

Market Segmentation and Energy Efficiency Program Design

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Abstract

Segmentation – identifying homogenous sub-populations within larger heterogeneous populations – has emerged as an important marketing tool over the past half-century. The technique is a response to the need to effectively communicate with, and motivate to action, an increasingly diverse population of individuals, families and businesses, who rely on a rapidly multiplying set of communication channels.

Attempts to segment energy efficiency markets began in earnest during the 1980s, through such techniques as SRI Consulting Business Intelligence's VALS™ method, which focuses on categorizing populations along psychological traits and demographic characteristics. However, until recently, most utility energy efficiency managers employed marketing approaches that tended towards sectorization, as opposed to segmentation. That is, in part driven by historical customer class definitions, energy efficiency programs have focused broadly on agricultural, industrial, commercial, and retail customers, without a significant tailoring to reflect segments within these sectors. Likewise, energy efficiency programs tend to be based on an engineering economics approach, in which specific technologies are pushed without much attention to what energy users want and how they behave in relationship to energy-using devices.

Over the past decade, utilities have made progress towards identifying segments and crafting programs and marketing strategies based upon them. For example, recent energy efficiency programs focus on wineries and dairies, which may have previously been lumped together as part of agricultural programs; and lodging facilities and food service vendors, which may have fallen into the broad retail category. These programs appear to more effectively reach the segmented populations than previous sector-based initiatives.

It remains to be seen whether utilities will continue to advance in their use of segmentation, and whether these entities are the most effective institutions to lead this effort. The market eco-system in which energy efficient and conservation products are nested is diverse, occupying an expanding number of niches that depend on a widening set of decomposed communication channels. To effectively reach these (sub)segments, a multitude of products, services, and marketing approaches will be needed, as supported by robust data analyses.

In addition, a number of basic elements need to be addressed if segmentation is going to be a fully effective tool to assist California to reach its ambitious energy savings goals. For example, greater thought needs to be given to product definition: is it energy efficiency in general; specific products; or particular product attributes? Likewise, consumers' resistance to prematurely retiring "perfectly good equipment" – which harkens to a previous days' understanding of conservation – needs to be more deeply considered.

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Executive Summary

Market segmentation – identifying populations which respond similarly to commodities and marketing messages – can provide a powerful method from which to design and spur the adoption of products, services, and ideas. While there are various approaches to segmenting markets, methods by and large rely on (statistically) examining qualitative or quantitative data to identify the relationships between social, economic, and demographic characteristics, particular goods, services, and ideas and adoption behaviors. Successful segmentation schemes identify the timing of and reasons behind key decision factors related to different commodities for a given population, so that these elements can be matched with products and messages. Market segmentation has been successfully used to speed the creation and adoption of a wide array of consumer products, ranging from automobiles to beverages, as well as part of campaigns to modify a variety of social behaviors, particularly associated with public health (e.g., HIV/AIDS; tobacco use).

While electric utilities are increasingly experimenting with segmentation schemes – with some notable successes – development of effective segments has been slowed by a lack of comprehensive data, particularly related to such hard-to-reach but ubiquitous sectors as small businesses; a tendency to base demand-side management programs on traditional broad industry sectors, such as residential, commercial, and industrial customers; and a energy regulatory process that emphasizes technological solutions to demand-side management that are principally based on engineering economics analyses. However, with encouragement from regulators and as a result of active third-party solicitations, the state’s investor-owned utilities exhibit a greater use of segmentation in their recently proposed energy efficiency programs.

Segmentation schemes tailored to residential customers typically focus on attitudes and motivations. For example, attempts are made to demographically or geographically isolate groups of consumers by whether they are likely to change their products or behaviors as a result of environmental, economic, or social messages. Flex Your Power’s messages, for instance, revolve around photographs of children selling compact fluorescent light bulbs; the underlying theme is that its important to save energy for future generations, and that to do so is child’s play.

Segmentation schemes for businesses also rely on motivating factors, and seek to isolate similar energy end-use technologies, ownership patterns, economic characteristics, and associated behaviors and match these with products and services. For example, the hospitality sector may be useful segmented into independent economy hotels, economy chains, and higher end hotels, and provided with devices that address a specific need (e.g., free, direct installation of sensors that regulate air conditioning in vacant rooms).

Once a segment has been described, product and service development and associated marketing efforts can be tailored to address identified segment-specific problems or needs, or to prompt action to be taken. Examples of potentially successful segments include:

- *Corner markets*: typically independently-owned, with old, inefficient lighting and equipment, low profit margins, and minimal access to capital. This segment might be addressed through direct installation programs that focus on lighting and refrigeration. Marketing is best conducted door-to-door, with easy to read materials and frequent references to neighboring stores that have adopted the measures.
- *Warehouses*: exhibit a variety of ownership patterns, and frequently do not pay, or even see, their utility bills. This segment can be further deconstructed by end-use activities, such as whether the operation is reliant on lighting, refrigeration or battery-powered equipment. Because of split incentives (e.g., the energy bill may be paid elsewhere, or the warehouse operators may rent), energy efficiency measures must be simple and immediately adoptable (e.g., timers for load-shifting battery-powered equipment). Because in many cases there will not be an energy manager, it's a difficult segment to market to, triggering the need for long-term efforts (e.g., three to five years).
- *Low income families*: may not own their homes, have old or inadequate equipment, be poorly educated on energy uses, and have little time to manage their energy use. Efficiency offerings need to provide a direct service, be low- or no-cost, and, directly installed. To the extent that energy programs offer co-benefits (e.g., outdoor sensors, which also increase security) they will be more attractive. Marketing is best done by community-based groups that have a long-term presence in the neighborhood and the necessary language and cultural skills.

As California attempts to achieve the ambitious energy-reducing goals associated with reducing greenhouse gas emissions, regulators and utilities need to pay greater attention to how best to apply market segmentation to the development and fielding of efficiency programs. High benefit-cost ratios estimated by an engineering economics framework that assumes significant adoption rates without clear marketing pathways should be carefully examined. Without a comprehensive approach to developing and marketing energy efficiency measures that is based on well described segments, programs are unlikely to be fully successful.

In addition, energy regulators and utilities should be thoughtful about how fast they move towards integrated approaches to demand-side management. Although in many cases ratepayers will welcome comprehensive energy (and other resource) saving measures, a significant portion of the population may prefer one-at-a-time solutions. In particular, families and small businesses may not have the capacity to adopt multiple measures simultaneously; for segments within these populations multi-year, stepwise approaches to increasing efficiency may be preferably to all at once comprehensive programs. Alternatively, if “whole house” tactics are strongly preferred by policymakers, segment-specific barriers to adoption (e.g., financing; staffing capacity) need to be identified and effectively addressed.

1.0 Introduction

The purpose of this paper is to describe the existing state of market segmentation among California's electric utilities, with an emphasis on the investor-owned utilities (IOUs). In addition, how segmentation is applied in various other economic sectors is reviewed, in part to provide a framework to identify potential practices that could be effectively adopted in the utility industry.

Segmentation is an important marketing tool. If used effectively it can result in the development of products and services that more closely match households' and businesses' needs, inform marketing campaigns so that they can more successfully motivate the populations of interest to action, and lead to faster and more widespread adoption of new technologies. In-depth application of market segmentation has only recently emerged within the utility sector as a way to implement demand-side management programs among residential and non-residential ratepayers. Greater use of this marketing approach could help the state achieve its ambitious energy efficiency and conservation goals.

This paper is organized to provide a basic primer on market segmentation, with an emphasis on how the technique is and can be applied to the electric utility sector. Section 2 reviews basic market segmentation concepts. Section 3 describes how to apply segmentation, and how to overcome barriers to its implementation. Section 4 provides example applications of market segmentation as used in various markets, as well as segmentation models. Section 5 evaluates segmentation as applied to utility demand-side management programs, including emerging patterns. A short conclusion is presented in Section 6.

2.0 Market Segmentation: A Basic Marketing Concept

Market segmentation can be defined as the subdividing of a market, or population, into distinct, but possibly overlapping, subsets, where any subset may be selected as a target for tailored marketing efforts.¹ In this sense, segmentation falls into the broad category of procedures for taxonomic classification which enable enterprises to better understand how best to interact with populations of interest.²

Segmenting markets into distinct populations can help enterprises develop products and associated marketing efforts in ways that improve the chances that consumers will respond positively to them. Segmentation is one of the initial phases in developing and implementing a marketing strategy for consumer and industrial markets, and, in some cases, for education campaigns focusing on public health, resource conservation, and other social goods.

Market segmentation is based on the assumption that customers demonstrate heterogeneous preferences and buying behaviors. That is, most markets aren't monolithic, but instead consist of subpopulations which are relatively homogeneous in terms of what they need or want, or how they respond to different messages and messengers. Market heterogeneity can frequently be explained by differences in product or user characteristics.

Market segments optimally consist of groups of people or organizations that are similar in terms of how they respond to a particular marketing mix or in other ways that are meaningful for marketing planning purposes. In this respect, to be useful for marketing purposes subgroup segments should both be similar in certain ways (e.g., demographics, lifestyles, types of business/industry) *and* respond to a specific marketing program differently than other groups.

Segmentation can offer the following benefits:

- It enables sellers to address consumer diversity by guiding how specific resource mixes can be effectively applied to particular customer groups, thereby improving the chances of overall adoption of the targeted product or service.
- It reveals concentrations of customers that can be marketed to and served cost-effectively.

¹ Segmentation may go by other names in the marketing literature. For example, in a recent treatise on emerging societal trends, it's argued that marketers should pay attention to "micro-precincts" that have better predictive value than historical segmentation schemes, such as sports fans, pet owners, international travelers, and early risers; shopping destinations (e.g., Wal-Mart; Target); and secular spiritual attitudes (Zogby 2008).

² If a seller could know and effectively act upon each individual buyer's purchasing trigger, they would of course do so. Market segmentation is an attempt to group buyers that have similar purchasing triggers to provide sellers with a better ability to act upon these triggers cost-effectively. In certain markets, such as internet transactions, this type of near-individual tailoring of marketing efforts is increasingly possible.

- It helps identify what marketing and delivery channels might be most effective for a particular customer group. For example, community-based organizations may be able to effectively work with low-income families; municipalities may be best suited to developing building retrofit programs; and retailers are likely the best channel to market specific household products.
- It can inform broadcast marketing and educational messages and enable sellers to develop more effective outreach material by targeting customers who are motivated by different messages and messengers, and have distinct adoption potentials.
- It can help focus products, services, and programs, so that they achieve economies of delivery, material purchasing, and resources.
- It can provide a basis for strategies related to customer retention, both in terms of sales of new products, and maintaining use of a product/service that's already been adopted.³
- It can provide the strategic basis for other marketing decisions, such as helping enterprises fine-tune their products and services. Understanding customer requirements can inform how operating systems can best be designed. For example, utility databases could provide a rich data source on which to base program design and marketing approaches if they adequately reflected ratepayer characteristics associated with (non)adoption of energy efficiency offerings.

