

**RESIDENTIAL SEGMENTATION FOR MARKETING UTILITY PROGRAMS:  
GENERAL OR SPECIFIC?**

Shel Feldman, Carl T. Finkbeiner and John A. Berrigan  
National Analysts  
and  
Larry Lewis  
Electric Power Research Institute

**ABSTRACT**

To assist electric utility managers in the design, implementation and marketing of demand-side programs through improved understanding of customers, the Electric Power Research Institute (EPRI) is sponsoring development of a database on customer preferences and behavior. Descriptions of convenient and useful residential market segments will be included in that database.

Available literature does not indicate appropriate segments or segmentation criteria, however. This study was therefore designed to identify factors that could be used in segmentation, based upon the needs and benefits associated with the purchase and use of electric energy and appliances. A key issue addressed is whether the appropriate factors are defined by needs and benefits that are specific to individual appliances or end uses, or by needs and benefits associated with energy or appliance use in general.

A battery of 141 needs/benefits statements was generated from the results and analysis of qualitative discussions among residential customers in eight focus groups and twelve family depth interviews. These statements were presented in an agree-disagree format to 161 other respondents via computerized interviews in four locations across the country.

The patterns of agreement and disagreement with statements were factor analyzed and eight orthogonal factors were identified on the basis of several defining items with loadings of .45 or greater. These factors were largely independent of specific appliances and end uses, and focused instead on such needs and benefits as: Appearance; Safety; Comfort, Convenience and Climate Control; Cautious Economization and Hi-Tech Orientation. Particularized factors seem appropriate only in studies of needs or benefits associated uniquely with a specific appliance or end use.

A reduced battery of needs/benefits statements based on the factors identified in this study is now included in the database development for EPRI and will be used to identify market segments for demand-side management programs.

**RESIDENTIAL SEGMENTATION FOR MARKETING UTILITY PROGRAMS:  
GENERAL OR SPECIFIC?**

Shel Feldman, Carl T. Finkbeiner and John A. Berrigan  
National Analysts  
and  
Larry Lewis  
Electric Power Research Institute

**BACKGROUND AND PURPOSE**

Improved understanding of the preferences and behavior of customers will help utility company managers design, implement and market demand-side management programs. To assist in the development of this understanding, the Electric Power Research Institute (EPRI) is sponsoring a large scale study that includes the development of a national data base on residential customers through hour-long in-home interviews this summer. This data base will include detailed information on the tradeoffs customers make among features of appliances and utility programs, and a description of the market segments into which residential customers may be conveniently and usefully grouped.

Segmentation is applied to markets for two reasons:

- First, by dividing consumers into groups that are homogeneous with respect to their response to a utility program or marketing effort, segmentation assists in determining the most effective design, pricing, and positioning of that program
- Second, by providing managers with the ability to forecast program acceptance within specified groups, segmentation assists in determining the most effective allocation of company resources

Segmentation can be accomplished according to a variety of criteria, including:

- Demographics, such as age, income or education
- Life cycle classifications, such as "Empty Nesters" or "Young Marrieds"
- Housing stock, appliance stock or consumption classifications, such as "Condo Dwellers," "Pool Pump Users," or "Lifeline Customers"
- Attitudes, such as pro- or anti-utility company feelings

However, the segmentation criteria most predictive of response to a program are the needs or benefits associated with that program by potential consumers. People with similar demographic characteristics, or those in the same

stage of the life cycle, or those with similar appliance stock may or may not react in the same way to a utility company initiative. But it is by virtue of their having the same needs that they respond to a program in the same way, or by virtue of the program offering them the same benefits that their responses are similar, rather than because they are all between 30 and 44 years of age or because they are all "Yuppies." Therefore, the segmentation developed in the EPRI survey will be based upon the needs and benefits residential customers associate with the purchase and use of electric energy and appliances.

A common method of needs/benefits segmentation is the following: A set of statements about the needs and benefits associated with a product, program or service is presented to customers, and they are asked to indicate their agreement or disagreement with each. The pattern of responses to individual items is then examined by the analyst, and underlying needs/benefits factors are isolated and described. Finally, groups of individuals who respond similarly with respect to the underlying factors are identified and characterized. In other words, segments are distinguished by their reactions to needs/benefits factors. In turn, then, the success or failure of the segmentation effort rests upon the careful definition of appropriate, predictive needs/benefits factors.

