CONSUMER RESPONSE TO LIFE CYCLE COST AND VARIOUS MANDATED APPLIANCE ENERGY LABEL FORMATS: A FIELD EXPERIMENT

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The views presented in this paper are those of the authors and do not necessarily reflect the views or positions of the Department of C.C.A.

PREFACE

This work was carried out with the financial support of Consumer and Corporate Affairs (CCA) Canada. It represents an extension of an earlier project designed to evaluate the potential of life cycle costing as a form of consumer information. The earlier work is contained in the authors report, Life Cycle Costing: An Annotated Bibliography and Evaluation of Its Potential as a New Form of Consumer Information, submitted to CCA in March, 1980.

The authors wish to acknowledge the encouragement and guidance of Dr. Geoffrey Hiscocks, Mr. Lee McCabe and Mr. Carman Cullen of CCA's Consumer Research and Evaluation Branch. Also, Dr. Dennis McNeill of the University of Denver deserves special mention for his major contribution to the design, implementation and analysis of the experimental study described in this report.

EXECUTIVE SUMMARY

A field experiment was set up to examine the relative impact (on consumers' appliance purchase decisions) of mandated energy label formats and formats incorporating the concept of life cycle costs. Five different label formats were tested on refrigerator-freezer and air conditioner buyers. One format contained kilowatt hour information (the unit of disclosure used on Canada's ENERGUIDE labels for refrigerators and freezers). The second and third formats were those used by the U.S. for refrigerators ($ per year) and air conditioners (an index number). The final two labels contained different expressions of the product's life cycle cost (a single total lifetime cost figure versus figures for costs of each component of the model's lifetime cost).

The most favourable consumer responses (across a variety of attitudinal measures and a choice measure) were associated with the life cycle cost component disclosure format. The $/year format ranked second in effectiveness. The index and total life cycle cost formats were quite ineffective. The kilowatt hour disclosure format, however, was by far the least effective of all the appliance energy labels tested.

These results imply that the current format for Canada's refrigerator and freezer ENERGUIDE labels should be revised. The objectives of the program are more likely to be achieved if one of the following actions is taken to revise present label formats:

(1) A matrix of cost data is added

(2) Dollar costs (per year) are used to replace kilowatt hours (per month) as the unit of disclosure

(3) Both the above alterations are made

(4) The format of the U.S. refrigerator-freezer label is adopted.

In addition, efforts to educate appliance buyers on the concept of life cycle cost (via supportive literature, training of appliance sales people, for example) would help achieve the objectives of the ENERGUIDE program. Despite the practical barriers to changing the status quo, some of the above mentioned steps should be seriously considered. Maintaining the status quo appears to be inadvisable based on the results of the present research study.

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1. INTRODUCTION

This report describes the results of an experiment designed to measure the relative impact on consumer appliance decisions of various energy label formats. The major focus is a comparison of life cycle cost (LCC) formats and recent mandated energy label formats that have appeared in Canada (1978) and the U.S. (1980).

Part 1 describes the LCC concept, the policy setting for LCC information and the initial evidence on consumer use of energy information in various "purchase" settings. Part 2 describes the method and results of an innovative experiment designed to provide policy makers with information on the relative effectiveness of alternative energy label formats. Part 3 outlines the implications of the results for managers of Canada's ENERGUIDE energy labeling program for major appliances.

1.1 The Concept of Life Cycle Cost (LCC)

LCC is a relatively new concept used to measure the major cost elements associated with the lifetime of a physical product.[1] The basic dimensions of LCC are product cost and product life. Various definitions of LCC have been offered depending on the nature of the product. In simple form LCC is the sum of all (discounted present value) dollars expended in the acquisition, operation, servicing and disposal of a product over its lifetime. The costs, therefore, are considered to go beyond simple initial acquisition; LCC is a multi-dimensional view of product costs.

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1 Product is used in the broad sense. It includes any capital investment or asset item, for example, buildings, equipment or systems, consumer durables, etc.

The potential of LCC as a conservation tool rests in its ability to facilitate trade-offs among product cost components, especially purchase price and energy costs of operation. Product purchases based on the unidimensional view of cost = purchase price (thus, based on the criterion of minimizing price) might not result in the lowest energy cost choice. In fact the lifetime energy cost of operation for a product chosen using this simple criterion might far exceed that of a higher priced unchosen alternative. Often it turns out that the lowest price option is not the most economical.

Thus, a purchase decision based on the LCC view of product costs might not only result in a reduction in units of energy consumption (and a saving of a nations energy resources), but might also result in a financial gain to the buyer. The LCC view of product costs also facilitates trade-offs between initial price and non-energy cost components. As with the price energy cost trade-off, the buyer is often rewarded for taking a multidimensional view of product cost.

1.2 The Policy Setting for LCC Information

A number of programs in recent years have focused on one or more of the components of LCC. Unit pricing in the U.S. was an attempt by the government to provide the consumer with consistent and uniform price information across a variety of products. In the energy area, the most important programs have been the U.S. Voluntary Labeling Program for Household Appliances and Equipment to Effect Energy Conservation, the U.S. Energy Policy and Conservation Act (EPCA) and Canada's ENERGUIDE program.

There appear to be at least five basic objectives underlying public policies involving energy information. LCC appears to have some potential for meeting each objective.

The first objective is to encourage consumers to utilize energy information by providing the data in a uniform and understandable manner. For example, EPCA is concerned with annual cost provision for most appliances and index numbers for those related to temperature modification, while ENERGUIDE presents energy costs in monthly kilowatt hours. In all three cases, the consumer is faced with the task of comparing "total" price to energy costs presented in a non-comparable form. How does the consumer decide whether a higher price is justified by fewer kilowatt hours used or by a lower index number or by a fractional (annual) energy cost figure? The LCC concept may provide some relief for the potential consumer problem since the information is presented in a uniform manner (i.e., dollars) and on the same level of measurement (i.e., total price and total energy cost).

A second objective is to educate the consumer about the signifi-

cance of operating costs. With LCC, since energy is presented as a total cost, the highest level of aggregation is used. This may increase the probability that the consumer will recognize the significance of energy in the decision process as differences between models will be magnified along the energy cost dimension (e.g., the difference between $10/year and $15/year is likely to be perceived as less than the difference between $100 and $150, the figures which result from aggregating energy cost over product life—say, 10 years).

A third objective is closely related to the second--to improve comparative shopping on the energy dimension. In order for the consumer to utilize energy in comparative shopping, he must recognize the importance of energy as an attribute. For the consumer, importance is usually a function of two factors: (1) the magnitude of the costs and (2) perception of significant differences between products/brands on the attribute. Both dimensions are highlighted in an LCC framework.