The need to effectively segment markets as a means to sell goods and services has become increasingly acute, as society itself becomes more diverse. During times in which consumers tend to conform to a standard norm, and rely on a narrow set of communication channels, market segmentation is less important. During the first half of the 20th century, consumers tended to be quite similar. In 1950, 90 percent of Americans were of European descent; today, less than 70 percent are European-Americans, and by 2050, there will be no single ethnicity that accounts for a majority of the U.S. population (U.S. Census Bureau, May 17, 2007). Similarly, placing chocolate bars and cigarettes in soldiers' supply kits during World War II solidified demand for these products, since virtually all Americans either were in the armed forces or related to someone who was. And when there were three or four television channels, these networks dominated advertising communications, and, since everyone who watched television viewed these channels, the social zeitgeist reinforced the messages.

Today, with the emergence of broadband cable, satellite radio, and the Internet, among other things, consumers are increasingly fractionalized into different niches, with

³ It has been observed that it can cost upwards of five times more to gain a new customer than to keep an existing one, and ten times more to get a dissatisfied customer back (Massnick 1997). In the case of energy efficiency measures, some segments may be more apt to override a technology (e.g., sensors), fail to maintain their equipment, or, when it breaks, to replace it with a less efficient model, than others, thereby meriting different post-sales strategies.

multiple communication communities and opportunities to engage in specific product choices. These segments are further reinforced by, in many cases, geographic separations that reduce cross-cultural communication. For example, Nielsen Media Research has identified six designated market areas (DMA) California – Bakersfield, Fresno, Los Angeles, Sacramento, San Diego, San Francisco – each of which reflect different demographics and generational attitudes.

In addition, the public and private sectors now have a greater desire to penetrate into and address the needs of distinct segments. These segments may have existed for a long time before they were discovered by marketers or regulators, but were simply ignored. For example, Safeway now has shelf space set aside for kosher, Asian, and Hispanic-oriented products, where previously these items would have been scattered across the store, or not carried at all. Similarly, with the emergence of the environmental justice movement over the past two decades, policy makers are more concerned with addressing the needs of low-income families and small businesses located in particularly vulnerable communities.

2.1 Segmentation Emerged from Technological Diffusion Theories

Several (quasi-) academic disciplines have attempted to describe the pathways by which new ideas, behaviors, technologies, products and services are absorbed into the market place. The concept of market segmentation, in particular, is broadly based on studies of how innovations in goods, services, and behaviors diffuse through different populations, as partially informed by social psychology and sociology.

Table 1 displays the different methodological approaches to segmenting markets, along with their associated basis for segmentation, necessary research, and examples.

Table 1⁴
Segmentation Methods

<i>Methodological Approach</i>	<i>Basis for Segmentation</i>	<i>Necessary Research</i>	<i>Examples</i>
Classical Economics	Preferences, usually exhibited through supply-demand equilibriums	Empirical data on supply-demand for specific products and services, particularly in the face of price changes and informational interventions. Estimates of benefits and costs of specific technologies.	Traditional way of marketing energy efficiency programs, in which incentives (e.g., subsidies) are provided to lower costs, and information about the benefits of adoption is provided. In depth segmentation is often not conducted, under the assumption that rational consumers will respond appropriately to price signals if they are provided with sufficient explanatory information.
Behavioral Economics	Same as classical economics, modified by understanding decision heuristics and context-dependent preferences	Controlled experiments examining how individuals make purchase/adoption decisions. Particular focus on identifying key decision-points.	Typical of consumer products segmenting approaches, in which the product is linked with trusted messengers or deep emotions/desires, and marketing is tailored based on triggering an attachment to the product based on the identified linkages.
Technology Diffusion	Patterns of technological adoption	Observational and survey-based examination of the pathways by which individuals/groups purchase/adopt products and services. Identifying what groups adopt at what rate, as well as their relationship to	Dominant in agricultural marketing, in which key change agents are identified to be early adopters of a technology, signaling to others that it's worth purchasing. Now embedded in a host of products which are linked to celebrities, hipsters, or techno-savvy consumers, in which segmenting focuses

⁴ Modified from Wilson and Dowlatabadi (2007).

		one another, is central.	on catering to early adopters first, and then linking these with follower populations.
Social Psychology	Psychological and demographic characteristics	Observational and survey-based examination of the pathways by which individuals/groups purchase/adopt products and services, with an emphasis on values, attitudes, norms, socio-demographic characteristics, and capabilities to absorb new products.	Applied in product areas in which there are a multiple of niches (e.g., beverages). Intermittently popular as a basis for energy efficiency marketing, though it's unclear how successful it's been.
Sociology	Institutional/group context in which preferences are formulated	Survey-based examination of the pathways by which individuals/groups purchase/adopt products and services, with an emphasis on social and cultural context/factors that influence behaviors	Used as part of broad campaigns to change behaviors of large groups of people (e.g., health care habits; environmental attitudes).

3.0 When to Apply Market Segmentation

Prior to implementing a segmenting strategy, several competing criteria need to be satisfied:

- *Differential Existence*: the members of different market segments should behave differently either towards the service or product, or towards the mix of marketing activity oriented towards them.
- *Membership Identification*: the marketer should be able to classify each consumer in the market place into one or more clearly defined segments on the basis of **obtainable** information. For example, electricity utilities have access to their customer's energy use data, and can match those with existing or survey-derived demographic and attitudinal information.
- *Marketing Accessibility*: segmentation should be feasible. For example, it may not be practical to group customers in vastly different geographical locations in the same market segment due to the difficulty and costs of reaching them.
- *Profitability*: There are additional administrative and marketing costs associated with implementing segmentation, as well as incremental expected revenues. The additional revenues likely to be generated through a segmentation effort must exceed costs for it to be worth doing (Desarbo and Grisaffee 1998).

3.1 How to Segment a Market

In principle, the process of market segmentation is the same regardless of the population or product. The basic assumption is that the process will generate a number of individual segments whose behavior is endogenously homogeneous, with maximum heterogeneity between segments. There are numerous approaches to segmenting a given market, and multiple software tools and statistical packages⁵ available to help with the tasks. Basic steps towards marketing segmentation include consideration of the following questions.⁶

- (1) *What's the product and associated use?* A key first step is having a viable product. Although this may sound trivial, there have been numerous examples of products or services that have been created that no one wants, or whose application is ill-defined (e.g., Coca-Cola's new formulation during the 1980s; spray-on furniture sanitizers). Most products, whether it's a digital camera, DVD player, or a sport coat, consist of a bundle of attributes, with different features and

⁵ A casual web search will identify numerous software products that focus on assisting marketers with segmentation, including SurveyZ, www.surveyz.com; MyBestSegments, www.claritas.com/MyBestSegments; Megaputer, www.megaputer.com; The Marketing Process Company, www.themarketingprocessco.com; Rosella, www.roselladb.com.

⁶ These steps were created by the author based on an extensive literature review as informed by actual marketing experience.

- functions. Optimally, enterprises seek to create products that most completely match the needs of the different population segments to which they want to cater. In the case of energy efficiency and other measures, the product as demanded by the consumer may be different than the product as identified by the utility or regulator (e.g., consumers want refrigerators; regulators want consumers to buy energy efficient refrigerators, which the consumer might see as an attribute to be weighed against other attributes as part of the refrigeration purchase decision, as opposed to the primary element to be purchased).⁷
- (2) *What is it competing against?* Along with clearly defining the product and broadly matching it with a market, an understanding of the general and specific products it's competing against is useful. For example, is the product a substitute for another existing product (e.g., compact fluorescents versus incandescent bulbs); or does it complement other products (e.g., lighting sensors)? Identifying the role the product (will) plays in the market can help marketers isolate possibly important consumer segmentation attributes, as well as identify other marketing strategies (e.g., co-branding).
- (3) *What's the market?* Some products and services are demanded by virtually everyone (e.g., televisions, in case of the consumer market), while others are more niche-oriented (e.g., industrial-strength timers). Defining the dimensions of the population for which the product might be of interest is a necessary step to further market segmentation. That said, it's also important to be aware of possible different applications of the same product within distinct segments (e.g., Cheese Whiz is popular with divers and fishing aficionados as a way to attract fish; campers as a long-lasting food product; and children as a fun snack), with each segment susceptible to different delivery and communication strategies.
- (4) *How does time factor into the product's adoption?* Time can play an important role in accurately defining segments. Some products and services are purchased regularly (e.g., batteries), while others turn over less frequently (e.g., air conditioners). Public policies often dictate when and how often a product or service will be demanded (e.g., energy efficiency rules governing new

⁷ “Refrigerators, for example, have a variety of features, such as size, color, configuration, features such as ice-makers, and other characteristics that are valued by consumers, almost certainly more than their energy efficiency in the absence of very high electricity price... In purchasing a refrigerator, for example, a consumer might first narrow down her choice to all refrigerators of a certain size or of a certain cost, that is, eliminate all those of the wrong size or that are too expensive. Subsequently, she might look, within the set of remaining refrigerators, those of a certain brand or those having certain features. This process continues until a refrigerator is selected. Energy cost or efficiency might, or might not, appear in the list of criteria” Sanstad et.al. 1994). As a result of this phenomenon, the residential market may not lend itself particularly well to being segmented as part of energy efficiency programs, given that efficiency is only one, and possibly a low-priority, among many attributes bundled into a single appliance. In this case, the most effective response, and the one typically adopted by utilities and regulators, is to focus on the segmentation already in the market (e.g., price), and implement ways to reduce the cost of purchasing an energy efficient model.

construction; Smog Check programs).^{8,9} As a result of these variables, different populations may be in the market for a product or service at different times, and may be at different consciousness levels about the value of particular product attributes. Economic conditions are also important. In the case of saving energy, a recession may be a motivating force, but the lack of resources or financing may inhibit a consumer's ability to act on these motivations.¹⁰ Overall, timing matters: "...energy-related choices which make sense – that is to say which make sense given a specific configuration of social, economic and organizational circumstances – this year may not make sense in the same terms a year or so later" (Shove 1998). Understanding the time dimension associated with a particular product can help isolate key segmentation factors and guide the staging of marketing efforts.¹¹

- (5) *How do public policies influence the market?* In the case of regulated markets, such as electric and water utilities, public policies have a particularly significant role in shaping the market. For example, laws, codes and standards can act to eliminate certain product options from the market place entirely, or make energy efficient ones relatively less expensive to purchase. In the case of California, the California Public Utilities Commission's (CPUC) Big Bold Energy Efficiency Strategies, the CPUC's Energy Efficiency Strategic Plan (CEESP), the CPUC's/California Energy Commission's (CEC) Energy Action Plan, the CPUC's Low Income Energy Efficiency Programs, the CPUC's Integrated Demand Side Management Program, Assembly Bill 32¹², The CPUC's Emerging Technologies Program, the CEC's Public Interest Energy Research (PIER) Program, and state and local codes and standards act to shape energy management segments.
- (6) *What's the market environment?* The market for different products has been changing rapidly, with consumer tastes regularly shifting. For example, in one year, organic foods may be the craze, while, in the next year, fair trade or purchasing locally grown products are all the rage.¹³ Saving energy is currently

⁸ Public policy might also drive the frequency and depth by which utilities examine the use of different marketing strategies. For example, under current regulations, California's investor-owned utilities (IOUs) request funding for their energy management programs every three years. Hence, there's pressure on them to refresh their marketing approaches along that time period.