The national survey referred to earlier required a valid, reliable battery of needs/benefits statements for use in segmentation of residential customers. However, the literature did not offer systematic guidance as to the needs and benefits that are most pertinent to decisions about the purchase and use of electric energy and appliances. Moreover, information was unavailable as to whether the needs and benefits that should be considered are specific to individual appliances or end uses, or apply generically to the use of energy or the choice and purchase of electric appliances. It was not known whether it is more effective to measure concern with cost containment, for example, as a general need, or as a need tied in different ways to VCRs and to refrigerators. Supposing some customer segment could be characterized as composed of "Sybarites": Should members of the segment be expected to exhibit sybaritic behavior in every aspect of energy use, or only in specified areas such as profligate use of air conditioning? The research reported here was designed to deal with these issues.

## RESEARCH DESIGN

In brief, a large set of needs/benefits statements was generated, covering the universe of potential factors associated with specific end uses of electric energy and general energy consumption. The statements were presented to a sample of residential customers who were asked to indicate their agreement or disagreement with each. Customer responses were analyzed to determine the factors that best describe the appropriate needs/benefits universe, and to provide a preliminary battery of statements for inclusion in the national survey.

Thus, the basic problem in this study was to develop a set of statements that adequately represent the universe of needs and benefits associated with

electricity consumption. These statements must be phrased clearly, in a way that mirrors customer perceptions. Sampling of customers and administration of the battery may be treated as standard issues of research administration.

### The Needs/Benefits Battery

Two dovetailing approaches were utilized in the development of the needs/benefits battery for this project. These were the collection of qualitative data and the imposition of a logical framework for hypothesis testing, based upon analysis of the qualitative data.

- The collection of qualitative data included the conduct of eight focus groups and twelve in-depth interviews of family groups. These groups were used to explore the needs and benefits that residential customers consider when they discuss utility programs and when they discuss specific appliances and end uses. The research yielded lists of needs and benefits associated with various end uses, as well as specific statements about some of those needs and benefits.
- The second phase of this project included development of a logical structure to categorize needs/benefits statements and to ensure adequate coverage of their universe. This structure was based on a qualitative content analysis of the needs and benefits that had been discussed in the groups.

The results of the qualitative data collection and analysis are shown, in part, in Table I. The rows of Table I show hypothesized needs/benefits factors, and the columns indicate various end uses. The cell entries represent statements linking particular needs and benefits to particular end uses.

Thus, for example, the benefit of convenience as linked to a washing machine is represented in the statement,

- "I want a washing machine that takes care of laundry additives (such as fabric softener or bleach) automatically, so I don't have to keep checking the machine and starting new cycles."

The benefits of convenience (and personal control) are represented more generally in the statement,

- "The electric company would probably pick the absolute worst time to ask me to limit my use of electricity if they had the chance."

An examination of these statements shows that they could be classified -- and could define factors -- in a number of ways. Factors were not forced to describe the needs and benefits associated with electric energy and appliances: The factors could describe specific end uses such as heating or cooling, or larger groups of end uses such as HVAC systems. Or the factors could

Table I. Structure designed for generation of needs/benefits statements regarding electric energy and appliances (portion).

Hypothetical Needs/Benefits	End Uses/Appliances/General Use			
	Central Heating	Washer/Dryer	Refrigerator	General Appliance Use and Purchase
Comfort	- What I look for in a heating system is even heat -- all over the house and all around each room	- I don't feel comfortable unless I'm wearing fresh, clean clothes.		- I work hard enough that I deserve to have my home as comfortable as possible.
Convenience	- I really want to be able to set one temperature for heating or cooling my home, and forget it.	- I find it very convenient to have all the different cycle and water level controls on a washing machine.	- I can't stand the time and mess involved in defrosting a refrigerator without automatic defrost.	
Operating Cost	- I think the best heating system is the one that saves the most money every month it's in use.	- I worry about how long my clothes will last if I get the wrong kind of dryer.	- I think it saves us money if people can use a water or ice dispenser or our refrigerator door, rather than having to open and close the door.	- I don't think much about the cost of turning an appliance on.