A fourth objective is to encourage energy efficient product design and competition among producers by providing consumers with information concerning product energy use. There are several alternative strategies for accomplishing this objective. One is to mandate the labels (e.g., EPCA, ENERGUIDE). This, however, does not guarantee increased competition. A second option is to set minimum efficiency standards to which products must be manufactured. It is unlikely that either of the above options will produce maximum effects. What is needed to complement these strategies is the motivation at the consumer level. Standards represent an efficiency tactic aimed at the industry. If implemented, they may achieve a

result that is inconsistent with other policy objectives. Manufacturers may move to the same minimum standard, thus producing no differences across models and minimizing the use of energy in the decision process. Consumer information presented in the right format can enhance competition by focusing on energy. Increased concern with energy by the consumer will act as a cue to retailers and manufacturers that energy has become a salient attribute. This process provides the manufacturer with a new competitive dimension, fosters a move toward more energy information, and may result in more efficient appliances being made. In fact, there is evidence that Canadian appliance manufacturers are taking steps to produce more energy efficient refrigerator-freezers, at least partially in response to Canada's new ENERGUIDE program (Anderson and Claxton, 1979).

While not mentioned specifically, it might be assumed that a fifth goal such as improving the consumer's perception of what constitutes product cost and encouraging favorable trade-offs between energy and price are also viable objectives. Product cost being equated with more than price is likely to be accomplished with the LCC framework. The dependence and interactions among the cost components are more clearly defined with an LCC framework thus theoretically making trade-offs between objective dimensions more likely.

For example, it is known that better insulation will result in reduced energy consumption for a refrigerator. The M.I.T. Report (1975) gives an example of how this trade-off may occur. If the value of energy is three cents per kilowatt hour, the cost of insulation is $7, and there is a 2 to 1 markup at the point of sale, the increased insulation will cause a $14 increase in price. However,

the reduction in heat leakage will reduce kilowatt hours from 1840 to 1402. Savings in electricity will be $13.14 a year based on $0.03/kilowatt hour.[2] If the savings are discounted at 6% for 10 years, there will be a $99.10 energy savings. The net gain is $85.10; and therefore, the extra insulation material is economically justified. These costs will already be provided to the consumer by the LCC construct, so that the trade-offs can easily be made. Of course, whatever decision is made will, in the final analysis, also depend on individual and situation specific factors.

One other policy issue should be mentioned. Before deciding which type of energy information to use, the policymaker should decide whether he is interested in promoting lowest LCC or lowest energy cost. Unfortunately, these are not always compatible. Consequently, he must know under which product classes differences are likely to occur and how large the differences will be. Then he will be able to determine the appropriate course of action for the program.

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[2]Savings will vary by area and year depending on utility rate structures.

1.3 Initial Evidence on Consumer Use of LCC

Though only one consumer study has dealt specifically with the consumer's response to LCC in a durable goods purchase decision there are other studies relevant to the topic of consumer use of energy information. Several studies have been carried out on energy labeling, an area of interest since labels are a likely place for LCC information to be provided should it prove to be better than alternative information. Also several more general studies have investigated the importance consumers attach to energy in purchase decisions. In summary, it has been found that:

(a) energy is not a salient attribute in purchase decisions, at least for appliances (Anderson, 1977; Contemporary Research Centre, 1977; Denham et al., 1977);

(b) appliance consumers show an unwillingness to trade off convenience for energy efficiency, (Anderson, 1977);

(c) appliance consumers show a lack of knowledge regarding energy (Contemporary Research Centre, 1977);

(d) with regard to Canada's ENERGUIDE program, labels appear to impact only the small size-low price segment of the appliance market (Claxton and Anderson, 1980), and

(e) label information can have a positive impact on pre-behavioral consumer measures but are not likely to impact appliance choice after only brief exposure (McNeill and Wilkie, 1979),

(f) appliance consumers don't naturally use discounting (or payback) but they should if energy efficient choices are to be made. Consumers tend to trade down in purchase price when they know the yearly energy cost of appliance operation - this may be a poor trade-off from the point of view of total lifetime costs (Redinger and Staelin, 1980).

Clearly, therfore, consumer use of energy information will not be universal and the use of energy labels may not have the intended effects. The latter is hinted at in the Redinger and Staelin (1980) study where knowledge of energy costs (provided by energy labels) resulted in trade-offs to lower purchase prices. It appears as if consumers become scared on learning the magnitude of energy operating costs and resort to a lower initial price choice to compensate. Unfortunately, this trade-off may be an expensive one since, from a lifetime cost point of view, the lower priced alternative may be an uneconomical choice. The LCC format of providing product cost information may help consumers avoid uneconomical choices. With LCC, all cost components can be presented in dollar units in the same time frame.

The only reported test of the impact of objective LCC information on attitudinal and behavioral dimensions of consumer decision making is a study conducted by Hutton (1977). His results (reported in Hutton, 1977 and Hutton and Wilkie 1980) provide a preliminary assessment of the potential of LCC information. The study involved consumers in a simulated purchasing task for refrigerator-freezers.

Hutton's findings support those of McNeill and Wilkie in that the strongest results in the LCC study occurred in early levels of consumer response (e.g., attitudes, knowledge) as opposed to <u>choice</u>. In addition, it is apparent from Hutton's work that consumer knowledge of energy cost data is lacking. Consumers consistently underestimated energy costs related to price. This supports other studies showing that consumers, when discriminating between brands and when evaluating a single brand, do not consider energy an important dimen-

sion for choice.

Hutton found, however, that the presentation of LCC information did improve perceptions of the importance of energy cost. It appeared that consumers will use the LCC information with positive results when it is provided to them. But, while the information is perceived as being helpful, results indicated that LCC does produce some potential dysfunctional consequences in terms of price perceptions; faced with LCC information, consumers recorded a less accurate recall of price. There is also some indication that lower educated consumers have more trouble with the complex LCC format, although even these consumers perform better with the information than without.

Results were somewhat weaker in the areas of attitudes and behavior, although still positive. In the LCC condition, more positive attitudes were recorded in relation to energy saving features while attitudes toward energy using features were less favorable. In terms of behavior, consumers exposed to LCC information appeared more willing to purchase energy saving features, but were not willing to give up the energy consuming convenience features.

Finally, in a simulated purchase condition, consumers were exposed to LCC information purchased appliances that were significanly more energy efficient. This is a promising finding in light of the low impact other energy disclosure formats appear to have had on actual choice behavior.

The results from Hutton's simulated purchase study show some promise for LCC as an information provision at the consumer level. However, it represents only one attempt and was not carried out under

actual market conditions.