⁹ Americans, and Californians in particular, have a hyper sense of time, generally expecting a rapid pace of change. In contrast, in the developing world change is seen as occurring slowly, with fundamental behavioral changes requiring a decade or more to effectively induce.

¹⁰ In this respect, higher energy prices may lead to lifestyle cutbacks, but not permanent conservation actions (Dilman et al. 1983).

¹¹ As stated by the Southern California Edison Company (SCE), "...marketing efforts are designed to move consumers through a continuum from awareness, to attitude change, to long term behavior change." *Application*, page 81 (SCE 2008).

¹² Which mandates the establishment of a policy framework to reduce greenhouse gases.

¹³ The coining of the term "localvore" – someone who prefers to eat food grown locally – has morphed into the concept of "localwatt" – individuals or communities that are working to become as energy self-sufficient as possible. These types of cross-over trends from different product categories can be usefully exploited as part of segmentation-based marketing schemes.

seemingly of keen interest to consumers, but the marketplace is also chaotic, with many (new) players competing for attention for their product, service, or idea. The amount of “noise” – marketing messages, news, and informal chatter – surrounding a product category can influence population groupings, by either reinforcing long-held attitudes (e.g., distrust of monopoly utilities), or creating new ones (e.g., it’s important to reduce electricity use during peak periods).

(7) *How can consumers in the market best be differentiated?* Segments might be developed around a host of different attributes:

- Demographics
- Geographic (e.g., neighborhoods, feeder lines, or distribution planning areas)
- Decision pathways (e.g., individual or institution; renter or owner)
- Knowledge
- Needs
- Values
- Attitudes
- Motivations
- Preferences
- (Energy) use patterns¹⁴
- Access to financing
- Access to information
- Trust levels
- Competing products
- Equipment turnover patterns
- Behaviors associated with the product and/or service¹⁵
- Sensitivity to price or features
- In the case of businesses, their size in terms of employees and energy use, among other variables

Psychographic segmentation, in which groups of people who are homogeneous in terms of how they think, feel, and act continues to be a popular approach to identifying segments. However, a key question to be addressed in this type of segmentation approach is whether attitudes can usefully inform marketing efforts in ways that effectively prompts action. Effectively answering this question frequently necessitates developing a deep understanding of the segment’s decision making processes, so that interventions can be designed and applied to the right trigger points.

In the case of energy management, other segmenting variables may also be useful, such as climate, building stock characteristics, building ownership and rental patterns, grid performance issues, and the local political context. Based on the

¹⁴ See, for example, Encinas et al. 2007.

¹⁵ See, for example, Brown 1984.

insights developed through the previous steps, theories of the variables by which the market of interest might be most usefully segmented are developed.

- (8) *What data are needed, and how can it best be analyzed?* The most widely used approach to formally identify key attributes is to execute a primary study, based on survey research among a representative sample of customers. This research might be preceded by a review of available information about the product, its substitutes or complements, and the populations of interest; formal learning conversations with population members; discussions with the enterprise staff most in contact with the population; and brainstorming sessions with informed individuals. If deemed desirable, a survey is crafted so as to be able to identify, in a statistically-robust fashion, key attributes. Data are then subjected to one or more analytical methods to group the population into segments (e.g., those with similar motivations to adopt the product or service) (Massnick 1997).¹⁶

It's important to note that while systematic analyses of robust data can provide an effective basis from which to develop segmentation schemes, nothing is better than the thoughtful insights of an open and creative mind developed over years of contacts with the population of interest. "It is necessary to live the life of your customer. No amount of cool, antiseptic research can take the place of being with your customers on their firing line" (Fortini, 2008)

- (9) *How can the segments be described?* After the segments are developed (Step 8), they're described in detail. These profiles help marketing managers better understand, for example, what each segment values, the product/service benefits it's seeking, whether it exhibits distinct behavioral patterns, and who it is demographically and geographically. Based on these descriptions, the enterprise may develop models that forecast to which segment current or prospective customers belong, and from which to apply sensitivity tests to different marketing strategies.
- (10) *What are each segment's decision making processes?* Segments will be involved with the purchase process in different ways, as determined by its perceived importance, the potential purchaser's interest level, attachment to the product or the one being replaced, and/or motivation. For example, individuals who are more highly involved with the product will search for more information, accept fewer alternatives, process relevant information in detail, want to know the strengths and weaknesses of possible alternatives, and will form attitudes that are more resistant to change. The extent to which a consumer is involved has an impact on their information processing, decision-making, and response to advertising (Broderick et al. 2006).

¹⁶ Whatever method is selected, it's important that it has explanatory power, and that it matches the available data. See, for example, Dibb and Wensley (2002), Schaninger and Buss (1986), and Meyers (1996).

(11) *Which segments should be pursued?* Different segments will be deemed to deserve different marketing attention. For example, segments may be at different stages in their ability to absorb technology, thereby meriting attention from a different stage in the marketing process.¹⁷ In general, enterprises prefer to focus on segments that are most likely to adopt the largest amount of the product or service being offered most readily. However, other factors may influence a marketer's decision to invest resources in a given segment, including equity issues and ancillary benefits (e.g., if that sector adopts the product others are likely to follow).

(12) *How much dynamism, or interactivity, should be included over time?* This step relates to Step 4. Depending on the product/service and marketing segments, it might be desirable to periodically – monthly, annually, every few years – re-examine both sides of the equation. Segmentation efforts can be seen as relatively static, changing slowly, or highly dynamic, where “...strategies need to be nimble, able to adjust, transmogrify, stop, or start at any given moment. A good campaign for a consumer segment of this ilk should culminate in a form much different than it began. It is an organic process that grows and modifies itself. It is evolutionary” (Ventura 2008). That is, products and marketing campaigns may need to be redesigned to match changes within segments. Likewise, each segment may require multiple different marketing mechanisms, implemented simultaneously or over time, to successfully penetrate, and the marketing efforts themselves may change a population's attitude, leading to further segmentation opportunities. In the case of energy efficiency, success would be exhibited by perhaps the temporary disappearance of a previously well-described segment as a result of their demand-side management needs being fully satisfied.

(13) *How can the identified segments best be acted upon to increase product/service adoption?* Once segments have been accurately and comprehensively described, available marketing tools and associated resources need to be matched with each segment. Possible tools include the following:

- *New or modified products and services (e.g., delivery-based):* For example, if a segment is most interested in reliability and quality and has developed a distrust of new devices as not meeting these needs, appropriate products must be offered that rebuild consumer confidence. There are numerous examples of energy efficiency devices that have performed poorly in their early years, including compact florescent light bulbs, low flow toilets, and photovoltaic installations. To address this segment's needs, new products must be of high quality and have provisions to address risk aversion (e.g., by providing long-term warranties, branding with vendors known for high-quality, or a paced market introduction).

¹⁷ The market effort itself can be usefully staged to match with individual segment characteristics, with basic and concise information presented to segments unlikely to adopt very quickly, and a more full-blown and detailed presentation provided to segments that seemed poised for adoption.

- *Different marketing packages:* Enterprises don't typically comprehensively package their offerings into a single marketing pitch. For example, consumer product companies don't bundle toothpaste, deodorant, and soap into one campaign, and beverage vendors don't market beer, wine, soda, and water as meeting all of their customer's thirst needs. Furthermore, government agencies are usually concerned with a narrow set of public problems. In the case of energy efficiency products, some market segments may prefer to undertake a comprehensive approach to better managing their energy or water use, and, as a result, they will be well suited to sophisticated auditing approaches and detailed use information. In contrast, others may respond better to simple packages that can be easily implemented (e.g., solely screw in an energy-efficient light bulb), or to opportunistic approaches that take advantage of decision points (e.g., when remodeling, purchase an energy-efficient refrigerator, dishwasher, or dryer).¹⁸
- *Different marketing messages (e.g., market-based):* Different segments may respond distinctly to different messages. For example, highly profitable businesses and high-income families may be more motivated by "saving the environment," or good public relations, than saving money. Bicycle messengers and skateboarders may be more apt to respond to low-key advertising campaigns that reinforce a product's (alleged) independent nature (Walker 2008). In this vein, marketing messages can focus on specific product attributes, or attempt to surround the product with an attractive patina (e.g., it's sexy, it's retro, it's cool).
- *Different marketing medium or messengers:* Different media can reach distinct populations. Blogs and social networking sites may be good channels to those under 30; neighborhood newspapers may cater to property owners - and the different segments may respond distinctly to different messengers, whether it be a community-based organization, governmental agency, utility, or a for-profit company.

As previously discussed, in some cases, segmentation doesn't provide a powerful platform to focus marketing efforts. For example, in the case of residential appliances, consumers may be mostly responsive to price and availability, with efficiency just one of many attributes considered in their decision making process. In this case, standards requiring specific efficiency thresholds, rebates, and fees placed on inefficient models may be the preferred approach.

¹⁸ This element goes back to how best to define the energy efficiency product: is it overall reductions in energy use, the size of a ratepayer's ecological footprint, or adoption of an energy efficient light bulb. The first two definitions lead themselves to integrated approaches, while the last may necessitate a more nuanced linkage between, light bulbs, for example, and sky lights.

3.2 Barriers to Effective Implementation of Market Segmentation

Although the concept of market segmentation is a straight-forward one, devising effective segments and acting upon those definitions can be challenging. In many cases, enterprises may have insufficient information to develop apt descriptions of their customers and prospects. This is particularly a problem for small commercial customers, which may exhibit extensive diversity along a host of attributes.¹⁹

Energy efficient vendors frequently attempt to segment populations based on the technical attributes of the product their pushing. That is, they focus on technical solutions to reducing end-use energy consumption. The resulting marketing effort typically ignores the expressed needs of the businesses or residents being pitched.