5.66

describe specific appliances such as refrigerators, or processes such as purchase or replacement.

A more complete version of Table I was used to ensure that, to the extent practicable, all logical combinations of needs/benefits and end uses were represented in the battery of statements generated for use in the pilot test. The structure was also used to check that all needs and benefits were also expressed in a generalized context, free of relationship to any specific end use. A number of informal pretests with a convenience sample of respondents was used to refine the statement wording.

The survey instrument consisted of 141 statements about needs and benefits, presented in an agree-disagree format, in addition to a brief battery of demographic questions.

- The needs/benefits statements were presented in two roughly equal portions:
  - The first portion consisted of statements about rates, load control programs, electricity use and appliances in general.
  - The second portion consisted of statements about needs and benefits of specific appliances, with respondents instructed to respond as if they owned and used each.
- The demographic section included questions about age, education, income, household size and composition, and size and ownership of home

### Administrative Issues

Sampling. The pilot study was conducted via central location testing: Interviewers recruited a mixture of adult shoppers at four malls around the country -- in Los Angeles, Orlando, Philadelphia, and suburban Chicago. Forty respondents were obtained at each location; a total sample of 160 customers was tested.

While variability of respondent characteristics is important in a study of this nature, the sample results need not be strictly projectable. In other words, the purposes of this phase of the project are to refine the needs/benefits battery and to draw preliminary conclusions about the nature of the factors that underlie customer segments. The development of a comprehensive, projectable data base is taking place in the larger project, and is based upon a strict national area probability sample. It was sufficient for the pilot study that a moderately large sample of customers be obtained, and that residents of different climate zones be included. (The needs and benefits associated with heating and air conditioning may differ systematically from one climate zone to another.)

Questionnaire Administration. After respondents were recruited, they were seated at a computer console equipped with a color monitor, and the instructions were presented on a series of computer screens. Respondents then rated their agreement with each needs/benefits statement and answered the demographic questions, at their own pace. An attendant remained available at all times to answer questions or assist in the operation of the equipment.

Computerized interviewing was chosen because it offered the following benefits:

- The technology and the design of the screens provided respondents with an interesting task that was less onerous than other methods of responding to the extremely large number of statements
- The statements could be presented in different random orders to each respondent, to minimize the effects of sequence biases and position biases
- Data preparation time was minimized; analyses could be completed almost instantaneously upon the end of data collection

## RESULTS

The results are consistent with the hypothesis that respondents are driven by the general needs and benefits offered by electric energy and appliances, rather than by needs and benefits associated with specific end uses and appliances. The factors obtained are described below, following a brief review of the nature of the respondents sampled and their ability to deal with the computerized interview. A more generalized discussion of the implications of these results is presented in the final section of this paper.

### The Sample and Data Collection

Sample. As intended, the sample was heterogeneous with respect to age, education, income, home ownership and other demographic characteristics. It should be noted that the distribution of respondent characteristics is not what would be expected from a random sample of residential ratepayers. As shown in Table II:

- Approximately one-third of respondents are between the ages of 21 and 29
- Four respondents in ten have a college education or more
- Two respondents in ten have an income of \$50,000 or more
- Almost half of the respondents are renters
- Approximately half of the respondents live in homes with three bedrooms or more

Table II. Distribution of selected sample characteristics.

<u>Characteristic</u>	<u>%</u>	<u>Characteristic</u>	<u>%</u>
Sex		Home Ownership	
Male	45%	Own	52%
Female	55	Rent	48
Age		Size of Home	
18 to 20 years	10%	One bedroom or none	19%
21 to 29 years	32	Two bedrooms	25
30 to 39 years	20	Three bedrooms	30
40 to 49 years	17	Four bedrooms or more	26
50 to 59 years	10	Household Size	
60 years or over	11	One person	15%
Education		Two people	40
High school graduate or less	19%	Three people	24
Some college or technical school	40	Four people	13
College graduate	25	Five people or more	8
Some postgraduate education or more	16	Number of Children in Household	
Income		None	62%
Less than \$15,000	9%	One child	20
\$15,000 to \$19,999	10	Two children	12
\$20,000 to \$29,999	28	Three children or more	6
\$30,000 to \$39,999	17		
\$40,000 to \$49,999	14		
\$50,000 or more	22		
Marital Status			
Married	59%		
Single	28		
Widowed, divorced, separated	13		

Data Collection. The computerized interview procedures were extremely successful. Respondents were engaged by the task and participated willingly. Despite the large number of statements to be judged, the interviews were brief: the median interview required only 22 minutes, and the mean interview required 25 minutes. Finally, an analysis of respondent uncertainty based on the opportunity to "page" back and forth between screens showed that three-fourths of the respondents never did so, and only one respondent in twenty did so four times or more.



