[4] This process involved calculating the skewness statistic of each attitudes question to check the normality of the distribution.
[5] Further, one of the assumptions of two-step cluster analysis is normality for continuous variables.
[6] This process involves calculating the Cronbach's alpha of the concepts - Cronbach's alpha is a measure of the internal consistency of a set of questions to see if they "hang together".
[7] We used Census data to ensure this. The source of the data is the U.S. Census Bureau, American Community Survey 2007 1-year estimates. Where available from the Census website, the data used was for ages 18 and over.
[8] Response based segmentation can also be performed using other methods such as binary and multinomial logistic regression, as well as CHAID analysis.
[9] CART (Breiman, et al., 1984) is a specific algorithm and software, belonging to a class of decision tree methodologies sometimes referred to as recursive partitioning methods. It is a non-parametric technique that can select from among a large set of categorical and continuous variables, regardless of their distributional characteristics, those that individually, or in combination, best predict the outcome variable of interest by splitting the sample into progressively more parsimonious subgroups using multiple predictors (or *splitters*, as they are called in CART).

cluster analysis approach, requires the selection of a response or target variable (SPSS Inc. 2006). In our case, the target variable was energy-saving behaviors. Using these two main approaches, we

developed multiple segmentation schemes (in excess of 15) for comparison.   We then reduced the number of models to 3 final schemes for consideration. We chose our final scheme by the following analysis:

- The first scheme was an attitudes-only scheme. This scheme did not directly incorporate behaviors and therefore, fell short on one of our overarching criteria for the segmentation – that it differentiates groups based on behaviors, not attitudes alone.
- The second scheme also involved cluster analysis, but involved two separate cluster analyses – one for behaviors and one for attitudes/barriers. It incorporated both attitudes/barriers and behaviors through two sets of clusters, one for behaviors and one for attitudes/barriers. This approach resulted in a total of nine segments. However, this approach required a modification to generate an effective marketing and outreach strategy. We reduced the number of segments to a more targetable five segments.
- Our third scheme involved the CART analysis technique. The final CART analysis had as the target variable a trichotomy of the index of total behaviors taken (other than the variables having to do with utility participation).[10] The predictor variables in this scheme were attitudes/barriers and an index of utility participation. This segmentation scheme provided descriptive segments, but fell short on one of our overarching criteria – the ability to identify the segments in the population. We discuss this more next.

After developing the 3 schemes outlined above, we used CART analysis to determine which of the schemes was best predicted by our demographic variables. We compared the "explained variances" of the 3 schemes. The "explained variance[11]" figure is interpreted in the way an R^2 is interpreted, i.e., proportion reduction in prediction errors. This similarity makes it possible to evaluate this overall model assessment figure in the in the same way as an effect size like Cohen's (1988) f^2 which is the percent of variance explained divided by the percent unexplained. As defined by Cohen (1988), a small effect is .02, a medium effect size is 0.15, and a large effect is .35.

Our findings are shown in the table below.

Table 1. Explained Variance of the Three Segmentation Schemes for Consideration

Scheme Number	Scheme	Variance Explained	f^2	Effect Size
1	Cluster Analysis on Attitudes - Attitudes Only Scheme	20%	0.25	Medium
2	Cluster Analysis - Attitudes/Behaviors Scheme	18%	0.22	Medium
3	CART Analysis	4%	0.04	Small

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[10] We ran several CART models, including the following as target variables: practices, low cost energy-efficient equipment purchases, low-medium-cost equipment requiring installation by a knowledgeable person, high-cost equipment purchases, and total energy saving behavior.

[11] This term is used for intuitive purposes. The actual figure that we refer to as "explained variance" is based on CART's Cross-Validated Relative Cost, which is subtracted from 1 to show the percent of prediction errors that is reduced by the model. To get a figure analogous to f^2 we calculated (1-Cross-Validated Relative Cost)/Cross-Validated Relative Cost.