Likewise, there is a tendency to sectorize, rather than segment, markets. A sectorized view of the market, as distinct from a segmented view, assumes that divisions are predominately based on product characteristics, rather than distinctive and differing customer needs. Sectors aren't segments. A small antiques shop may have little in common with a computer retailer, though both are in the same sector.

Table 2 illustrates the differences between sectors and segments. As indicated in the table, neither two-digit North American Industry Classification System (NAIC) codes nor electric utility customer classes typically define actionable segments. Instead, these sectors may contain a large population of potentially definable segments from which to devise products, services, and marketing strategies.

¹⁹ In some cases, this challenge can be overcome in the longer-term by the creation of an effective data collection and management system, in which customer's actions, such as applying for rebates or participating in a program, can be tracked.

Table 2
Sectors Are Not Segments

<i>NAICS Codes²⁰</i>	<i>Utility Customer Class</i>	<i>Possible Segments</i>
Agriculture	Agriculture	Dairies; wineries; tree fruits
Real Estate	Commercial	Property managers; agents
Mining	Industrial	Hobby miners; large mines
Professional	Commercial	Computer-intensive; office type
Utilities	Industrial/Commercial	Irrigation/water districts
Management	Commercial	Geographic; energy-intensity
Construction	Commercial	Fuel source; equipment mix
Administration	Commercial	Size; profitability
Manufacturing	Industrial/Commercial	Printers; machine shops
Educational	Industrial/Commercial	Public schools; preschools
Wholesale	Commercial	Warehouses; product type
Health Care	Industrial/Commercial	Nursing homes; pharmacies
Retail	Commercial	Restaurants; convenience stores
Arts and Entertainment	Commercial	Movie theaters; stadiums
Transportation	Commercial	Package deliveries; distribution nodes
Accommodation	Commercial	Economy lodges; large hotels
Public Administration	Commercial	Small cities; building types

Although PG&E appears to be migrating away from a sectorized approach to marketing, it continues to rely on sectors as a dominant strategy. For example, PG&E organizes its business-oriented marketing strategies based on NAICS codes, repeating, at least in its funding applications to the CPUC, somewhat stale “segmentation” schemes: The basic industry segments for business customers are Agriculture – includes Agriculture and Food Processing; Commercial – includes Commercial and Trade; Healthcare and Hospitality; Government and Public Services; and Schools, Colleges and Universities; and Industrial – includes Industrial and High Tech (PG&E 2008)

In this respect, the method by which energy efficiency measures are vetted, which is dominated by cost-effectiveness analysis, with little formal attention paid to consumer preferences, tends to reinforce a sectorized approach to segmentation, though this is being increasingly balanced by specific regulator and utility requests for products and services geared toward a particular market.

Segments can be too broad (e.g., small businesses) or too narrow. San Francisco Community Power (SF Power), a nonprofit that helps small businesses and low-income families better manage their resource use, attempted to implement a program to provide free industrial timers to owners of battery-powered forklifts and pallet jacks as a way of shifting recharging to off-peak periods. However, the nonprofit found that the program’s focus was too narrow to be cost-effective: it took considerable resources to simply track-

²⁰ U.S. Census Bureau, 2007.

down suitable forklifts and pallet jacks. In this case, a preferred approach may have been to identify several segments (e.g., warehouses; golf courses; particular types of construction firms) and broaden the offering to include a wider range of equipment and applications (e.g., scissor lifts; golf carts).

Once an enterprise has reasonably described key segments, implementation issues arise. Being able to describe a segment doesn't guarantee that an organization can effectively communicate with it, any more than being able to recognize a French accent enables an individual to speak French. Communication challenges can be exacerbated by inflexible management structures (for example, insisting on a NAIC-based segmentation scheme because it serves other organization purposes), an unwillingness to discriminate among, or operationalize, the consumer segments described (for example, marketing to "small businesses" as opposed to printers), and abuse or neglect by inexperienced marketers tasked with carrying out the segmented marketing strategy (for example, stressing the technological advantages of a device rather than exploring how it might fit a particular businesses production characteristic). Utilities in particular are not known to be nimble and may face particular challenges developing effective collaborations with a diversity of media and messengers (e.g., community-based nonprofits).

In this vein, segmentation benefits need to be matched with the realities of an enterprise's structure, distribution system, and sales force, which, in many cases, may be geared towards satisfying operational considerations rather than marketing requirements. In the end, no matter how well segments are described they're meaningless unless they can be applied to real-world situations (Dibb and Simkin 1994).

4.0 Examples of Market Segmentation

Market segmentation has been applied to a large variety of populations in service of a multitude of products and services. These applications can be usefully reviewed as a means to gain insights into how different approaches may be effectively implemented in the utility sector.

Examples of segmentation schemes include the following:

- *Automobiles*: Henry Ford said, “The customer can have any color of car he wants, as long as it is black,” and in the early 1900s he made only one style of car (e.g., Model T and Model A). Alfred Sloan of General Motors (GM) offered “a car for every purse and purpose,” and, in the 1920s, GM’s sales surpassed Ford’s (Meyers 1996). Ford essentially marketed to one segment, while GM attempted to market to many. Today, most automobile manufacturers segment their products within non-competing categories: trucks, cars, sports utility vehicles (SUVs). Within these categories, consumers are further segmented by income and a variety of attitudinal elements, which, in the case of cars, revolve around luxury, near-luxury, mid-category, compact, and subcompact segments. Safety, interior size, and increasingly, fuel efficiency, likewise serve to segment the market. Vehicles and customers are sub-segmented by features, such as heated seats and high-quality sound systems.
- *Beverages*: Fifty years ago the main beverage segments consisted of coffee or tea, Coca-cola or Pepsi. Mirroring society’s niche-a-fication, today there are dozens of beverage categories – including sugary drinks, sports beverages, organic teas, “vitamin” water, and just plain water²¹ – that cater to multiple market segments, some of which consist of overlapping populations during different time periods.
- *Clothing*: Clothing is segmented by price and image, and further segmented by the retailer from which it’s available. Nike, which caters to a particular set of shoe shoppers, further segments its markets by enabling their shoes to be customized. Old Navy segments its jean lines along three different price tiers.
- *Food*: Food has become increasingly segmented, including by whether the product is a “whole” food or processed; whether it’s organic, fair trade, conventional, or grown locally; and by price and quality.
- *Internet transactions*: Customized tailoring of marketing efforts is increasingly possible as a result of web-based interactions. For example, Amazon and Netflix

²¹ A careful examination of the bottled water industry could be illuminating. This sector was created whole cloth less than two decades ago, as a result of changing social attitudes and extremely effective marketing and distribution campaigns. From a strictly neo-classical economists perspective, it should not exist: the product is more expensive, and, in some cases, less pure than the alternatives (i.e., tap water). Yet, it is a multi-billion dollar business.

both unilaterally recommend books and movies to their customers based on previous purchase patterns. Likewise, Google’s Insights for Search enables marketers to track the popularity of words and phrases used in Google’s search engine. This collection of search queries has been called a “database of intentions,” since it’s a window into what people are interested in, and, sometimes, what they’re in the market to buy. These data, in turn, could be used to develop and track advertising campaigns. Flex Your Power, for example, could experiment with different messages in different utility service areas and see which prompts more searches; or search data could be used to determine what energy management measures are subject to the most searches, with marketing efforts focused accordingly.²²

A business or family’s decision-making process, organizational structures, and underlying behaviors can significantly influence their willingness to adopt energy management measures. An ongoing study by SF Power,²³ in which small businesses and low income families are offered a tailored package of interventions oriented towards reducing their air and greenhouse gas emissions, found the following:

- *Small organization’s decision-making approaches vary widely, substantially influencing the willingness and pace of adoption.* For example, a family-owned automobile dealership took a top-down decision-making approach, in which absolute savings were the most important action criteria. In this case, the owner could make and implement decisions quickly, but the information presented had to cater to his decision criteria. Alternatively, a family-owned printer stressed the need for employee acceptance of the proposed measures, necessitating an employer-supported bottom-up decision-making process. And a synagogue established a sustainability committee that required hard evidence of savings to show to their board for any actions to be taken.
- *Low income families tend towards energy wasting behaviors, and aren’t motivated by environmental messages.*²⁴ Climate change is a low, or non, priority for many low income families, who have more immediate concerns to cope with, and may have never heard of *The Inconvenient Truth*. Likewise, the connection between their utility bills and energy inefficient appliances is not always clear. These families frequently rely on old technology, are financially unable to purchase highly efficient appliances, and have to improvise solutions, such as turning up the heat – or even relying on the oven for heating – because they don’t have access to suitable blankets, or their home is not insulated, or they have poor heating options and low quality windows.

²² A cottage industry has emerged to identify what search words are most popularly used to find particular products on the web.

²³ Climate for Community Pilot Initiative.

²⁴ Low income households are also given mixed messages. Through the California Alternative Rates for Energy program, these families and individuals are offered a 20 percent discount on their electricity use, which acts to subsidize energy consumption, while being admonished to save energy. A better approach might be to mandate energy management programs for this sector that result in at least a 20 percent reduction in utility bills without disrupting underlying health and comfort levels.

These distinct decision making processes and behaviors necessitate different types, and timing, of interventions.

Perhaps the grandfather of all market segmentation efforts is exhibited by different religions. All of the major religions – Christianity, Islam, and Judaism – have multiple sects, entry points, and messengers that meet the needs of different population segments. For example, Judaism includes ultra-Orthodox, Orthodox, Conservative, Reform, and Renewal sects, as well as various more tribal expressions (e.g., Hasidism). Elements of Judaism can be accessed through participation in formal synagogues, or as part of a wide array of other entry points, ranging from community centers, welfare agencies, education programs catering to every age, study tours to Israel and elsewhere, among other pathways.

Religions also illustrate that in a free market – for ideas, spirituality, or products – opportunities arise for new entrants in situations in which a population segments’ needs aren’t being met. In most cases, new sects have emerged because an off-shoot was “selling” a new way of interacting with the religion, or using a new marketing technique to attract and retain adherents.²⁵

It is noteworthy that small businesses – which barely describes a sector, but is more akin to a population – are a frequent topic of market segmentation studies, due to the difficulty most marketers have in cost-effectively reaching these enterprises. This population has been segmented in numerous ways, such as: decliners (i.e., older companies fighting for survival); stragglers (i.e., slow growing companies); self-sufficient expanders (i.e., don’t use outside services); successful entrepreneurs (i.e., unilateral decision-makers) (Krakoff and Fouss 2008). Small businesses have also been segmented by their profitability, and the likely gap between energy efficiency potential and the enterprise’s existing energy use characteristic. Both segmentation schemes, though perhaps not fully refined, provide a ready-made means of guiding planners on how best to focus marketing resources. For example, a customer in the most profitable, or energy inefficient, segment that’s classified as a self-sufficient expander might warrant a direct sales call; a customer in the average segment gets a telemarketing call; and a low-profitability decliner customer gets no call at all (Davis and Austerberry 1999).