In summary, there appears to be a number of complexities to operationalizing an LCC information system for consumer durables. However, it also appears that LCC has potential in this area. First, there is an appealing "fit" betweeen policy objectives and and LCC based consumer information system. Consumer response to existing energy labeling schemes appears to be low and at times contrary to policy objectives. Second, though only a small amount of research attention has been directed at consumer use of LCC, it appears that the LCC format of disclosure may be more effective than present energy label disclosures.

2. AN EXPERIMENTAL ASSESSMENT OF THE RELATIVE IMPACT OF LCC VERSUS MANDATED ENERGY LABEL FORMATS ON CONSUMER APPLIANCE PURCHASE DECISIONS

2.1 Introduction

The basic objective of this experiment was to extend the accumulated knowledge of LCC as it relates to consumer decision making and energy labeling. Specifically, the study was designed to increase the information available to policymakers in the following areas:

- Label information
- Energy cost information
- Consumer response to LCC
- Consumer decision processes
- Relative efficiency of energy label formats

It is easily seen from the accumulated studies relating to LCC that there is a lack of knowledge about consumer response to energy information, in general, and to LCC and other disclosure formats in particular. In spite of this, both the U.S. and Canada have recently mandated programs that provide energy labels to consumers for a variety of major durables. Canada's labels contain kilowatt hours per month and the U.S. labels contain dollar energy cost per year or an efficiency rating. It is not at all clear, however, what cost information and/or format of presentation will be the most effective in eliciting the desired changes in consumer decision making behavior. In fact, there is at least some evidence (Hutton and Wilkie, 1980) that LCC information may be a better form of information.

The lack of specific information on consumer response to energy

information and format types is an important gap for policymakers to fill for several reasons. The most obvious reason is that the more effective the label in motivating consumers to choose energy efficient products, the greater the ultimate savings in energy. Another significant reason is to help improve future policy decisions; without data on the relative effectiveness of different types of information and a diagnostic evaluation of alternative formats, erroneous conclusions about energy labeling could be reached. For example, a disappointing response to current label formats could lead to a decision that labels per se are an ineffective conservation strategy while, in fact, poor formatting or poor methods of disclosure may underlie the lack of effectiveness. Consequently, this experiment was designed to examine consumer response to a variety of energy information formats. Consumer responses were analyzed across several response levels -- awareness and knowledge, attitudes, preferences, and choice.

2.2 Study Design

The basic design for the experiment was as follows:

		Energy Label Formats (treatment conditions)				
		Dollars/ Year	Kilowatt Hours/year	Index	LCC Aggregate	LCC Components
Product	Air Conditioners	n=20	20	20	20	20
	Refrigerator -Freezers	20	20	20	20	20

Two product classes were used--room air conditioners and refrigerator-freezers. The two types were chosen for several reasons. The first was the fact that U.S. label disclosures vary depending on the product class. For most products, an average dollars/year energy cost information format will be used. However, for those products related to climate control--space heating or cooling--an index number will be used. In the U.S., air conditioners will have an index number and refrigerator-freezers a dollar cost. Second, it is likely that the consumer decision process for these two types of products will differ. Consumers shopping for air conditioners may be more energy conscious since this product type is more easily associated with energy consumption. Additionally, the consumer has more control over climate control product use in the home. Refrigerator-freezers, on the other hand, are not normally associated with energy use and, since they are continually "plugged in", their energy use is less subject to consumer control.

Five types of energy information were chosen for study, with all five information types presented on 5 1/2 x 7 1/2 inch yellow and

black labels with the same basic structure. (Table 1 and Table 2 on the next two pages contains examples of each label type for refrigerator-freezers and for air conditioners). These standardized labels were used so that any consumer response could be attributed to the treatment information. The basic label structure was the one designed for the U.S. labeling program since Canada's ENERGUIDE program had not, as yet, included air conditioners. The basic label form contained several pieces of cost information: (1) an average dollar cost per year; (2) a range of energy costs for like models complete with an indication of where the particular model falls in that range; and (3) a matrix designed to assist the consumer in more closely calculating his/her specific costs.

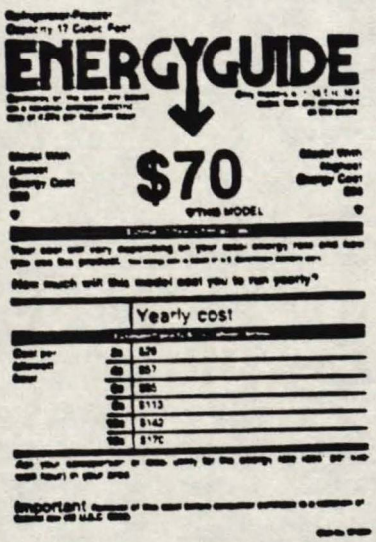
The five types of energy information tested were:

- Average dollars per year (i.e., the disclosure as per U.S. refrigerator-freezer labels)
- Average kilowatt hours per year (approximating Canada's ENERGUIDE label)
- Index (i.e., the disclosure as per U.S. air conditioner labels)
- Life cycle cost aggregated (i.e., an alternative to the above mandated formats)
- Life cycle cost broken down by components (i.e., an alternative to the above mandated formats)

