

# **An Investigation into Public Attitudes Toward Energy Efficiency**

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## **ABSTRACT**

A key goal of market transformation is to alter the way consumers think and act with regard to making decisions about energy efficiency. Successful market transformation will lead consumers to view energy efficiency as an important attribute to at least consider in making choices, and ultimately may lead to sustaining energy efficient choices with an underlying energy efficiency ethic. Consumers, however, have many views of the energy situation, its role in decisions, and reasons for either attending to energy efficiency or ignoring it when they make decisions. This paper examines more thoroughly the structure of general attitudes regarding energy efficiency and the relationships of these attitudes to awareness and intentions to take action.

## **Introduction**

A key goal of market transformation is to alter the way consumers think and act with regard to making decisions about energy efficiency. Successful market transformation will lead consumers to view energy efficiency as an important attribute to at least consider in making choices, and ultimately may lead to sustaining energy efficient choices with an underlying energy efficiency ethic. Consumers, however, have many views of the energy situation, its role in decisions, and reasons for either attending to energy efficiency or ignoring it when they make decisions.

This paper examines the structure of general attitudes regarding energy efficiency and the relationships of these attitudes to awareness and intentions to take action. Specifically, the following key areas are addressed:

- ◆ Energy efficiency as a preferred product attribute – Do consumers consider energy efficiency as a “top-of-mind” concern when selecting products? How do they rate concerns for energy efficiency relative to other product attributes?
- ◆ Energy efficiency attitude dimensions – What is the general structure of public attitudes toward energy efficiency?
- ◆ Energy efficiency attitude segments – How are consumers grouped together with respect to their attitudes toward energy efficiency?
- ◆ Linking energy efficiency attitudes to awareness and intentions – To what extent are energy efficiency attitudes correlated to energy efficiency awareness and intentions to take action?

In late 1998 and early 1999, the California Board for Energy Efficiency (CBEE) conducted a study to help lay the groundwork for analyzing and tracking changes over time in public awareness and attitudes toward residential energy efficiency products and services promoted through California’s

energy efficiency programs. This paper draws heavily from the research and analysis completed by Hagler Bailly Services on behalf of the CBEE.

## Energy Efficiency as a Preferred Product Attribute

An important element of understanding public attitudes toward energy efficiency involves investigating the extent to which energy efficiency is included within a consumer's set of preferred product attributes. This issue was addressed through a survey of random households in which respondents were asked to indicate the qualities or features they would consider when making new product purchase decisions. Specifically, respondents were asked the following questions:

- ◆ “Suppose it’s the middle of summer and your aging *central air conditioner* breaks down. What features or qualities would you want to make sure you got in your new central air conditioning system?”
- ◆ “Let’s suppose you are thinking of remodeling your kitchen. Since your *refrigerator* is approaching its last days, you are considering a replacement. What features or qualities would you be looking for when shopping for a new refrigerator?”
- ◆ “Let’s suppose you were thinking about making a major home improvement, like replacing your *windows*. What features or qualities would you be looking for when selecting your replacement windows?”
- ◆ “Let’s suppose your *clothes washer* suddenly quits working on you. What features or qualities would you be looking for when shopping for a new clothes washer?”
- ◆ “Let’s suppose you are thinking about remodeling your kitchen or bathroom. You’re specifically looking at upgrading your *lighting fixtures*. What features or qualities would you be looking for when selecting your new lighting fixtures?”

As shown in Table 1, the frequency with which California respondents mentioned “energy efficiency” as a preferred product attribute is low – ranging from 12% for clothes washers to 25% for central air conditioning and windows. In addition, the frequency with which “energy efficiency” is mentioned *first* is even lower for all products – an indication of the extent to which energy efficiency represents a “top of mind” attribute preference for consumers when selecting among different product options.

**Table 1. Energy Efficiency as a Preferred Product Attribute**  
*(Percent of Respondents who Mentioned "Energy Efficiency" as a Preferred Product Attribute)*

	California	U.S.
<b>Energy Efficiency "Mentions"</b>		
Central air conditioning	25%	26%
Clothes washer	12%	12%
Lighting fixture	17%	13%
Refrigerator	22%	15%
Window	25%	28%
<b>Energy Efficiency First Mention</b>		
Central air conditioning	14%	18%
Clothes washer	4%	4%
Lighting fixture	10%	9%
Refrigerator	11%	5%
Window	15%	17%

As a follow-up to the attribute preference question, respondents were asked to specifically rate their concern for energy efficiency when making product selection decisions. That is, respondents were asked to indicate, on a 10-point scale, whether they were "not at all" (1) or "extremely" (10) concerned about energy efficiency when selecting the replacement products described in the previous question. Table 2 presents a summary of these findings for all five products.