4.1 Existing Segmentation Models

For the past decade, segmenting populations based on their lifestyles and psychological traits has been particularly popular. Some marketers believe that these characteristics can have significant explanatory power. However, while these techniques may provide a basis for significant insights into how best to package products, services, and educational campaigns, in many cases they may not adequately explain variations in

²⁵ At the other end of the spectrum, pornography, as well as sexual lifestyles, now caters to virtually every market segment that can be imagined.

actual behavior among populations, nor provide actionable measures that can be taken to induce behavioral changes.²⁶

As indicated in Table 3, existing segmentation models consider demographics, lifestyles, attitudes, and preferences toward energy and the environment (*Project Energy Efficiency*). For example, Flex Your Power's segmentation approach relies on a survey-based approach to understand Californians' attitudes and values toward energy efficiency and conservation, which is used to inform media and outreach strategies. Nielson's approach is likewise based on survey data, though at a substantially deeper level, and focuses on profiling changes in consumer behavior associated with purchasing healthy, environmentally-friendly products. SRI Consulting Business Intelligence's VALS™ uses proprietary psychometric techniques to measure psychological characteristics that correlate statistically with consumer behavior. And Yankelovich applies survey-based techniques to profile consumers by their attitudes towards the environment and associated "green" behaviors.

Table 3
Segmentation Models

<i>Major Segmentation Variables</i>	<i>Hagler Bailly</i>	<i>Flex Your Power</i>	<i>°C</i>	<i>Yankelovich</i>	<i>Nielson</i>	<i>Experian</i>	<i>VALS</i>
Geographic	x	x			x	x	
Age, Family Size, Family Lifecycle	x	x	X	X	x	x	
Gender			X	X			
Income, Occupation	x	x	X	X	x	x	
Education		x		X	x	x	
Race, Religion, Nationality	x	x		X	x	x	
Generation, Social Class	x	x			x	x	
Lifestyle, Personality		x	X	X	x	x	x
Behaviors	x			X			
Attitudes	x	x	X	X	x	x	x

Derived from Project Energy Efficiency California

²⁶ See, for example, Sjoberg and Engelberg (2007).

5.0 Demand-Side Management Segments

As previously discussed, electric utilities and energy efficiency vendors have historically identified a new energy management product or service first – compact fluorescent light bulbs, or programmable thermostats – based on technological and economic criteria, and then attempted to market it to customers, as opposed to finding out what different types of customers want and developing a matching product/service.²⁷ This is evidenced by the basic process that is used to examine energy efficiency measures, which focuses on available data about a measure’s cost-effectiveness (as essentially measured by an engineering economics-based analytic approach) in which likely rates of consumer adoption are frequently either assumed or simply established as a priori goals.²⁸

Estimates of energy efficiency potentials typically start with an identification of the gap between the technical potential for energy use reductions – as measured by a comparison of estimates of existing equipment characteristics with available technology, utility rates, and program costs – with likely diffusion rates. Given that empirical data on probable diffusion patterns are frequently unavailable, adoption rate assumptions are based on generally ill-informed scenarios that are predicated on addressing potential adoption barriers.²⁹

This engineering economics approach is slowly changing, principally through the creation of more tailored approaches to bundling technology to particular customer segments. For example, direct installation programs for low income residential customers living in high crime areas may focus on installing outdoor sensors, which have the dual benefit of reducing electricity use and enhancing a sense of security (i.e., the light turns on when someone walks by). In this case, sensor technology, which has been around for years, is being marketed as addressing dual problems, in which achieving energy savings might be secondary to security improvements.

Regardless, attention remains focused predominately on improving the efficiency of various technologies, without much regard to what new technologies, programs, or services ratepayers may want. This is in part due to a lack of systematic data on customer adoption of energy efficient technologies and practices, which could inform both forecasts of efficiency potentials and actual program development and implementation.

²⁷ For example, compact fluorescent lighting systems can deliver equivalent light using 70 percent less electricity than incandescent bulbs, and new variable-speed drive chillers can deliver cooling to buildings using 40 percent less energy than status quo systems (e.g., Rufo and Coito 2002).

²⁸ These assumptions can result in significant over- or under-estimates of potential efficiency savings for individual programs and energy efficiency portfolios as a whole.

²⁹ For example, the KEMA model of adoption behavior is based, in part, on modeling customer awareness – said differently, overcoming the barrier of a lack of awareness – as a function of the amount of funds spent on awareness/information building. However, there is little analytic basis from which to estimate how a dollar spent on a generic information/education campaign will impact awareness as defined as a barrier to adoption of energy management measures. Similarly, Itron’s assessment of ratepayer “willingness,” which is defined as all non-awareness barriers, is based largely on “professional judgment” (Itron et al. 2006).

There is no measure-level database of all statewide program accomplishments available in a single, consistent format, no tracking of measures adopted outside of utility programs, and, in most cases, no user-friendly way for utilities to monitor specific customer's energy efficiency potentials and needs.

5.1 Segmentation as Applied in Utility Ratemaking

Electric utilities have long been subjected to different segmentation schemes, though mostly due to non-market-oriented forces. Investor-owned and municipal utility services are segmented along geographic boundaries, which were principally established for political reasons. Utility service territories are further segmented by distribution planning areas or other designations, mostly for planning purposes. Utility rate payers are sectorized into customer classes, and sub-divided by tariffs, historically due to having similar energy use patterns. While these divisions have not been made based on market segmentation rationale, they serve to segment the utility market: different utilities offer different products, services, and rates through distinct sets of marketing approaches. And, increasingly, planning area-based transmission and distribution (T&D) characteristics influence the type of energy management interventions that are of most interest to regulators and utility managers. For example, in areas where T&D facilities are constrained, greater attention is being paid to potential pricing and distributed energy resources-based solutions.

These regulatory-endorsed sectors do not necessarily match with what might be identified as preferred segmentation approaches to develop and market energy management programs. For example, Southern California Edison Company's (SCE) products and marketing approaches may actually be adopted faster in Santa Clara County than Pacific Gas and Electric Company's (PG&E) offerings, and the Sacramento Municipal Utility District (SMUD) may have an array of products and services that are better suited to Los Angeles residents than currently offered by the Los Angeles Department of Water and Power. Similarly, the use of sectors, rather than segments, in regulatory structures likely leads to cross-subsidies between segments, and undermines the cost-basis for rates. For example, demand-response program expenditures are overwhelmingly focused on industrial class customers. While program outcomes (e.g., reduced demand for expensive and polluting generating resources) benefit all ratepayers, specific program investments almost exclusively reward a narrow customer population, yet program costs are spread across all customers.

5.2 Public Policies Dominate Potential Segmentation Strategies

California's electric utilities, as directed by the state's regulators, are almost certainly the most advanced in the country in terms of designing, marketing, and implementing energy management programs. And the utilities have been tasked with obtaining heroic goals, far beyond what a typical enterprise strives to achieve, including (SCE 2008):³⁰

³⁰ The IOU's 2009 to 2011 energy efficiency programs are supposed to obtain 1,049 megawatts in savings (D.08-07-047). The current push for rapid adoption of energy management practices in California may be

- To encourage residential consumers to consider “energy efficiency first” within their daily lives;
- To promote, educate, and motivate the adoption of comprehensive residential retrofits.
- To contribute to the ultimate transformation of energy consumption patterns.

Each of these goals, if taken seriously, would require a revolution in Californians’ behavior, though taken over a two decade period this might be better characterized as a rapid evolution. If fully internalized by the utilities, the goals have a significant impact on how best to implement energy management. For example, to succeed in placing efficiency at the top of individuals’ minds, people’s consciousness about energy has to be fundamentally changed, in the same way Americans’ attitudes towards littering was completely altered in the last mid-century. On the other hand, a more modest goal of increasing the adoption rate of energy efficient devices, essentially along the timelines of their turnover rates, would prompt a different type of marketing approach. Influencing consumers’ choice of light bulbs is one thing; changing the way they think about light is quite another.

Market segmentation can significantly assist the utilities in meeting the state’s ambitious goals. For example, from a technological diffusion perspective, identifying early adopters and linking them to the populations of “laggards” they’re most likely to influence could be an important segmenting strategy. This segmenting approach might consist of identifying business or growers who have adopted energy efficiency measures, developing case studies of these efforts, including detailing cost-savings, and using this information – combined with more active marketing, such as open houses at early adopting facilities – as part of marketing efforts that focus on slow adopters.

5.3 Segmentation Techniques Emerging from Electric Utilities

As previously discussed, electric utilities have relied upon some level of segmentation to market their energy efficiency programs for almost two decades. Since the late-1980s, many utilities have used geo-demographic segmentation (e.g., PRIZM) to, for example, pre-qualify individuals for low income programs. Likewise, starting in the

analogous to efforts to encourage Africans to wash their hands; or soft drink and tobacco companies’ successful, if temporary, efforts to convince consumers that their products were sexy and healthy in the middle of the last century (though adopting energy efficient practices is indeed healthy behavior). These ambitious goals have been adopted by policy makers in part as a result of studies indicating the vast achievable economic potential for energy efficiency measures, equal to 10,000 megawatts in peak demand reduction over ten years, according to one study (see Rufo and Coito 2002). Note, however, that “While the efficiency gap debate has focused almost exclusively on rates-of-return to these investments and the high revealed hurdle rates applied by consumers, the actual magnitudes of savings may be quite modest: figuratively speaking, from the individual’s perspective, what’s on the sidewalk may not be a \$20 bill but rather a penny or a nickel. Thus, in aggregate, the social consequences of under-investment in efficiency in the form of the environmental effects – on air quality, or from greenhouse gas emissions – are proportional to the sum of individual instances of non-adoption and may be large, while at the individual level the losses may be small, so that the presence of even moderate transaction costs can imply that non-adoption may be individually rational.” (Sanstad, et.al. 1994, p. 6-12)

early-1990s, the Electric Power Research Institute (EPRI) developed in-depth studies on ratepayers' needs, attitudes, and energy decision-making patterns. This research was ultimately developed into the CLASSIFY system, which defined segments in the residential and commercial sectors, and is still being used by utilities.