Ultimately, all of the 3 schemes performed well in providing descriptive and adequately differentiated segments. However, our second segmentation scheme was predicted well by our demographic variables (necessary to ensure that the segmentation is actionable) and incorporated behaviors directly. We adopted this as our final scheme. [12]

Results

The Opinion Dynamics team identified five unique segments for the IOU program outreach efforts. These segments were developed to allow for a strategic and tailored marketing and outreach strategy. To develop clear descriptions of each segment, we "profiled" segments by other variables in the survey (via cross-tabs) including demographics, psychographics and others. Using these profiles, we developed names and marketing and outreach recommendations for our final five segments: Leading Achievers, Practical Spenders, Striving Believers, Thrifty Conservers, and the Disconnected.

Our final five segments are ordered in this report by their relative levels of behavioral adoption and their attitudes towards energy use. The first segment, Leading Achievers, have both a high level of energy efficiency adoption and high levels of personal concern and interest in saving energy. They are followed by the Practical Spenders, who have high levels of energy efficiency adoption, but lower personal concern for saving energy and conservation as an issue. Next, we describe the Striving Believers, who adopt energy conservation practices, have a high personal concern for saving, but fail to move to the next tier of behavior change (i.e., installing energy efficiency measures). The Striving Believers are then followed by the Thrifty Conservers, who also engage in conservation practices, but have a relatively low concern for conserving resources, low daily concern for saving energy, and are less likely to reduce their energy use. Finally, we have the Disconnected, who take little to no energy saving actions (including energy efficiency and conservation) relative to the other segments and have low personal interest in saving energy.

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[12] The final scheme we adopt is most similar to the approach found in Yankelovich Inc. (2007).

Figure 1. Final Five Statewide Segments

SEGMENT	E.E. RELEVANCE	MOTIVATION RANK		BEHAVIORAL MOVEMENT POTENTIAL
LEADING ACHIEVERS	Low ⟷ High (circle at High)	1 Money 2 Environment → 3 Foreign oil 4 Future gen. 5 Health	1 Climate chg. 2 Healthy env. 3 Future gen.	No Cost ⟵ High Cost (circle at High Cost)
PRACTICAL SPENDERS	Low ⟷ High (circle at Low)	1 Money 2 Foreign oil → 3 Future gen. 4 Health 5 Environment	1 Energy independence 2 Nat'l security 3 Help economy	No Cost ⟵ High Cost (circle at High Cost)
STRIVING BELIEVERS	Low ⟷ High (circle middle)	1 Money 2 Environment → 3 Future gen. 4 Foreign oil 5 Health	1 Climate chg. 2 Resources 3 Animal and plant life	No Cost → High Cost (circle at No Cost)
THRIFTY CONSERVERS	Low ⟷ Relevance High (circle at Low)	1 Money 2 Environment → 3 Foreign oil 4 Health 5 Future gen.	1 Climate chg 2 Healthy env. 3 Resources	No Cost → High Cost (circle at No Cost)
DIS-CONNECTED	Low ⟷ High (circle at Low)	1 Money 2 Environment → 3 Help state lead 4 Health 5 Foreign oil	1 Animal and plant life 2 Healthy env. 3 Climate chg.	No Cost ⟵⟶ High Cost (both directions)

* The circles in these diagrams indicate where each segment is now. Arrows show the direction for movement. Disconnected has low adoption overall, and needs to be moved in both directions.

In the next few sections we describe our segments in greater detail:

- **Leading Achievers**: (22%) The Leading Achievers have the means and personal will to take energy saving actions. The Leading Achievers are generally willing to reduce their energy use and are resource-minded. This group recycles regularly and index highly compared to other segments (i.e. are higher than other segments) on energy-related altruism, energy efficiency purchases and IOU program participation. Politically this group is liberal and is most motivated

to change their energy-related behaviors due to a concern for the environment and climate change in particular. This group indexes low on all barriers to action. Demographically, they are homeowner-driven, are older, and have a majority that is Caucasian (76%). The Leading Achievers are attitudinally and behaviorally primed to serve as leaders in California's movement

towards net zero energy households. The Leading Achievers are highly educated and informed and are more likely to be weary of mass media advertisements or view them as targeted at others, not themselves.