**Table 2. Importance of Selected Product Attributes**  
*(Mean Score, Scale: 1=Not at all important, 10=Extremely important)*

California				
	Energy Efficiency	Brand	Features	Price
Central Air	9.20	6.21	8.92	8.25
Refrigerator	8.80	6.26	7.56	7.92
Window	9.17	5.45	8.52	7.96
Clothes Washer	8.51	6.70	6.88	7.99
Lighting Fixture	7.94	4.88	8.06	7.38
U.S.				
	Energy Efficiency	Brand	Features	Price
Central Air	9.15	6.50	9.00	8.30
Refrigerator	8.58	6.97	7.98	8.24
Window	9.44	5.77	8.15	8.33
Clothes Washer	8.80	7.07	6.46	8.12
Lighting Fixture	8.24	5.13	8.30	8.01

Initially, we speculated that these data were biased and provided an exaggerated estimate of respondents' overall concern for energy efficiency in actual product selection decisions. However, a follow-up "blind" survey revealed average ratings for "energy efficiency" that were even *higher* than the average ratings from the initial survey. Therefore, we can conclude from this research that while energy efficiency is not a "top of mind" concern that is likely to be automatically considered in most product selection decisions, it does hold considerable importance for most consumers as an individual or societal goal to be pursued.

## **Dimensions of Energy Efficiency Attitudes**

To examine the general structure of attitudes toward energy efficiency products and services, we conducted a factor analysis of a battery of opinion statements that represent different customer views on energy issues. Factor analysis is a statistical technique that groups items based on their inter-correlation such that items that are highly inter-correlated "load" together on a factor. Any group of items may have one or several factors that indicate which items are highly interrelated and which are less interrelated. This technique is used to identify the underlying dimensions in a set of items and to understand which types of items load together.

The results of the factor analysis of eleven attitude items are shown in Table 3. The results show that consumers manifest several different dimensions in their thinking about energy efficiency and that these dimensions operate somewhat independently of each other. This can be seen by observing the pattern of the factor loadings in Table 3. Items that have a high loading ( $\pm .6$  or higher) on one factor and generally low loadings on the other factors are evidencing a pattern suggesting a strong underlying dimension that is relatively unique.

Factor 1 is made up of three items that have high loadings (Items #1, 2, and 3). These items express a general sense among households that "my life is busy and individuals are only a small part of the problem, so I am not concerned about energy in my household." We have labeled this dimension "I'm Too Busy." Consumers who have high scores on this dimension appear less concerned about energy efficiency; they don't have the time to worry about energy efficiency; and they do not believe they are a big part of the energy picture.

Factor 2, "Conservation Ethic," includes Two items that load highly. It is perhaps too strong a label to call this the conservation ethic dimension, but these two items are the closest to a moral imperative to conserve. In essence, these two items seem to tap the basic idea that energy conservation is the right thing to do, even if you do not have to, and that you can do it without sacrifice.

Factor 3, "Energy Supply Concerns," also includes two items. These two items tap consumer views on the future of energy supplies and on building power plants. The items share a focus on supply and energy efficiency's role with regard to supply. People who score high on this dimension are expressing a concern about future energy supply and the need to use energy efficiency to offset the need to build additional power plants.

**Table 3. Summary of Factor Analysis**

<b>Items:</b>	<b>Factor 1</b>	<b>Factor 2</b>	<b>Factor 3</b>	<b>Factor 4</b>	<b>Factor 5</b>
<b>I'm Too Busy</b>					
1. I am not very concerned about the amount of energy used in my home.	.70	.02	.01	.11	.07
2. The household consumer is such a small part of the whole energy consumption picture that it really doesn't matter how a family uses energy.	.70	.18	.02	.10	.08
3. My life is too busy to worry about making energy-related improvements in my home.	.70	.06	.03	.14	.16
<b>Conservation Ethic</b>					
11. It is possible to save energy without sacrificing comfort by being energy efficient.	.03	.87	.03	.00	.02
7. Everyone should make a real effort to conserve energy even if they don't have to worry about the cost.	.12	.71	.27	.13	.02
<b>Energy Supply Concerns</b>					
6. Scarce energy supplies will be a major problem in the future.	.02	.09	.76	.08	.14
9. Instead of building new power plants, customers should use less electricity.	.18	.23	.60	.20	.40
<b>Economic Necessity</b>					
10. Conserving energy in my home is an economic necessity.	.10	.16	.19	.88	.08
<b>Little I Can Do</b>					
8. There is very little I can do to reduce the amount of electricity I am now using.	.30	.03	.06	.10	.86
<b>Individual Rights</b>					
5. It is my right to use as much energy as I want, as long as I can pay for it.	.56	.52	.47	.23	.07
<b>Environmental Preservation</b>					
4. It is worth it to me for my household to use less energy in order to help preserve the environment.	.14	.04	.47	.34	.10