## Factor Analysis Results

Several different methods of factor analysis were used, and the results were found to be essentially invariant with respect to those methods. In other words, there is evidence that the results are not subject to the peculiarities of any specific analytic method. In particular, analyses were done both with unity and with squared multiple correlations in the diagonal; both orthogonal and nonorthogonal rotations were considered; and results based on several criteria for determining the optimal number of factors were explored.

The solution shown in Table III best represents the results of this study. Eight factors were identified: each is represented by a minimum of four statements with factor loadings of .45 or greater.

### **IMPLICATIONS**

The results of this pilot study indicate that, for marketing of utility company programs, consumers should be segmented according to the general needs and benefits they associate with electric energy and appliances.

Specific end uses and specific appliances may be more associated with certain needs and benefits than others.

- For example, heating and cooling and related technologies are associated with comfort and control. Similarly, computers, VCRs and tape decks are associated with education and entertainment.

However, specific end uses and specific appliances do not tend to define stable independent factors.

- Despite the number of statements about refrigerators included in the item battery, for example, no refrigerator or food storage factor emerged from the analysis.

Only in the case that an appliance is uniquely representative of a particular need or benefit does it appear to define a factor.

- Microwave ovens, alone among the appliances considered in the item battery, represent an innovative, utilitarian technology.

A further implication of the results is that the design and promotion of utility programs should be focussed on the needs and benefits they address. The effectiveness of advertising a washer/dryer feature, for example, should be enhanced by emphasis on the safety or control it offers the consumer.

Based on this analysis, a modified set of 48 needs/benefits statements is included in the national survey of residential customers sponsored by EPRI. The final factor structure and the resulting segments will be described in later project publications. Through use of this information, utilities can enhance the effectiveness of their marketing programs and better address the needs of their customers.

Table III. Needs/benefits factors and defining statements (Selected).

<b>I. CONCERN WITH APPEARANCE</b>			
<u>LOADING</u>	<u>MEAN<sup>a</sup></u>	<u>S.D.</u>	<u>TEXT</u>
61	2.7	1.7	I like to keep a bright, well-lighted home because it looks better to neighbors and visitors than one with just a few lights on
56	4.0	1.5	When I buy or replace a major appliance, I want it to be first class -- with all the options
- 55	4.8	1.5	I don't need a lot of light around except in the one place I'm using it
<b>II. AVOIDANCE OF HASSLE</b>			
<u>LOADING</u>	<u>MEAN</u>	<u>S.D.</u>	<u>TEXT</u>
68	2.8	1.7	Once I've decided to buy or replace a major appliance, I don't pay any attention to specials or rebates
60	3.3	1.7	I don't like to spend much of my time looking around when I need to buy or replace an appliance of any size
55	3.2	1.7	I can't be bothered calculating the total cost of purchasing and running different major appliances; it's not worth my time
54	3.0	1.6	I usually find it easiest to replace a worn out major appliance with the same brand, rather than spend a lot of time and energy looking around
51	3.7	1.6	Once I find a store that gives me a good price for a major appliance, I don't spend much time checking further in other stores
47	3.2	1.7	I don't like to spend much of my time looking around when I need to buy or replace any appliance
<b>III. CONCERN WITH SAFETY</b>			
<u>LOADING</u>	<u>MEAN</u>	<u>S.D.</u>	<u>TEXT</u>
65	3.9	1.8	I still worry sometimes about the safety of electric blankets

62	3.3	1.8	I sometimes worry about which is safer -- a gas dryer or an electric dryer
53	3.4	1.8	I sometimes worry about which is safer -- a gas range or an electric range
47	2.8	1.7	I don't see the point of spending several hundred dollars on a microwave, if you already have a regular oven