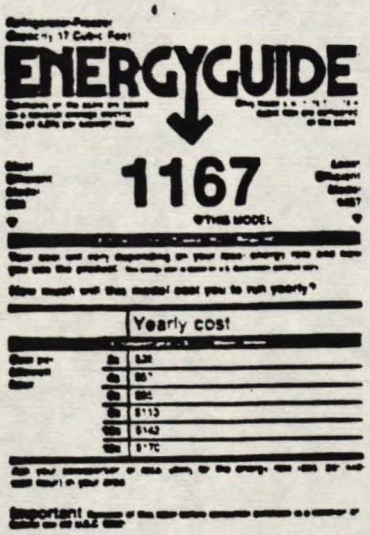
TABLE 1

SAMPLE REFRIGERATOR-FREEZER ENERGY LABEL FORMATS USED FOR EACH EXPERIMENTAL CONDITION

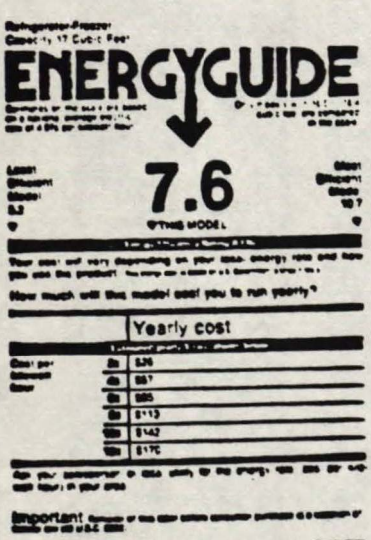
$/YEAR



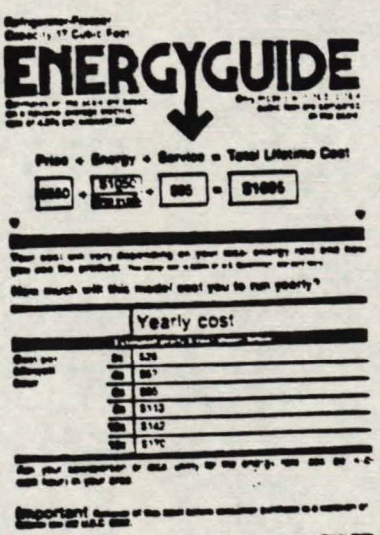
KWH/YEAR



INDEX



TOTAL LCC



LCC COMPONENTS

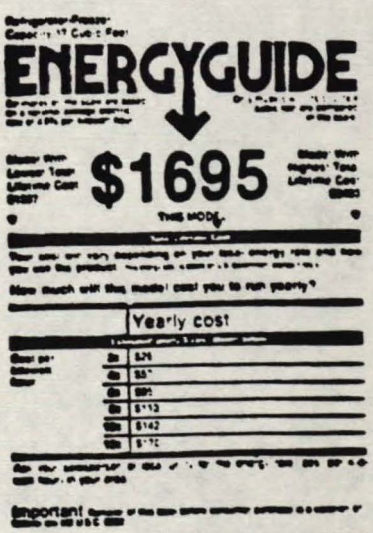
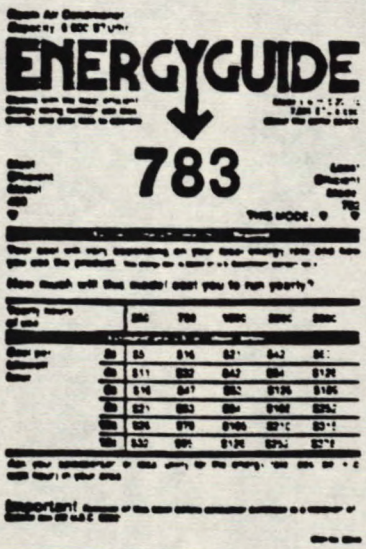


TABLE 2

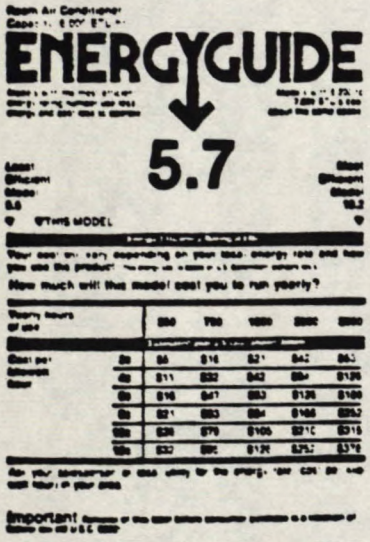
SAMPLE AIR CONDITIONER ENERGY LABEL FORMATS USED FOR EACH EXPERIMENTAL CONDITION

$/YEAR

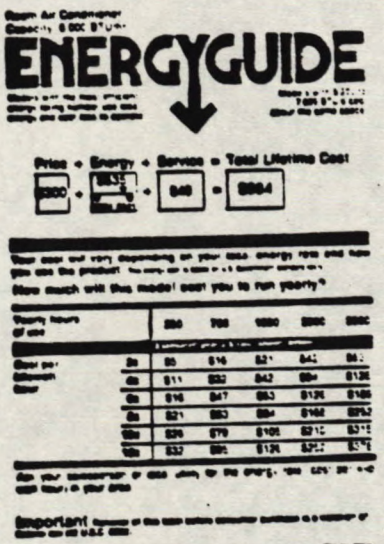
KWH/YEAR



INDEX



TOTAL LCC



LCC COMPONENTS

Table 3 presents the product information on the models used in the experiment. (The models were provided courtesy of Montgomery Ward). The information, while similar to actual product information, was manipulated slightly to achieve the desired amount of variability in price and energy use. Note that the most efficient model for both refrigerators and air conditioners was Model A. The reader should refer back to Table 3 when reading the results in section 2.4 of this report.

TABLE 3

ENERGY INFORMATION BY LABEL TREATMENT AND PRODUCT CLASS

Label Treatment	Product Class			
	Air Conditioner Models			
	A	B	C	
1. Total LCC	$777	$895	$984	
2. Yearly Energy Cost	$ 25	$ 37	$ 47	
3. Yearly KWH	417	617	783	
4. Index	9.9	7.3	5.7	
5. LCC - Components	$777	$895	$984	
. Price	$400	$350	$300	
. Energy	$338	$500	$635	
. Service	$ 39	$ 45	$ 49	
	Refrigerator-freezer Models			
	A	B	C	D
1. Total LCC	$1394	$1537	$1695	$1761
2. Yearly Energy Cost	$ 51	$ 62	$ 70	$ 82
3. Yearly KWH	850	1033	1167	1367
4. Index	10.5	.6	7.6	6.5
5. LCC-Components	$1394	$1537	$1695	$1761
. Price	$ 545	$ 515	$ 550	$ 425
. Energy	$ 765	$ 930	$1050	$1230
. Service	$ 84	$ 92	$ 95	$ 106

2.3 Field Methodology

The study took place in two shopping malls in Denver, Colorado during May, 1980. The malls were in sections of Denver that were similar in terms of the demographic make-up of shoppers. A standard shopping mall intercept technique was used to recruit subjects. Subjects were women eighteen years of age or older. Each subject was compensated for her participation. The flow of the experiment can be seen in Figure 1. Those subjects who evaluated air conditioners had three models from which to choose. The refrigerator-freezer conditions had four models. Standard verbal instructions were given. Subjects were told the purpose of the study was to gain knowledge about how consumers shop for the particular appliance.

Subjects were told to role play the following shopping situation: they are in the market for a refrigerator-freezer (or air conditioner); the models they are about to evaluate have been recommended to them; and after shopping, they are to take the information gathered back to their spouse and possibly shop at some other stores. The displays were set up to resemble as closely as possible a real shopping environment with all the accompanying product information. The only variance in shopping experience was the label conditions. Only one or two subjects shopped at a time. Total time for shopping and completion of the post-test questionnaire was 45 minutes. Subjects were actually in the shopping task for five to ten minutes. The Appendix contains the written instructions and post-test questionnaire given to each subject. A profile of the subjects that participated in the study is found in Table 4.