The final two factors are single-item factors, but they show the same basic pattern that identifies them as relatively unique – a high loading on one factor and low loadings on the others. Factor 4, “Economic Necessity,” captures the idea that saving energy is an economic necessity for the household. People who have a high score on this item believe they must conserve energy for economic reasons. Factor 5, “Little I Can Do,” measures the extent to which customers believe they can control their energy consumption. Consumers who score high on this item are indicating they feel there is little they can do to reduce their consumption.

The final two items in Table 3 are examples of items that did not surface in the factor analysis as completely unique dimensions. This is seen by the fact that they do not have high factor loadings (.6 or higher) on any factor, and they have fairly high factor loadings (e.g., .4 to .6) on several of the factors. For example, Item 5, “Individual Rights,” has a loading of .52 on Factor 2 and .47 on Factor 3. This suggests that each item is really correlated with several of the other factors and does not really fall in one dimension. These results do not mean that these items are not measuring important beliefs, only that they are not uniquely related to one of the factors. We have labeled these last two items: “Individual Rights” and “Environmental Preservation.”

To summarize the factor analysis, the results show that the consumer beliefs about energy efficiency measured in this study are organized around five relatively unique dimensions. These dimensions operate somewhat independently of each other as consumers show patterns of beliefs that represent all combinations of high and low scores on these dimensions. Rather than one single underlying set of beliefs or attitudes that operate as a single “energy conservation ethic,” consumers demonstrate that their general attitudes about energy efficiency have many dimensions. For market transformation programs, this means that communications designed to change these general beliefs will face a patchwork market in which many different philosophies about energy efficiency exist and the fact that there are many reasons for both attending to energy efficiency and ignoring it.

## **Energy Efficiency Attitude Segments**

To examine the combinations of these dimensions that might exist, we conducted a segmentation analysis. We used cluster analysis on the five dimensions outlined above. We also included in the cluster analysis the specific item on individual rights (Item 5) believing that this would also be important in understanding consumer attitudes, even though it did not emerge as a unique dimension. Cluster analysis is basically a technique for grouping customers with similar patterns of response on a set of items. The goal is to find groups that are relatively homogeneous in their pattern of response and as different as possible from the other groups. In this case we were testing for similarities and differences in the pattern of response to the five factor dimensions and the individual rights item. We used the cluster analysis to test segmentations from 4 to 12 segments.

The results of this analysis suggested that seven segments are adequate for distinguishing meaningful groups with respect to their energy efficiency attitudes. The results of the segmentation analysis are summarized in Table 4. The first row in Table 4 shows the proportion of households in the California sample and the U.S. sample that fall into each segment (the results are fairly similar for California and the U.S.). The remaining rows presents the profile of responses on the energy efficiency attitude items used in the segmentation analysis.

**Table 4. Summary of Segment Attitude Profile**

*(Percent agreeing – 7, 8, 9, 10 – with statement)*

	Segment 1	Segment 2	Segment 3	Segment 4	Segment 5	Segment 6	Segment 7	CA Sample	U.S. Sample
	Well meaning but lack control	I'm too busy and lack control	Supportive but it's my right	Say no to energy efficiency	Economic necessity, but...	Concerned but not committed	Middle		
<b>Proportion of Households in Segment:</b>									
California	20%	8%	16%	5%	5%	15%	30%	--	--
U.S.	17%	14%	16%	5%	5%	9%	35%	--	--
<b>Proportion of Households Agreeing with Item:</b>									
I am not very concerned about the amount of energy used in my home.	17%	71%	17%	54%	14%	9%	17%	21%	28%
The household consumer is such a small part of the whole energy consumption picture that it really doesn't matter how a family uses energy.	9%	64%	5%	43%	12%	7%	9%	15%	17%
My life is too busy to worry about making energy-related improvements in my home.	14%	63%	11%	47%	12%	5%	10%	18%	16%
It is possible to save energy without sacrificing comfort by being energy efficient.	95%	91%	90%	25%	34%	24%	84%	73%	76%