- **Practical Spenders** (18%): Practical Spenders, like the Leading Achievers, index higher than *all* other segments combined (including the Leading Achievers) on energy efficiency purchases. They index lower on altruism and resource-mindedness compared to all other segments and are more likely to believe that energy saving is not important day-to-day. Members of this segment are convenience and comfort-driven. This group is comprised mostly of homeowners, is the most politically conservative of all segments, and is ethnically diverse.

- **Striving Believers** (25%): This segment has a high stated willingness to reduce their personal energy use, but has not engaged in greater than average energy efficiency measure adoption. Overall, Striving Believers are on par with the energy saving movement, but relative to all other segments, this group has adopted fewer energy efficiency measures given their high sense of personal responsibility to take action, strong sense of altruism, and high concern for resources. As a group, the Striving Believers index low on all barriers to action. The Striving Believers are a highly educated group, the most liberal leaning of all segments, have a higher proportion of renters compared to all others, and a high proportion of Striving Believers live in urban areas compared to all other segments. Striving Believers are clearly engaged in energy-saving issues, but have yet to be moved to substantive actions.

- **Thrifty Conservers** (21%): Like the Striving Believers, the Thrifty Conservers are taking mostly conservation actions, and index lower on many energy efficiency installations. Drawing on their stated motivations, their propensity to adopt practices is due mostly to a concern for climate change and natural resources. Like Practical Spenders, the Thrifty Conservers have a relatively low concern for conserving resources, low daily concern for saving energy, and a low sense of altruism around saving energy. Further, Thrifty Conservers are more likely to feel that saving energy is not their personal responsibility. Like Practical Spenders, this group is Conservative-leaning. In addition, this segment is appearance-conscious, and more likely to feel that energy efficient appliances won't look as good as standard appliances. Thus, Thrifty Conservers may be more susceptible to product-specific barriers when considering energy efficiency. The Thrifty Conservers are less likely to feel that they can reduce their energy use during a demand response event and have a lower willingness to do so when compared to all other segments. Thrifty Conservers tend to have lower levels of education, have a greater proportion of renters compared to all other segments combined and have a greater proportion of low-income individuals. Of the two groups with great potential for movement, Thrifty Conservers have the greatest number of barriers prohibiting them from taking action.

- **Disconnected** (15%): Of all segments, the Disconnected are the most limited financially in their ability to take action and have the greatest barriers overall to action. This segment also performs lower than all other segments on the behavioral indexes, including no-cost practices as well as energy efficiency measures and purchases.   Attitudinally, and much like Practical Spenders and Thrifty Conservers, the Disconnected are more likely to feel it is not their job to save energy, to be less resource-minded, and to be convenience and comfort focused. Like Thrifty Conservers,

they tend agree with product-specific barriers to efficiency purchases, indicating that efficient products do not look as good as or perform as well as standard products. Overall, this group is politically diverse. Of all groups, the Disconnected have the greatest number of low-income individuals and the greatest number of individuals with a high school education or less. The Disconnected have a greater proportion of Hispanic/Latino households and African-American Households, and have the greatest number of renters of all segments. Since the Disconnected are convenience-driven (likely due to their financially constrained lifestyle) and have high barriers to energy efficiency purchases, this group will need to be convinced of the ease of changing their behaviors and the value of energy efficiency.

Discussion

In this section, we discuss key findings and the lessons learned from our research.