IV. RESISTANCE TO ELECTRIC COMPANY CONTROLS

<u>LOADING</u>	<u>MEAN</u>	<u>S.D.</u>	<u>TEXT</u>
72	4.5	1.6	Letting the electric company limit the amount or time of use of electricity would probably interfere a lot with the comfort of the people in my household
65	4.0	1.7	I would find it difficult to shift my household activities to different times of the day to make electricity available for other uses, such as factories
63	4.0	1.7	I wouldn't let the electric company control any uses of electric power in my household, even if I could save some money by doing so
59	4.5	1.5	I wouldn't want to put up with worrying about when the electric company might want me to limit my use of electricity
56	3.9	1.8	I couldn't accept any restriction on the amount of electric power used in my household at any time
- 50	3.3	1.6	I'd be willing to shift my household activities, or to use less, if that would make more electricity available for business and industrial uses
- 48	4.2	1.6	I'd be happy to shift some of my household activities to different times of the day, if it would save me some money on electricity

V. COMFORT, CONVENIENCE AND CONTROL

<u>LOADING</u>	<u>MEAN</u>	<u>S.D.</u>	<u>TEXT</u>
62	4.9	1.4	What I look for in a heating system is the even distribution of heat all around the house

60	5.2	1.1	I want a cooking range that allows me the most control over the heat
59	4.9	1.3	It's important to me that a cooling system keep the humidity in the house at the right level
58	5.0	1.2	What I look for in a cooling system is the even distribution of temperature all around the house
56	4.9	1.4	I think the most efficient cooling system for my household is one that's just the right size for the room or the household
51	4.9	1.1	To me, the most important thing about a humidifier or dehumidifier is that it makes a household more comfortable
48	5.0	1.2	It is important to me that an air conditioning or cooling system cleans the air and makes it more healthy to breathe
46	4.6	1.4	I like the convenience offered by lots of different cycle and water level controls on a washing machine

#### VI. HI-TECH ORIENTATION

<u>LOADING</u>	<u>MEAN</u>	<u>S.D.</u>	<u>TEXT</u>
70	4.8	1.4	I believe a home computer can be lots of fun
66	4.9	1.3	I think having a home computer can be extremely educational
65	4.1	1.6	I think having a home computer can save a lot of time doing things that need to be done
56	3.6	1.7	I like to play with all the different functions on a VCR or a tape deck

#### VII. CAUTIOUS ECONOMIZATION

<u>LOADING</u>	<u>MEAN</u>	<u>S.D.</u>	<u>TEXT</u>
72	4.3	1.6	I like to check Consumer Reports for repair frequencies when I need to buy or replace a major appliance
71	4.0	1.7	I always like to check Consumer Reports for economy before I buy or replace any appliance

66	4.4	1.6	I track my monthly electricity costs pretty carefully
63	5.1	1.1	When I want to buy or replace a major appliance, I look around a lot at different brands and models before I try to narrow down my choices
61	4.3	1.7	I like to check the economy ratings in Consumer Reports when I need to buy or replace a major appliance
54	5.0	1.4	Before I would buy or replace a furnace, I would try to figure out which fuel -- gas or electricity -- is going to be cheapest in future years
52	4.5	1.4	I want to wait until a technology is already proven and reliable before I buy it in a new appliance
48	3.9	1.5	I would never buy or replace an appliance without checking the experiences my friends or neighbors have had with a particular brand or model
- 48	3.1	1.8	I don't pay attention to the cost of running major electric appliances

VIII. INTEREST IN THE NEWEST THING

<u>LOADING</u>	<u>MEAN</u>	<u>S.D.</u>	<u>TEXT</u>
65	5.1	1.3	The best thing about a microwave is the time you can save by using it
55	4.4	1.5	It's very important to me that using a microwave in the summer helps keep the kitchen cooler than using a range or oven
52	3.9	1.6	It's very important to me that using a microwave is cheaper than using a regular range or oven
51	4.4	1.5	Having a microwave gives me a lot more time to do things I want to do instead of things I have to do
46	3.5	1.8	When I get a new VCR or TV or stereo, I want my friends and neighbors to see it

<sup>a</sup>Scale: 1 = Strongly disagree; 6 = Strongly agree.