**Table 4. Summary of Segment Attitude Profile***(Percent agreeing – 7, 8, 9, 10 – with statement)*

	Segment 1	Segment 2	Segment 3	Segment 4	Segment 5	Segment 6	Segment 7	CA Sample	U.S. Sample
	Well meaning but lack control	I'm too busy and lack control	Supportive but it's my right	Say no to energy efficiency	Economic necessity, but...	Concerned but not committed	Middle		
Everyone should make a real effort to conserve energy even if they don't have to worry about the cost.	95%	94%	92%	19%	55%	35%	94%	78%	82%
Scarce energy supplies will be a major problem in the future.	79%	74%	48%	31%	73%	23%	71%	56%	59%
Instead of building new power plants, customers should use less electricity.	62%	65%	29%	19%	41%	7%	51%	41%	45%
Conserving energy in my home is an economic necessity.	47%	84%	32%	12%	92%	15%	88%	55%	64%
There is very little I can do to reduce the amount of electricity I am now using.	71%	80%	8%	27%	73%	26%	7%	34%	34%
It is my right to use as much energy as I want, as long as I can pay for it.	2%	73%	60%	72%	65%	4%	3%	24%	28%
It is worth it to me for my household to use less energy in order to help preserve the environment.	86%	83%	72%	21%	66%	35%	85%	70%	71%

The following provides a brief description of each segment:

- ◆ *Segment 1: Well Meaning, but Lack Control.* This segment represents about 20% of California households. This group has a profile that is generally supportive of taking energy-efficiency actions, but they stand out as believing there is little they can do to personally reduce their energy use.
- ◆ *Segment 2: I'm Too Busy and Lack Control.* This segment represents about 14% of U.S. households, but only 8% of California households. This group strongly believes that they are too busy and they are too small a part of the problem. They also strongly hold the belief that there is little they can do to reduce electricity they are currently using.
- ◆ *Segment 3: Supportive, but It's My Right.* This segment is about 16% of both California and U.S. households. This group, like group 1, has many beliefs that are supportive of energy efficiency behavior, but they have a very strong sense that it is their right to use as much energy as they want.
- ◆ *Segment 4: Say No to Energy Efficiency.* This segment represents 5% of the population. This group has the strongest set beliefs that do not favor energy efficiency actions. It is too strong to say that they are anti-energy efficiency, but they agree they are too busy, disagree that they should save, do not believe supplies are scarce, do not feel that saving energy is an economic necessity, and strongly believe it is their right to use as much energy they want.
- ◆ *Segment 5: Economic Necessity, But....* This segment also represents 5% of the population. This group most strongly agrees that saving energy is an economic necessity, but they also strongly hold several beliefs that act against energy efficiency actions. These include: disagreeing that everyone should make an effort to save energy, believing that it is their right to use as much energy as they want, and believing there is little they can do to reduce their electricity use.
- ◆ *Segment 6: Concerned but Not Committed.* This segment represents 15% of California households, but only 9% of U.S. households. This group expresses a concern about energy use in their homes, but they do not believe supplies are scarce, they don't think people should feel obligated to save energy, and they do not see energy efficiency as an economic necessity.
- ◆ *Segment 7: The Middle.* This segment is 30% of California households and 35% of the U.S. households. This is the largest segment and represents the group whose response pattern is near the average on most items. They demonstrate that the status quo, if there is one, leans toward the following: I'm not too busy, I should save, scarce supplies are a concern, it is not my right to use as much as I want, I could do more, and it is an economic necessity.

The results of the segmentation analysis point to the difficult communication problems that must be overcome to successfully transform the many patterns of beliefs about energy efficiency. But this is only half the problem. The other half is how to change behavior. This is a more complicated problem because of the many different potential influences on behavior. As suggested in the next

section, broad patterns of beliefs like energy efficiency attitudes may not be particularly predictive of any one specific action. Many other types of beliefs, besides energy efficiency concerns, will enter into the decision to take a specific efficiency action. These could include:

- ◆ other product attributes like brand or features,
- ◆ financial concerns such as price,
- ◆ service delivery issues such as when the product can be delivered, and
- ◆ the influence of other decision-makers like other members of the household.

## **Linking Energy Efficiency Attitudes with Awareness and Intentions**

As part of this analysis, we also examined how these energy efficiency attitude segments vary in terms of consumer awareness and willingness to take energy efficiency actions. Table 5 summarizes awareness and willingness to purchase for the behavioral scenarios related to each measure. Overall, the results show that there is some consistent variation in awareness and willingness to purchase, but that the differences among segments are not generally substantial.