Energy Efficiency is a Complex Product

Segmentation studies that incorporate energy efficiency and conservation behaviors should group behaviors according to cost and convenience. Practicing energy efficiency and conservation entails multiple behaviors (with no cost, low cost, and high cost actions) and the motivations and barriers to taking or not taking specific behaviors differ. Our ethnographic research qualitatively collaborated this, by exploring the motivations and barriers for a list of 30 energy efficiency and conservation behaviors. For example, inconvenience was cited as a barrier to unplugging appliances when they are not in use, while cost was cited as a barrier to purchasing new, more EE appliances. To address these multiple behaviors in the study, we developed five behavior indices to group behaviors based on similar adoption thresholds. In developing the indices, we drew upon the behavior change literature (McLain ID Consulting, Deborah Laurel and Associates, & KVD Research Consulting 2008), which found that cost and convenience is an important moderator to behavior. The groups were:

- Practices (e.g., turning off the lights when leaving the room)
- Low cost energy-efficient equipment purchases (e.g., purchasing a CFL)
- Low-medium-cost equipment requiring professional installation (e.g., installing programmable thermostats)
- High-cost equipment purchases (e.g., installing solar panels), and
- Participation in utility programs (e.g., having an energy audit).

The study found that there can be disparities across these behaviors. For example, we found a segment, Practical Spenders, which indexed higher than all other segments combined on energy efficiency purchases. However, it does not exceed other segments in conservation practices. In contrast, there is the Thrifty Conservers segment that is taking mostly conservation actions and index lower on many energy efficiency installations.

Leverage *Current* Attitudes

Outreach activities should leverage the *current* attitudes, values and beliefs of each target audience and speak to them in their terms, from their perspective, through messaging that focuses on these aspects.

Moving individuals to action does not require changing their fundamental belief systems or generating new concern for issues that are not currently relevant to a given customer, but mirroring the belief system and appealing to the values of the segments. It is not about making people feel differently or changing attitudes. For example, our segmentation research found one segment (Practical Spenders), who are adopting many energy efficiency measures but index low on personal responsibility to take action or resource consciousness, are politically conservative and ranked the environment as least likely to motivate them to take energy saving actions. This group will not respond to messages that promote saving the environment and stopping climate change. They may even react negatively to these kinds of campaigns. However, they may be spurred to take action by appealing to their values and attitudes on achieving independence from foreign oil imports. In our ethnographic research, we qualitatively collaborated this finding. The key is not to focus on simply changing attitudes to fit into a given marketing approach, but to understand attitudes such that a different marketing approach can be taken as deemed appropriate for a given audience.

Behaviors

It is important to make sure that behaviors are incorporated in a segmentation scheme so that people can effectively be motivated to take action. Studies that segment on attitudes only are based on the assumption that if you change attitudes, then behaviors will change (i.e., that attitudes are strongly linked to behaviors). Although true in less complex subjects, this was not supported by our research. The structural equation modeling effort found that the predictors with the lowest impact on CFL purchase were the attitudes of concern for both energy efficiency and global warming. Our final scheme effectively captured the inconsistency between attitudes and behaviors. For example, the Striving Believers segment believe in the energy saving movement but relative to all other segments, this group has adopted fewer energy efficiency measures given their high sense of personal responsibility to take action, strong sense of altruism, and high concern for resources. Although the Striving Believers are less affected by most barriers compared to all other segments, specific lifestyle barriers emerge that may be preventing them from taking more action when we compare Striving Believers to the other highly motivated segment – the Leading Achievers. When compared to Leading Achievers, the Striving Believers indicate in greater numbers that they often do not think of saving energy or are too busy day-to-day to remember it. The Striving Believers will take action if standard efficiency and conservation actions are made easy and more relevant.

Barriers are Important

Barriers play a very important role in the ability to practice energy efficient behaviors. This finding is also revealed in previous Opinion Dynamics research. For example, our structural equation modeling effort pointed to the importance of barriers (specifically, dislike of the product) on CFL purchase behavior. Knowing each segment's barriers is crucial to understanding why some segments are not taking action and provides insights on what it will take to increase the segment's energy saving actions.

Demographic Distinction

It is important that segmentation provides sufficient demographic[13] distinction to identify and target the segments within the wider population. No matter how descriptive or insightful a segmentation scheme is, if

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[13] This includes regional distinction.

you cannot "find" the segments in the population, then it is not actionable. These attributes will be useful when designing an integrated communication plan to reach these segments. To ensure these important attributes, our segmentation explicitly included demographic[14] distinction as a criterion for the final scheme.

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[14] This includes regional distinction.