As pressure to reach ambitious energy savings goals increase, electric utilities are becoming more sophisticated in their use of market segmentation. This is reflected in the wider adoption of segmentation schemes across customer classes.

Industrial ratepayers have long been subjected to segmentation, in that the utilities have historically provided these high-consuming customers with dedicated account representatives. Account representatives have traditionally been assigned particular geographies and customer classes, which, while not an especially powerful segmenting approach for marketing purposes, lends itself to developing segment-specific expertise over time. While there can be communication barriers between field operatives and utility headquarters, account representatives are typically quite familiar with their clients' energy challenges, knowledge that can be transferred to those responsible for designing energy management programs. Similarly, when particular programs geared towards industrial customers prove unpopular, the account representatives can convey this information to program managers.

While agricultural customers also frequently have dedicated account representatives, the sector's diversity and its relative small size – well less than 10 percent of energy consumption for any California utility – has acted to inhibit the development of market segmentation, though particular agricultural energy uses, such as water pumping, have been provided with targeted efficiency programs for decades.³¹

Until recently, residential and commercial customers have been relatively unsegmented, though social psychology and sociology-based efforts have been attempted for decades, with varying degrees of success, as a means to develop targeted messages to these populations. It's noteworthy that it wasn't so long ago that utilities branded themselves more as friendly neighbors than purveyors of demand reduction programs (e.g., Ready Kilowatt), and that just a half century ago consumers were being told that electricity would be "...too cheap to meter."³²

Today, utilities tout broad green messages (e.g., PG&E's "Let's Green this City" campaign), and, along with Flex Your Power, provide more focused communications related to turning off lights when not in use, reducing electricity demand during energy alert days, and linking adoption of energy efficient practices to acting locally against

³¹ For example, see www.pumpefficiency.org/.

³² "Our children will enjoy in their homes electrical energy too cheap to meter...It is not too much to expect that our children will know of great periodic regional famines in the world only as matters of history, will travel effortlessly over the seas and under them and through the air with a minimum of danger and at great speeds, and will experience a lifespan far longer than ours, as disease yields and man comes to understand what causes him to age." Lewis L. Strauss, Atomic Energy Commission Chairman, Speech to the National Association of Science Writers, New York City, September 16th, 1954, as reported in the New York Times, September 17, 1954.

global climate change. These messages are based, in part, on segmenting analyses. A number of utilities – including Puget Power and Light, Bonneville Power Authority, and SCE – are experimenting with multi-variant profiling as a means to more effectively tailor their customer communications, messaging, and staff training, as well as program, technology, and rate designs. For example, BC Hydro recently completed survey-based research into possible residential segments, ultimately settling on six: turned-out and carefree, stumbling proponents, comfort seekers, entrenched libertarians, cost-conscious practitioners, devoted conservationists (Pedersen 2008). Similarly, Ontario Power Authority recently identified four residential segments: Live4Today, Budget Driven, Pragmatic Conservers, Green Champions (Ontario Power Authority 2008).

The challenges with these taxonomies has, and continues to be, how best to act upon them. Perhaps the most effective way to use these segmenting schemes is as a way to help determine how best to dedicate marketing resources. For example, perhaps little to no resources should be invested in those segments categorized as turned-out and carefree, entrenched libertarians, or Live4Today, under the assumption that they are not ready to adopt many, or any, energy management behaviors; with somewhat more attention paid to devoted conservationists and Green Champions, under the assumption that they are seeking ways to improve their management of energy, and simply need to know how best to do so; with most resources, and innovative programs, focused on stumbling proponents, comfort seekers, cost-conscious practitioners, and Pragmatic Conservers, under the assumption that they will adopt energy management measures if suitable messages and programs are presented to them, and they may even be susceptible to becoming devoted conservationists or Green Champions. Of course this approach assumes that these segments can be readily found and cost-effectively reached.

The utilities' energy efficiency programs appear to emerge both organically – as a result of formal or informal vendor pitches – by design, and by state mandate. The California Public Utility Commission has instructed the IOUs to include program participation goals in specific population sectors or segments within their 2009-2011 program applications (CPUC 2006), and to rely on third parties to "...solicit innovative ideas and proposals for improved portfolio performance" (CPUC 2001). Similarly, statewide energy efficiency campaigns are supposed to be crafted so as to provide a range of messages targeted to groups of consumers identified through statewide segmentation research. The highly targeted vertical program marketing efforts proposed by the utilities, in turn, are supposed to be executed to drive results, focusing on populations with the highest propensity to participate (CPUC 2008).

California's two largest utilities, Pacific Gas and Electric Company (PG&E) and Southern California Edison Company (SCE), are increasingly relying on market segment studies to sample customers' attitudes towards energy use, energy efficiency, conservation, and demand response, and to collect information regarding customers' knowledge of energy efficiency and peak demand reduction options, demographic characteristics, and program participation. In addition, the utilities are developing the necessary customer databases from which to identify effective segmentation schemes. PG&E, for example, is consolidating customer data "...from multiple sources into one

master database which will include customer type, tenure, energy usage, and other relevant customer information. Variables being used to indicate the state of energy need, or “requirement” include non-temperature climates, high levels of payment variability, and multiple accounts...To further develop strategies using this segmentation, customers are being grouped into clusters based on key attributes. These customers will be refined by developing profiles that reveal the particular attributes of each, and will be used to target like-minded customers with tailored IDSM messages and calls to action.”³³

How emerging databases and studies are or will be used, however, is unclear. They seem to be one several resources that may, or may not, be relied upon to develop marketing programs. For example, PG&E’s 2009 to 2011 residential and business marketing and outreach plans will principally be segmented after the fact based on “customer segmentation and analysis currently underway...Marketing collateral will be developed based on in-depth customer market segmentation...”³⁴ Similarly, according to SCE, segmentation study “...results will be provided to utility, partnership, and third part personnel involved in marketing and outreach activities to assist them in increasing the effectiveness of their messages and message delivery methods.”³⁵

PG&E and SCE exhibit somewhat different approaches to energy efficiency program segmentation. For example, in order to achieve the state’s aggressive goals, SCE has crafted its energy programs and associated marketing efforts towards a progression of short-, mid-, and long-term actions, with a goal of transforming the way consumers, particularly residential customers, use energy by 2020. In this context, SCE’s 2009 to 2011 Residential Market Segmentation Plan (RSMP) “...is not program specific; rather it is a combination of delivery and market-based activities to target the principal barriers to adoption in key sectors.”³⁶

Table 4 displays SCE’s proposed residential market segments for its 2009 to 2011 residential energy efficiency programs. As indicated in the table, SCE has directed different approaches to different segments, including the use of delivery- or market-based methods, and intervening in the supply-demand chain at different points. Upstream programs focus on providing incentives to manufacturers to produce/provide more efficient products and services. PG&E’s and SCE’s residential lighting programs have historically relied on this tactic, by providing incentives to manufacturers and distributors to produce and sell compact fluorescent lamps and other efficient lighting to retailers at a reduced price. Midstream program strategies generally target retailers, offering them incentives to provide discounts, additional in-store signage, or other marketing attractions. In some cases, retailers are given an incentive to stock certain types of energy-efficient equipment. Downstream programs target ratepayers, by directly providing customer rebates as well as technical and other forms of assistance. The utility

³³ PG&E 2008: DR proceeding, page 4-22.

³⁴ PG&E 2008: PG&E Application 08-07-, *2009-2011 Energy Efficiency Portfolio, Prepared Testimony*, 2008.

³⁵ SCE 2008: *Application of Southern California Edison Company for Approval of its 2009-2011 Energy Efficiency Program Plans and Public Goods Charge and Procurement Funding Requests*, July 21.

³⁶ SCE 2008: Southern California Edison, *2009-2011 Energy Efficiency Plans*, “Residential Market Segment Plan,” 2008.

defines segments within the equipment market along multiple axis, such as major (e.g., heating, ventilation and air conditioning, water heating, and refrigerators) and small (e.g., lighting, small appliances, consumer electronics) systems; and between single or multifamily buildings. In this respect SCE, is relying on a web of marketing approaches to move residential ratepayers towards behavioral changes.

According to the utility, its "...residential EE portfolio offers a resource or solution applicable to each and every private dwelling within its service territory....The design of programs within SCE's portfolio has been closely coordinated with SCE's marketing unit to target varying residential customer groups and drive the adoption and eventual transformation of energy use."³⁷ Finding an applicable energy efficiency solution for every dwelling may not be as challenging as one might think: all residential customers use lighting, making CFLs a minimum threshold to meet this requirement. A house that has been fully saturated with CFLs may need motion sensors, or better windows. That is, the challenge may be more related to marketing, program packaging, and financing options than identifying suitable technologies.

For low-income residential customers, all three IOUs are exploring four segments: geography, demographic description (e.g., language preference), social networks, and level of energy use. These segments have been identified as potentially effective ways to locate low-income households that are in particular need of efficiency investments (e.g., geography is also a proxy for climate zone), and to successfully reach these families with impactful messages (e.g., in their native language, disseminated by communication networks that they rely on and trust).

³⁷ SCE 2008: Market Segment Plan, page 8.

Table 4
SCE Residential Market Segments

	Delivery-Based				Market-Based		
Program	Major Systems	Small Systems	Single Family	Multi-Family	Consumer Behavior (Demand)	Market Development (Supply)	Market Segment Tactics
Appliance Recycling	x						Downstream Direct Install
Home Energy Efficiency	x	x	x				Downstream, Midstream
Business Consumer Electronics		x				x	Midstream
Plug Load		x			x		Outreach
Residential Lighting Incentive		x				x	Upstream
Multifamily Energy Efficiency		x		x			Downstream, Outreach
Comprehensive Mobile Home		x		x			Direct Install, Outreach
Comprehensive Home Performance	x		x			x	Downstream, Midstream, Direct Install
Home Energy Efficiency Survey					x		Outreach
Efficient Affordable Housing	x		x		x		Downstream
Online Buyers Guide					x	x	Outreach
California New Homes	x	x	x			x	Midstream, Outreach, Direct Install
Manufactured Housing	x	x	x			x	Midstream, Outreach, Direct Install

SCE relies on programs developed and implemented by third party providers for much of its program-specific market segmentation. The utility helps to engender segment-specific programs, in part, through its third-party solicitations. For the 2009 to 2011 period, SCE requested proposals in the following segments: efficient affordable housing, new multi-family homes, energy efficient campus housing, industrial markets, agriculture and water systems, commercial and small businesses, residential/light commercial heating, ventilation and air conditioning (HVAC), public schools, governments, and institutions, comprehensive manufactured homes, community language efficiency outreach, and nonresidential direct install.³⁸

³⁸ Ibid, page 144.