FIGURE 1

EXPERIMENTAL FLOW

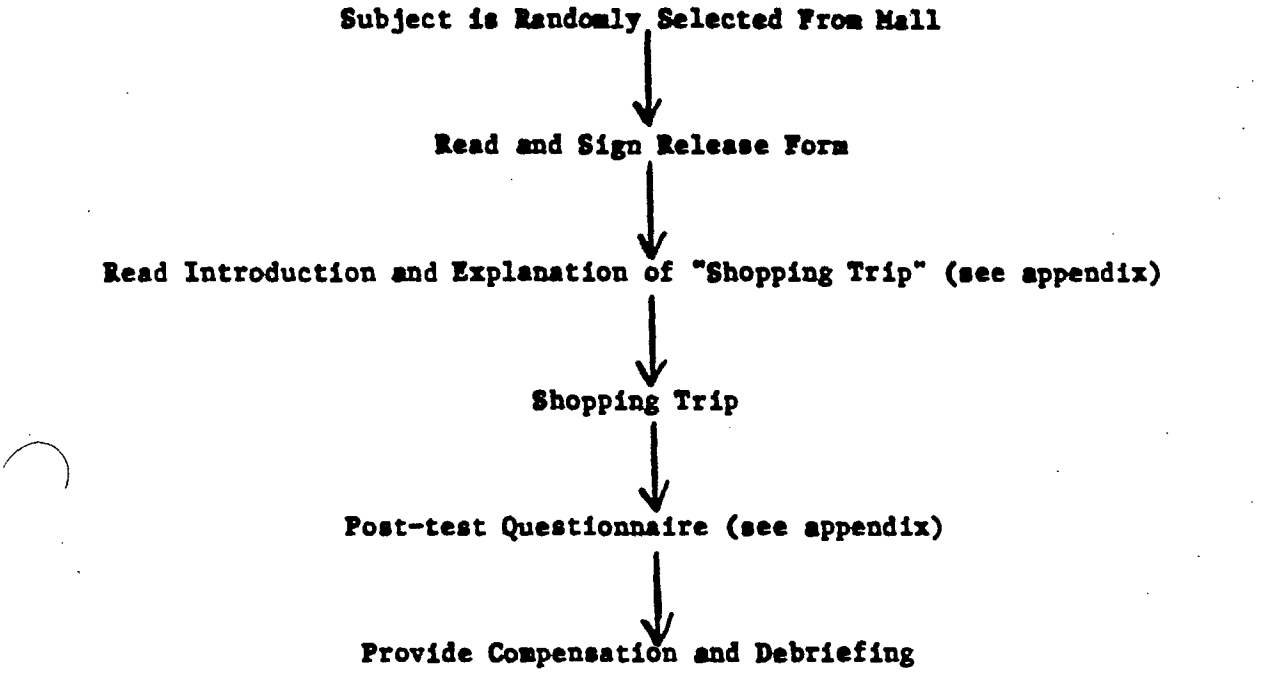


TABLE 4

DEMOGRAPHICS OF SAMPLE: REFRIGERATOR/AIR CONDITIONER

1. Years Since Last Purchase of:

. refrigerator	4.5 years (average)
. air conditioner	8.5 years (average)

2. Estimated Yeare Before Next Purchase:

. refrigerator	7 years (average)
. air conditioner	8 years (average)

3. Age (years):

	18-22	23-28	29-33	34-38	39-44	44-54	55-65	66+
. refrigerator sample (%)	22	33	18	2	4	10	8	3
. air conditioner sample (%)	23	21	16	13	6	10	11	0

4. Education:

. refrigerator sample	13.25 years (average)
. air conditioner sample	12.98 years (average)

5. Income ($):

	$0-4999	$5-9999	$10-14999	$15-19999	$20-24999	$25,000+
. refrigerator sample (%)	6	17	19	14	17	26
. air conditioner sample (%)	6	17	16	17	23	26

6. Occupation:

	Housewife	Mgt.	Sales	Student	Education	Nurse	Secretarial	Other
. refrigerator sample (%)	29	16	3	3	5	4	10	29
. air conditioner sample (%)	40	7	3	5	3	4	8	22

7. Spouse Occupation:

. refrigerator sample (%)	1	32	2	2	2	0	1	10
. air conditioner sample (%)	2	20	7	0	1	0	1	21

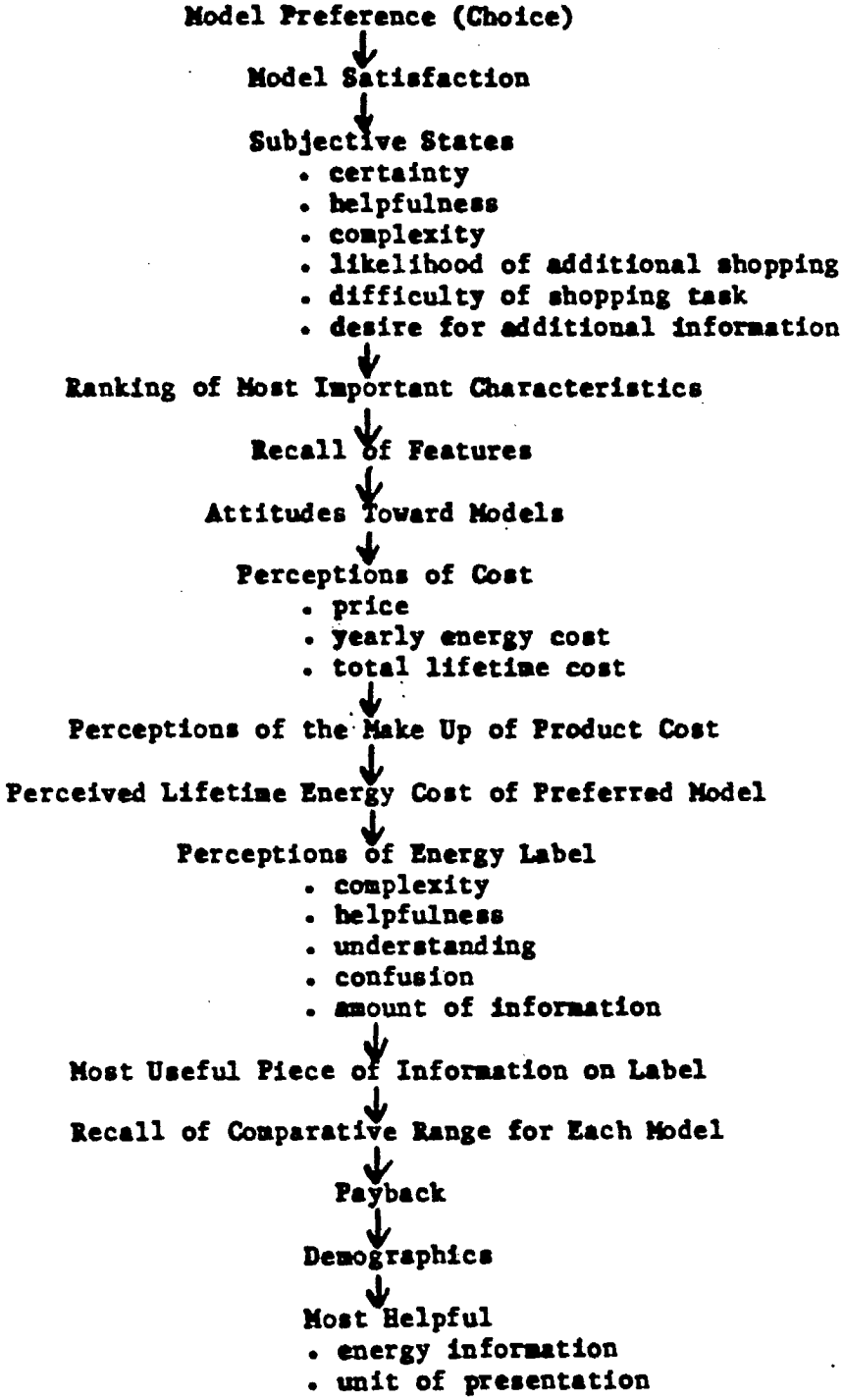
8. Children At Home:

. refrigerator sample (% yes)	43%
. air conditioner sample (% yes)	46%

The post-test questionnaire was designed to elicit several levels of response toward the energy information and format of the label (see the Appendix for sample questionnaires). The order of questions was chosen to minimize bias due to "yea-saying" and to minimize the possibility that the respondent would discover that the purpose of the study was focused on the energy labels, and consequently, the energy data. The flow of the questionnaire can be seen in Figure 2 on the next page.

FIGURE 2

QUESTIONNAIRE FLOW



2.4 Results

The discussion of results will follow the flow of the questionnaire (Figure 2). The focus will be on the impact of the different energy label disclosure formats on both attitudinal and behavioural (choice) aspects of decision making for refrigerator-freezers and air-conditioners.

2.4.1 Impact on Choice

Respondents were asked to rank the models they were exposed to during their shopping trip in terms of the likelihood of them buying each model (1 = most likely choice; 2 = second choice, etc.) Table 5 indicates the number of subjects who chose Model A, the most efficient model, as their first choice or preference.

As indicated, for air conditioners, the number choosing the most efficient model (Model A) was significantly different across the formats; the Total LCC condition produced by far the least number of choices for the most efficient model (7 vs 15 to 18 for the other four formats). For refrigerators, while the dollars per year and KWH per year disclosures yielded slightly lower proportions of preference for the most efficient model, the differences across conditions did not achieve conventional levels of significance.

Two aspects of the results presented in Table 5 are interesting. First, for refrigerators, the number indicating preference for the most efficient model was considerably lower than for air conditioners (35 vs 74). This holds even when adjustments are made for the different number of models available. Second, across the two product

classes, the Total LCC condition, which did not explicitly provide energy data, resulted in by far the fewest (only 15) energy efficient choices. The index and the LCC component disclosures yielded the greatest preference (26 choices each) for the energy efficient models. The yearly formats resulted in intermediate levels of preference for Model A ($/Year = 20; KWH/Year = 22).

TABLE 5

CHOICES OF MOST EFFICIENT MODEL BY DISCLOSURE FORMAT

Product Type	Total Choices of the Most Efficient Model	Label Condition				
		$/Year	KWH/Year	Index	Total LCC	LCC Components
Refrigerator[2]	35/100	5[1]	5	8	8	9
Air Conditioner[3]	74/100	17	15	18	7	17
Total		22	20	26	15	26

1. Table is read: # Choosing most efficient model (ie., Model A) Choosing is defined as indicating Model A as the most preferred (highest ranked) choice.

2. Spearmans rho = -.049, $p < .311$

3. Spearmans rho = -.3312, $p < .001$

2.4.2 Impact on Satisfaction and Subjective States

In previous studies different energy label disclosures have resulted in differences in the satisfaction felt with models of refrigerators (see McNeill and Wilkie 1979; Hutton and Wilkie, 1980). However, this pattern of finding did not emerge in the present study. Table 6 contains the relevant results. Virtually all of the format effects are insignificant for both product classes and for both types of measures (overall satisfaction with each model and subjective feelings about the shopping experience) when choice is used as the co-variate. It, therefore, appears that the respondents' choice pre-

TABLE 6

IMPACT OF DISCLOSURE FORMATS ON SATISFACTION AND SUBJECTIVE STATES

Dependent Variable	Significance of Covariate: Most Preferred Choice	Significance of Format
	REFRIGERATORS	
Satisfaction - A[1]	$F = 31.43$, $p < .00$	$F = .10$, $p < .98$
Satisfaction - B	$F = .33$, $p < .57$	$F = 1.08$, $p < .37$
Satisfaction - C	$F = 16.27$, $p < .00$	$F = .44$, $p < .78$
Satisfaction - D	$F = 4.90$, $p < .03$	$F = 1.58$, $p < .19$
Subjective States:		
Certainty of best choice	$F = 1.35$, $p < .25$	$F = .69$, $p < .60$
Helpfulness of cost information	$F = .05$, $p < .81$	$F = .37$, $p < .82$
Complexity of cost information	$F = .04$, $p < .83$	$F = .43$, $p < .78$
Likelihood of shopping elsewhere	$F = .08$, $p < .78$	$F = .39$, $p < .82$
Difficulty	$F = .48$, $p < .49$	$F = 1.24$, $p < .29$
Desire for more information	$F = .57$, $p < .46$	$F = .45$, $p < .76$
	AIR CONDITIONERS	
Satisfaction - A	$F = 53.26$, $p < .00$	$F = 2.79$, $p < .03$
Satisfaction - B	$F = 3.73$, $p < .08$	$F = .66$, $p < .62$
Satisfaction - C	$F = 39.79$, $p < .00$	$F = 1.45$, $p < .22$
Subjective States:		
Certainty of best choice	$F = .09$, $p < .77$	$F = .66$, $p < .63$
Helpfulness of cost information	$F = .02$, $p < .89$	$F = 1.35$, $p < .26$
Complexity of cost information	$F = 1.27$, $p < .27$	$F = .51$, $p < .73$
Likelihood of shopping elsewhere	$F = .03$, $p < .85$	$F = 1.65$, $p < .17$
Difficulty	$F = 2.53$, $p < .12$	$F = 1.03$, $p < .39$
Desire for more information	$F = 3.72$, $p < .05$	$F = 3.22$, $p < .01$

1. Refers to satisfaction rating for Model A, the most efficient model.

ference overwhelms the effects of different disclosure formats. Though the methods of disclosure do not appear to influence subjective states, they do appear to have a potential to impact choice as will be discussed below.