In terms of aided awareness, the results show that Segment 5, “Economic Necessity, But...” is consistently the least likely to be aware of all five measures. This is the group that views energy efficiency measures as an economic necessity, but also has a lower conservation ethic and believes it is their right to use as much energy as they want. Segment 3, “Supportive, But It’s My Right,” is consistently among the highest in awareness, suggesting this group attends more closely to ways to improve efficiency. The other segments tend to be less consistent and nearer to the average awareness of all customers. Segment 1, “Well Meaning, But Lack Control,” and Segment 6, “Concerned but Not Committed,” tend to be a little higher on most measures. Clearly these results suggest that there is some filtering of awareness of these measures depending on overall attitudes, but in general they show that awareness of these five energy efficient measures has seeped into all of the attitude segments.

In terms of intentions to buy high efficiency equipment, the story is also mixed but a bit more dramatic. Segment 4, “Say No to Energy Efficiency,” clearly has the lowest intentions to purchase among all the segments, and this fits well with expectations given their strong attitudes that do not favor conservation actions. Their scores are consistently and significantly lower than the average. Segment 1, “Well Meaning, But Lack Control,” on the other hand is generally high in their intentions to take efficiency actions across the five scenarios. The remaining segments show mixed results varying by the measure.

Taken together, the results show that general attitudes are related to awareness and intentions to purchase specific measures, but that this relationship is not particularly strong. This suggests that market transformation programs designed to reinforce a broad array of messages concerning the value of energy efficiency are alone unlikely to generate substantial action. These efforts must be married to specific messages on the benefits of these actions and directed to the specific audiences being targeted by specific programs.

**Table 5. Summary of Awareness and Intentions by Attitude Segment**

	Segment 1	Segment 2	Segment 3	Segment 4	Segment 5	Segment 6	Segment 7	CA Sample	U.S. Sample
	Well meaning but lack control	I'm too busy and lack control	Supportive but it's my right	Say no to energy efficiency	Economic necessity, but...	Concerned but not committed	Middle		
<b>Aided Awareness</b>									
High Efficiency Central Air Conditioner	43%	42%	47%	51%	39%	42%	45%	41%	51%
High Efficiency Windows	61%	59%	59%	58%	57%	61%	58%	59%	59%
High Efficiency Refrigerator	59%	61%	62%	57%	47%	59%	59%	61%	56%
High Efficiency Clothes Washer	41%	37%	43%	38%	32%	40%	45%	41%	42%
High Efficiency Lighting Fixtures	72%	60%	62%	67%	52%	65%	66%	65%	66%
<b>Intentions to Buy</b>									
High Efficiency Central Air Conditioner	73%	63%	67%	65%	63%	65%	66%	66%	69%
High Efficiency Windows	72%	60%	72%	30%	57%	57%	57%	57%	66%
High Efficiency Refrigerator	80%	49%	67%	57%	80%	66%	81%	75%	68%
High Efficiency Clothes Washer	73%	61%	59%	27%	42%	53%	68%	63%	59%
High Efficiency Lighting Fixtures	45%	45%	49%	20%	71%	47%	41%	41%	54%

*Notes: Aided awareness refers to the percent of respondents who indicated (after being aided by a product description) they were aware of the high efficiency product. Intentions to buy shown as the percent of respondents who reported they were "very likely" to purchase high efficiency product (using four-point scale, where 1 is "very likely" and 4 is "very unlikely").*

## Conclusions

This research has answered some very important questions regarding the general structure of attitudes toward energy efficiency and the relationships of these attitudes to awareness and intentions to take action.

First, energy efficiency is not a “top of mind” concern that will automatically be considered by consumers in most product selection decisions. However, energy efficiency holds considerable importance for most consumers as an individual or societal goal to be pursued. This suggests that a positive foundation exists upon which to grow public support for energy efficiency initiatives.

Second, energy efficiency attitudes are multi-dimensional – consumers do not generally hold one set of beliefs or attitudes that operates as a single “energy conservation ethic.” For market transformation programs, this means that communications designed to change these general beliefs will face a patchwork market in which many different philosophies about energy efficiency exist and the fact that there are many reasons for both attending to energy efficiency and ignoring it.

In addition, consumers can be grouped into several distinct segments with respect to their energy efficiency attitudes. These segments vary in terms of size and favorability toward energy efficiency objectives – including a small but distinctive “Say No to Energy Efficiency” segment. Again, these results point to the communication challenges that must be considered to successfully transform the many patterns of beliefs about energy efficiency.

Finally, energy efficiency attitudes are related to awareness and intentions to purchase specific measures, but this relationship is not particularly strong. This suggests that market transformation programs focusing on specific attitudes and beliefs for specific measures may have a more significant impact on behavior. As a result, overall broad-based communications strategies will be most effective if they are coordinated with specific messages targeted to specific attitudes that facilitate taking energy efficiency actions.