Between 2006 and 2008, PG&E segmented its customers based on mass market – residential and small commercial – and targeted markets, which consisted of agricultural and food processing, schools, colleges and universities, retail, heavy industrial, manufacturing and fabrication, medical facilities (e.g., hospitals and clinics), large commercial and institutional, hospitality (e.g., hotels and motels), high technology, multi-family, education and training, and residential new construction. PG&E attempted to act on these segments by relying on 30 different implementers, and offering 46 unique programs.

Tables 5 and 6 display PG&E’s and SCE’s proposed segments for the 2009 to 2011 period. Many of the segment-oriented programs are third-party based, as indicated in italics, implying that a robust market for segment-specific programs is developing.

Table 5
PG&E's Market Segments³⁹

PG&E		
<i>Sectors</i>	<i>Core Segments/Programs</i>	<i>Sub-Segments/Programs*</i>
Agriculture	Food processors, wineries, dairies, greenhouses, refrigerated warehouses	<i>Wine Industry Efficiency Solutions; Dairy Energy Efficiency; Dairy Industry Resource Advantage.</i>
Industrial	Fabrication, process, heavy manufacturing, laboratories, clean-rooms, data centers, clean tech, biotech	<i>Industrial Compressed Air; Compressed Air Efficiency; Energy Efficiency Services for Oil Production; Refinery Energy Efficiency Program; California Wastewater Process Optimization Program; Heavy Industry Energy Efficiency; Industrial Refrigeration Performance Plus; Laboratory Airflow and Fume Hood Control Systems; Cement Production and Distribution Energy Efficiency</i>
Commercial	Office buildings, general retail, big box retail and supermarkets, health care and hospitality, assisted living facilities, skilled nursing facilities, medical specialty facilities, lodging, resort, hotel facilities, restaurants, food services, government and public services, schools, colleges, and universities.	<i>Campus Housing Efficiency Solutions; School Energy Efficiency; California Preschool Energy Efficiency; LodgingSavers; Enhanced Automotive Initiative; EnergySmart Grocer; Air Care Plus; Boiler Energy Efficiency; Comprehensive Retail Energy Management; Medical Building Tune-up; Small Commercial Comprehensive Refrigeration Program; Energy Efficient Parking Garage; Healthcare Energy Efficiency Program; Furniture Energy Efficiency; SmartVent for Energy Efficient Kitchens; Hospitality Steam Systems; Health Care Gas Efficiency; Energy Efficiency Program for Entertainment Centers</i>
Residential	New construction; low income households; contractor training	<i>California Multifamily New Homes</i>
Cross-cutting	Residential, public sector	<i>Green Communities; Energy Star Manufactured Homes</i>

*Third party programs are italicized.

³⁹ PG&E, op.cit, Table 1-9; partial program list.

Table 6
SCE's Market Segments

SCE		
<i>Sectors</i>	<i>Segments</i>	<i>Sub-Segments/Programs*</i>
Residential	Multi-family, affordable housing, manufactured housing	Home Energy Efficiency Rebate; Residential Lighting Incentive Program for Basic CFLs; Advanced Consumer Lighting, Multi-family Energy Efficiency Rebate; On-line Buyer's Guide; <i>Comprehensive Mobile Homes; Manufactured Housing New Construction; Efficient Affordable Home; California New Homes</i>
Nonresidential	Industrial, agriculture, commercial and small business, new construction, schools and universities	Business and Consumer Electronics, Plug Load Efficiency; Business Incentive Elements; Agricultural Energy Efficiency; Financial Solutions Element; Business Services Element; Savings By Design; Emerging Technology Program; Workforce Education and Training Synergies; <i>Entertainment Centers Energy Efficiency; Private College Campus Housing Energy Efficiency; K-12 Private Schools and Colleges Audit and Retrofit; Healthcare Energy Efficiency; California Preschool Energy Efficiency; Integrated Demand Side Management Pilot for Food Processing; Automatic Energy Review for Schools; Leased Office Space Retrofit; Data Centers Energy Efficiency; Data Center Optimization</i>

*Third party programs are italicized.

The utilities propose to use a variety of channels to promote their energy efficiency measures, including the following: sales personnel and field representatives, direct mail, public relations, trade publications, alliances with vendors and associations, conferences, retailers, websites and email, bill inserts, third-party programs and implementers, and co-marketing.

5.4 Utility Energy Efficiency Programs Target Specific Segments

Several highly-segmented energy efficiency programs are included in the IOU's 2009 to 2011 proposals. For example, PG&E's LodgingSavers program focuses on providing energy management devices to the economy hotel segment.⁴⁰ This segment, which closely mirrors other small business segments, is dominated by small business owners, with no maintenance staff, who are short on investment cash and tend not to participate in traditional programs. LodgingSavers provides free, direct installation of lighting and controls, faucet restrictors and low flow shower heads, and air conditioning repair and maintenance, among other items. Program marketing is conducted principally through field canvassing.⁴¹

Likewise, PG&E's Dairy Energy Efficiency Program, which began in 2004 as the California Multi-Measure Farm Program, focuses on dairy farms. The program incorporates interventions throughout the upstream, midstream, and downstream market chain, working closely with equipment manufacturers and dealers, and local farm organizations. The utilities' marketing approach includes electronic application processes, regular customer satisfaction evaluations, and single points of contact, so that individual operations can be case managed across the spectrum of available energy management measures.

5.5 Integrated Approaches to Energy Management

As previously discussed, state policymakers are increasingly calling for a comprehensive and integrated approach to developing and marketing energy management measures. "The new theories stress using a simplified, easy to access and unified delivery approach to encourage comprehensive adoption of energy efficiency measures, as well as demand response (DR), distributed generation (DG) which includes the California Solar Initiative (CSI), and Self-Generation Incentive Program (SGIP) actions among applicable customers."⁴² "Bundled" marketing efforts are intended to bring together DR, energy efficiency, and CSI programs to provide consumers with a full array of energy efficiency and demand-side management (DSM) options.

Effective comprehensive integration can provide a number of benefits, including reducing "stranded benefits" (e.g., ignoring possible DR actions when implementing energy efficiency measures), and improving marketing cost-effectiveness (e.g., by reducing the number of distinct messages or competing messengers). However, while certain segments, such as new construction, lend themselves quite well to comprehensive energy management interventions, in general, integration must be carefully matched with distinct segments – as well as the time dimension of DSM decision making – to be effective.

⁴⁰ Higher end lodging facilities may require a different approach (e.g., see Bernstein 2008).

⁴¹ PG&E, op.cit.

⁴² PG&E, op.cit.

In many ways, the rest of the marketing world is moving away from comprehensive integration approaches. Large department stores – such as Mervyns and Sears – which, in bygone days, may have met a majority of a consumers’ non-food needs – are struggling to survive.⁴³ Supermarkets are increasingly segmented along value- and economic-based dimensions, and they are experimenting with smaller stores that emphasize prepared meals and grab-and-go drinks.⁴⁴ And newspapers – formally the one-stop place for all of a consumers’ information needs – are being replaced by issue-specific blogs and targeted newsletters and magazines.

Similarly, some public relations experts believe that the most effective approach to changing behavior is one step at a time. For example, the Lights Out initiative, in which businesses and residents in entire cities are encouraged to turn off their lights on a single night, is predicated on the notion that a single dramatic collective event can best lead to a change in consciousness, as opposed to burdening consumers with too much choice. Previous public sector campaigns – against littering, smoking, forest fires – have followed this more narrow approach (i.e., public health campaigns weren’t launched against obesity and smoking simultaneously). Energy use is made-up of dozens of daily interactions with hundreds of devices. It remains to be seen whether a comprehensive approach to DSM can be effective.

In this vein, a DSM approach that simply reflects a collection of energy efficient, load shifting, peak use reducing, renewable pots and pans suitable for all ratepayers is most likely to be ineffective. Instead, the proffered measures generally need to be tailored to specific segments or particular decision points. If, for example, an owner is remodeling their house, it might be an apt opportunity to ask them if they’d like to supersize their efficiency savings, by adding a high efficiency toilet to their list of Energy Star appliance purchases. Businesses and families can be pitched DR or solar while they’re contemplating, for example, a lighting retrofit, but in most cases they’re unlikely to act on these additional choices. The exception might be when the target is a Green Champion, or for programs that package in the additional measures seamlessly (e.g., lighting retrofits that include DR enabling devices).

5.6 Integrated Approaches to Energy Management

Several integrated energy management programs are included in the California IOU’s 2009 to 2011 proposals. For example, SCE’s third-party Comprehensive Mobile Home Program, which targets mobile homes and home parks, includes a comprehensive set of energy efficiency measures – such as direct installation of air conditioning diagnostics and tune-ups, duct tests and sealing, hardwired fluorescent fixtures, and CFLs – as well as plug load management, performance standards, collaborations with local government, and integration with other demand-side opportunities. It also features inter-program referrals, data sharing and a bundling of energy efficiency, DR, CSI, smart

⁴³ Though competition from other emporiums, as much as emerging segmentation in the market, may be chiefly responsible for their travails. Mervyn’s will cease to exist in 2009.

⁴⁴ Andrew Martin, “Miles of Aisles for a Gallon of Milk? Not Here,” *The New York Times*, September 10, 2008.

meters, and other Integrated DSM (IDSM) efforts, as well as provision of CARE and the Family Electric Rate Assistance (FERA) program.⁴⁵ Mobile home park residents are typically moderate or fixed income, elderly, retired, disabled, and single parents.

SF Power is attempting a wider scope of integration through its Climate for Community Pilot Initiative.⁴⁶ This initiative focuses on providing low income households and small businesses with a comprehensive set of measures that span energy efficiency, transportation, water conservation, solid waste disposal, and product use. In the case of low income families, the entry point is a water conservation audit coupled with a free high efficiency toilet, low flow shower heads, and faucet aerators. Other items that are geared towards reducing electricity and private vehicle use, recycling, and transitioning to greener cleaning products are offered at low- or no-cost based on a more comprehensive audit. Small businesses enter the pilot through a tailored DR program, and they are audited and provided with a range of measures intended to reduce their ecological footprint.

Based on roughly one dozen audits of small businesses and nonprofits, SF Power has found that while participants' appreciate the comprehensive approach, they tend to choose only a handful of measures to actually implement. In addition, the participants, though in many cases Green Champions, have little patience for site audits that take much more than one hour to complete, and it can take months after a package offer has been made for any action to be taken.⁴⁷ SF Power intends to work with 100 low income households before the end of the year, and plans on publishing pilot results shortly thereafter.