2.4.3 Impact on Importance of Product Characteristics

Respondents were asked to indicate which product attributes were most important in their decision. Table 7 illustrates how importance of product characteristics varies by label formats. Similar to the findings for choice of most efficient model (Table 5), there were differences by product class. For air conditioners, energy consumption was perceived to be the most helpful information available followed by price information. However, for refrigerators, data on energy use ranked either second or third behind shelves or size. It is clear, however, that while energy information is perceived as helpful in both conditions, the degree of helpfulness is not, in general, impacted by the manner in which energy information is disclosed.

TABLE 7

IMPORTANCE OF PRODUCT CHARACTERISTICS BY DISCLOSURE FORMAT

Product Characteristics Mentioned as Most Important	Label Condition				
	$/Year	KWH/Year	Index	Total LCC	LCC Components
Refrigerators:					
. shelves	7[1]	4[2]	5	6	7
. energy use	4	4	4	4	2
Air Conditioners:					
. price	7	4	3	6	4
. energy use	7	6	8	9	9

1. Table is read: # mentioning characteristic as most important.

2. Most mentions were for size (n=6)

2.4.4 Impact on Perceptions of Price, Energy Use and Total Lifetime Cost

Respondents were asked to recall the price and energy use figures and to estimate the total lifetime costs for the appliances they were exposed to in their shopping condition. The variations in these measures by label format are depicted in Table 8. The numbers in the table are those giving accurate information (i.e., the correct range of values as compared to exact values) on the different models. As could be expected from the fact that price data was not communicated on the labels, there were no significant differences in the perceptions of model price by disclosure format. However, interesting variations occured in the accuracy of the yearly energy cost and the total lifetime cost. In general, the subjects do not appear to be able to transform the energy data from the form presented on the label to some other measure. For example, by far the largest number of accurate perceptions about yearly energy cost occured in the condition with annual cost label information. Similarly, when the subjects were asked perceptions about total lifetime cost, the highest degree of accuracy occured in the LCC component disclosure condition. An implication of these findings is that the consumers ability to make trade-offs between energy and other product characteristics (eg. price) will likely be limited by the type of disclosure on the label.

Of particular relevance to Canada's ENERGUIDE program, the KWH/year disclosure does not seem to result in accurate perceptions of either yearly or lifetime costs. This may explain the limited impact of these label disclosures on consumer choice. An interesting

TABLE 8

ACCURACY[1] OF PERCEPTIONS OF PRODUCT PRICE, ENERGY USE AND TOTAL LIFETIME COST BY DISCLOSURE FORMAT

Product and Characteristic	Label Condition				
	$/Year	KWH/Year	Index	Total LCC	LCC Components
Refrigerator - Price:[2]					
Model A	8	12	13	13	14
Model B	12	10	7	7	9
Model C	5	6	12	7	3
Model D	8	9	8	12	10
Total	33	37	40	39	36
Air Conditioner - Price:					
Model A	15	15	15	9	15
Model B	14	9	13	14	14
Model C	15	12	11	9	14
Total	44	36	39	32	43
Refrigerator - Yearly Energy Cost:					
Model A	8	0	7	2	0
Model B	4	2	3	2	1
Model C	8	3	4	2	1
Model D	7	1	2	0	2
Total	27	6	16	6	7
Air Conditioner - Yearly Energy Cost:					
Model A	8	2	0	3	0
Model B	7	2	2	6	1
Model C	8	1	1	2	2
Total	23	5	3	12	3
Refrigerator - Total Lifetime Cost (15 years):					
Model A	4	4	5	3	6
Model B	2	2	3	3	2
Model C	2	3	3	2	6
Model D	4	1	4	2	4
Total	12	10	15	10	18
Air Conditioner - Total Lifetime Cost (15 years):					
Model A	2	3	4	2	8
Model B	2	2	6	1	9
Model C	0	1	0	2	4
Total	4	6	10	5	21

1. Accuracy means an answer that indicated the correct range of values for a given model attribute not the exact value.

2. Table is read: # of respondents who gave accurate information about the particular characteristic of a model.

additional observation (not recorded in Table 8) was that where inaccurate estimates were given, they tended to be overestimates of energy use.

2.4.5 Impact on Perceptions of Components of the Cost of a Product

Respondents were asked to indicate which cost component (electricity, price or maintenance cost) would cost more over the life of the product. These perceptions are presented in Table 9. Generally, the findings show that consumers know the importance of the energy component to overall product cost. This was not found in an earlier study (Hutton and Wilkie, 1980).

Specifically, as indicated in Table 9, the majority of respondents in every cell of the experimental design reported (realistically) that electricity costs would be the greatest cost component over the lifetime of the product. Only in three label conditions did any sizeable number of respondents indicate that initial purchase price would be the largest cost component over the life of the product. (These perceptions are realistic in that, as shown in Table 3, the price component of the most energy efficient models approximate the lifetime energy costs of these models). In order, the label formats in which this perception occured were total LCC, LCC components and index. The fact that the LCC labels produced the greatest awareness that price could be higher than lifetime energy costs implies that these labels facilitated price-energy cost trade-offs, a trade-off that is consistent with policy objectives.

TABLE 9

PERCEPTION OF PRODUCT COST COMPONENTS BY DISCLOSURE FORMAT

Question: Which cost more over the life of the product?	Label Condition				
	$/Year	KWH/Year	Index	Total LCC	LCC Components
Refrigerator:					
electricity cost	16[1]	14	10	12	12
price	3	4	7	6	6
maintenance cost	0	1	1	1	1
	19	19	18	19	19
Air Conditioner:					
electricity cost	18	16	16	10	15
price	2	3	3	10	5
maintenance cost	0	1	0	0	0
	20	20	19	20	20
Combined:[2]					
electricity cost	34	30	26	22	27
price	5	7	10	16	11
maintenance cost	0	2	1	1	1
	39	39	37	39	39

1. To be interpreted as 16 respondents in this condition answered that the electricity cost component would cost the most over the products' life. The most meaningful comparisons are among the three numbers in a particular format - product class cell.

2. chi square = 11.93, $p < .15$

2.4.6 Impact on Perceptions of Lifetime Energy Use of Most Preferred Model

Respondents were asked to recall (exactly) the lifetime energy costs of the model they chose (i.e., ranked first). They were also asked to indicate how sure they were about the accuracy of their recollection. The relevant results are presented in Table 10. There were no differences in correct recall between product types. However, there was a difference, though not large, across disclosure formats in the accuracy of perceptions of the most preferred models' lifetime energy use. The explicit cost disclosures--$/year--and LCC components--produced the highest accuracy counts, followed by KWH/year and total LCC. The index disclosure format was a distant last.