5.7 New Ways to Understand How Best to Define Segments

Although notable progress has been made over the past several years, utilities are far from identifying segments and associated programs that comprehensively and cost-effectively penetrate the full range of energy management markets. This is in part because several underlying behavioral and market characteristic issues have yet to be addressed, or even thought about deeply.

In many markets, service quality has as much influence on consumers as the products being offered: as much as 80 percent of customer dissatisfaction arises from poor relationships with their vendors, as opposed to unhappiness with the product (Massnick 1997). Yet, as previously discussed, demand-side management efforts

⁴⁵ This may be a bit of hyperbole, designed to cater to the CPUC's mandate to comprehensively package demand-side management efforts. While mobile home parks with high air conditioning loads may be good candidates for DR programs, there are few suitable DR programs available to them. Likewise, while solar might be an option for some mobile home customers, it doesn't seem like a well-matched technology in general for this segment. Still, SCE intends to offer these options when they're applicable to the customer's needs and characteristics.

⁴⁶ www.sfpower.org.

⁴⁷ Again, time is an important dimension. There's a tension between the desire to implement measures that tangibly reduce energy use by a date certain, and the need for sufficient time to lead a horse to water and get them to drink.

principally focus on installation of new technologies, with little long-term relationship-building within the residential and small commercial sectors. This imbalance needs to be corrected if energy management programs are to be fully successful.

As previously discussed, social psychology provides a key underlying basis for segmenting analyses. In addition, psychology and, to a certain extent, philosophy, also significantly influence individual's and businesses' behavior. A key psychological element that is frequently ignored – and which is contrary to classical economists' admonition to ignore “sunk costs” when making a decision – is that people tend to place a higher value on something they already own than the same product being offered for sale.⁴⁸ This observation, called the “endowment effect,” was made almost three decades ago by Richard Thaler, a University of Chicago economist. The endowment effect contradicts neoclassical economic theory, which is based on the assumption that individuals always act to maximize their welfare, implying, in turn, that the value someone puts on something shouldn't depend on whether they already own it.

Somewhat related to the endowment effect is the notion that conservation, in its true, historical sense, means maintaining equipment as long as possible. Why throw-away a perfectly good stove, refrigerator, or toaster?

Today's energy efficiency programs run counter to both the endowment effect and historical conservation mores. Families and businesses are being asked to retire “perfectly good” appliances in favor of new, often unfamiliar, technology. What's more, in some cases the new technology may not perform as long or as well as the technology being replaced (e.g., lighting ballasts; CFLs). While people and businesses are used to changing their computers and cell phones every few years, they do not exhibit the same behavior with virtually any other appliance or electronic device. One study found that the average age of a home cooking appliance is more than 10 years; the average age of a household water heater almost nine years; and the average age of the main area heater almost 11 years (TXU Networks 2000). Yet energy management programs by and large depend on the accelerated retirement of electric devices to be successful.⁴⁹

Apropos of the endowment effect and traditional attitudes towards conservation, it's important to point out that current energy management efforts are in part an attempt to transform individual's and businesses' attitudes towards ownership of energy using appliances. More than two decades ago people's perspective about public space was transformed from one in which litterers and smokers had dominant rights to one in which these same individuals exhibiting these same behaviors are considered pariahs.⁵⁰ In a more subtle way efficiency advocates are attempting to shift the use of lighting,

⁴⁸ Policy makers have this same inclination. It's difficult to get regulators to close existing nuclear and fossil fuel power plants, no matter how expensive or polluting they are to operate, due to insecurity about what new supply or demand assets will replace these resources.

⁴⁹ In this respect, repair and maintenance programs may be more successful in certain segments than replacement initiatives.

⁵⁰ Note that contrarian segments have emerged consisting of populations who smoke in part as a gesture of defiance – a psychology that cigarette vendors effectively use as part of their marketing strategies – and intentionally litter as a way to “stick it to the man.”

appliances, and electronics from an entirely private act to one that essentially occurs within the public realm. This evolution is simultaneously occurring in the marketplace, with solar vendors offering power purchase arrangements in which they own the photovoltaics installed on their customers' roofs; and various energy management firms offering programs in which they control a facility's energy consumption patterns remotely.⁵¹

This push to shift a sense of ownership over energy-using appliances is a dangerous game. Once absolute private ownership is delinked from an object's use, a sense of responsibility can also be disrupted. If the government is responsible for air quality, and the government doesn't regulate SUVs in the same way it does automobiles, than it must be okay to drive an SUV. This effect can certainly be countered – through economics (e.g., higher prices) or marketing (e.g., *An Inconvenient Truth*) – but it's best not to ignore it.

More needs to be known about human behavior associated with energy use. Developing anthropologically-based insights into how customers use energy-dependent products could help with effective segmentation. For example, how exactly people use their lights, particularly in a business setting, is substantially unknown. Many employees housed in larger buildings do not know where the light switches are, making it difficult for them to actively participate in DR programs. Similarly, families' and workers' relationship to plug loads and power strip use is a bit mysterious, and could be subject to behavior modifications.

Finally, underlying these elements is the fundamental question that has to be answered to segment any market: what is the product? Said differently, what is the consumer's ultimate concern or interest in the purchase experience? In the case of DSM, is the product a lower and more off-peak electricity use pattern? A specific device? A changed attitude? How this question is answered will dictate how best to segment the markets of interest.

5.8 Emerging Patterns

Two other issues merit attention. First, as economic conditions change, as reflected in higher energy costs, stagnant wages, and lower housing prices, opportunities for improving DSM will emerge and disappear. Higher energy prices encourage conservation, but, in concert with stagnant wages, not necessarily energy efficiency, which may require investment capital. Lower housing prices depress the new construction and renovation markets, reducing the opportunity to pitch energy efficiency programs towards these segments. In this respect, the push of utility-offered energy efficiency programs needs to be ameliorated by changes in the pull caused by different economic cycles.

⁵¹ Electricity meters have long been owned by utilities, though there's no particularly strong economic rationale for this to be the case.

Second, institutional and political patterns matter a lot. The IOUs are emerging from an extremely stressful decade-long period, in which they sold off much of their generating assets, yielded some of their power sales to third parties, and, in the case of PG&E, went into bankruptcy. Similarly, policy discussions continue about what types of institutions would be best suited to managing and implementing DSM programs.

For example, an approach that could provide a better ability to segment markets and develop suitably matching products, services, and marketing campaigns might be better nested in chaordic alliances. The concept of a chaordic alliance was pioneered by VISA, which is owned by 20,000 financial institutes and manages \$1.5 trillion.⁵² Alliances attempt to manage operations across geographic, cultural, and linguistic boundaries by maintaining local operations, but sharing information and management structures. In the case of DSM efforts, a network of regional energy agencies, community groups, and businesses could work under the umbrella of an overarching alliance to achieve efficiency goals.⁵³

As a result of these and the other factors previously discussed, new market segments will be created, and old ones will disappear. In the end, segmenting is not a static exercise, but requires a nimble and thoughtful approach to understanding and responding to consumers' needs, wants, and behaviors.

⁵² Thomas Kostigen, "Forming Order from Chaos," *MarketWatch*, December 14, 2000.

⁵³ The term chaord comes from the words chaos and order.

6.0 Conclusion

While electric utilities are increasingly experimenting with segmentation schemes – with some notable successes – development of effective segments has been slowed by a lack of comprehensive data, particularly related to such hard-to-reach but ubiquitous sectors as small businesses; a tendency to base DSM programs on traditional broad industry sectors, such as residential, commercial, and industrial customers; and an energy regulatory process that emphasizes technological solutions to DSM that are principally based on engineering economics analyses. However, with encouragement from regulators and as a result of active third-party solicitations, the state’s IOUs exhibit a greater use of segmentation in their recently proposed energy efficiency programs.

Segmentation schemes tailored to residential customers typically focus on attitudes and motivations. For example, attempts are made to demographically or geographically isolate groups of consumers by whether they are likely to change their products or behaviors as a result of environmental, economic, or social messages. Segmentation schemes for businesses also rely on motivating factors, and seek to isolate similar energy end-use technologies, ownership patterns, economic characteristics, and associated behaviors and match these with products and services.

Once a segment has been described, product and service development and associated marketing efforts can be tailored to address identified segment-specific problems or needs, or to prompt action to be taken. Examples of potentially successful segments include:

- *Corner markets:* typically independently-owned, with old, inefficient lighting and equipment, low profit margins, and minimal access to capital. This segment might be addressed through direct installation programs that focus on lighting and refrigeration. Marketing is best conducted door-to-door, with easy-to-read materials and frequent references to neighboring stores that have adopted the measures.
- *Warehouses:* exhibit a variety of ownership patterns, and frequently do not pay, or even see, their utility bills. This segment can be further deconstructed by end-use activities, such as whether the operation is reliant on lighting, refrigeration or battery-powered equipment. Because of split incentives (e.g., the energy bill may be paid elsewhere, or the warehouse operators may rent), energy efficiency measures must be simple and immediately adoptable (e.g., timers for load-shifting battery-powered equipment). Because in many cases there will not be an energy manager, it’s a difficult segment to market to, triggering the need for long-term efforts (e.g., three to five years).
- *Low income families:* may not own their homes, have old or inadequate equipment, be poorly educated on energy uses, and have little time to manage their energy use. Efficiency offerings need to provide a direct service, be low- or no-cost, and, directly installed. To the extent that energy programs offer co-

benefits (e.g., outdoor sensors, which also increase security), they will be more attractive. Marketing is best done by community-based groups that have a long-term presence in the neighborhood and the necessary language and cultural skills.

As California attempts to achieve the ambitious energy-reducing goals associated with reducing greenhouse gas emissions, regulators and utilities need to pay greater attention to how best to apply market segmentation to the development and fielding of efficiency programs. High benefit-cost ratios estimated by an engineering economics framework that assumes significant adoption rates without clear marketing pathways should be carefully examined. Without a comprehensive approach to developing and marketing energy efficiency measures that is based on well described segments, programs are unlikely to be fully successful.

In addition, energy regulators and utilities should be thoughtful about how fast they move towards integrated approaches to DSM. Although in many cases ratepayers will welcome comprehensive energy (and other resource) saving measures, a significant portion of the population may prefer one-at-a-time solutions. In particular, families and small businesses may not have the capacity to adopt multiple measures simultaneously; for segments within these populations multi-year, stepwise approaches to increasing efficiency may be preferable to all at once comprehensive programs. Alternatively, if “whole house” tactics are strongly preferred by policymakers, segment-specific barriers to adoption (e.g., financing; staffing capacity) need to be identified and effectively addressed.

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