In terms of the measure for surety of estimate of lifetime energy cost, there were significant differences across conditions for refrigerators but not for air conditioners. An additional and interesting finding was that, regardless of under or overestimating these costs, both subject groups were equally sure that they were right. Clearly, then, there is a need to increase the accuracy of consumer perceptions of product energy use.

2.4.7 Impact on Comparative Judgements of Products' Energy Use

Respondents were asked to judge the energy use attribute of the various models on a seven point scale (1=good; 7=bad). The findings of particular interest, the manner in which respondents judgement of models' energy costs varied by disclosure format, are presented in

TABLE 10

CORRECT ESTIMATES[1] OF PREFERRED MODELS' LIFETIME ENERGY USE BY DISCLOSURE FORMAT

		Label Condition				
Product	Total	$/Year	KWH/Year	Index	Total LCC	LCC Components
		# Correct Estimates				
Refrigerator	17/95	6	3	2	2	4
Air Conditioner	16/96	3	4	0	4	5
	Total	9	7	2	6	9
		Average Scores (1=Very Unsure, 7=Very Sure)				
Surety of Energy Use						
Refrigerator[2]		3.95	2.95	2.55	4.26	3.45
Air Condititoner[3]		3.2	3.7	4.00	3.9	4.05

1. Correct answers are (1) for refrigerators: Model A = $765; Model B = $930; Model C = $1050; Model D = $1230; (2) for air conditioners: Model A = $338; Model B = $500; Model C = $635.

2. $F = 3.16$, $p < .02$

3. $F = .85$, $p < .49$

Table 11. As indicated, the method of disclosing energy use data did provide some differences in comparative judgements on this attribute of product performance. The LCC components most consistently produced differences in the perceptions of comparative product performance. Both $/year and index formats also produced clear differences between the best and worst models but not to the degree of the LCC-components disclosure. Both the KWH/year and the Total LCC conditions did not produce these differences consistently.

2.4.8 Impact on Perceptions of Price-Energy Cost Tradeoffs

An direct attempt was made to measure respondent perceptions of relationships between initial purchase price and energy costs of operation. Respondents were asked whether they felt a price difference between the most and least energy efficient products ($120 price difference for refrigerators; $100 price difference for air conditioners) would be recovered by energy savings over the life of the product and, if so, in how many years. The results are presented in Table 12.

As indicated in Table 12, it is evident that most (65 to 95%) consumers believe the higher priced model will recover the price difference via savings in energy costs of operation. Though not statistically significant, there are slightly higher agreement scores in the index and total LCC conditions.

There is no apparent systematic format effect on estimates of how many years it would take for savings in energy operating costs to compensate for the difference in initial price. Estimates range from approximately 3 1/2 years (average) to 7 years (average) depending on

TABLE 11

COMPARATIVE JUDGEMENTS[1] OF MODELS' ENERGY USE BY DISCLOSURE FORMAT

	Label Condition				
Product/Model	$/Year	KWH/Year	Index	Total LCC	LCC Components
Refrigerators:					
Model A	4.15	4.15	4.90	4.70	4.40
Model B	4.70	4.75	5.50	5.00	4.95
Model C	4.70	5.35	5.35	5.50	4.90
Model D	5.40	4.65	6.40	5.15	5.70
Difference between most and least efficient (Model D - Model A)	1.25	.50	1.50	.45	1.30
Air Conditioners:					
Model A	4.50	3.85	4.95	4.55	2.95
Model B	5.40	5.30	5.30	4.45	5.10
Model C	4.55	6.25	5.95	4.74	6.40
Difference between most and least efficient (Model C - Model A)	1.00	2.40	1.00	.19	3.45
Combined:					
Sum of differences between most and least efficient models	2.25	2.90	2.50	.64	4.75

1. Judgement about models' energy use were recorded on a seven point good-bad scale which was subsequently coded 1=good, 7=bad.

TABLE 12

PERCEPTIONS OF PRICE-ENERGY COST TRADE-OFFS BY DISCLOSURE FORMAT

Question	Label Condition				
	$/Year	KWH/Year	Index	Total LCC	LCC Components
Will a higher price pay off in energy savings?					
. refrigerator	15/20[1]	13/19	16/20	19/20	15/20
. air conditioner	13/20[1]	18/20	19/20	17/20	14/20
Total	28/40	31/39	35/40	36/40	29/40
How long will it take to make up price difference through energy cost savings?					
. refrigerator	3.55[2]	3.90	4.30	3.45	3.20
. air conditioner	2.56[2]	3.05	2.85	3.16	3.30
Total	6.01	6.95	7.35	6.61	6.50

1. Figures in these rows read: # yes/sample size

2. Figures in these rows are average code values where the scale is coded: 1 = 0-1 years, 2 = 2-3 years, 3 = 4-5 years, 4 = 6-7 years, 5 = 8-9 years, 6 = 9 or more years, 7 = never.

the product and label condition. The shortest payback estimates for refrigerators occured with the LCC component label while, for air conditioners, the shortest payback was associated with the $/year format.

2.4.9 Impact on Attitudes Toward the Label Itself

Since the five label formats differed in amount and type of information, it is reasonable to expect variations in respondent attitudes toward the labels themselves. Five attitudinal dimensions were measured: complexity, helpfulness, understanding, clarity and adequacy of information. The results are presented in Table 13 for each format condition and product type. (Note that with the exception of the adequacy of information measure, the larger the number the more positive the perception of the label format).

There are several interesting variations in respondent perceptions of the labels. For refrigerators, the LCC components format was rated highest in simplicity and ease of understanding while $/year and total LCC formats received the poorest ratings on these attitudinal dimensions. For air conditioners, there were no significant differences in perceptions of label simplicity but the understanding rating was highest for $/year and LCC components formats and lowest for the KWH/year format.

For both products there were significant differences in perceptions of labels in terms of adequacy of information. Since, for this measure, a score of 1 would indicate "way too much information" and a score of 7 would signify "way too little information", a score of 4 ("neither too much nor too little information") can be taken as the

TABLE 13

ATTITUDES TOWARD LABEL BY DISCLOSURE FORMAT

Attitudinal Dimension[1]	Label Condition					Statistics	
	$/Year	KWH/Year	Index	Total LCC	LCC Components	F	P
Refrigerators:							
Simplicity	3.7	4.20	4.25	3.45	4.40	2.40	.05
Helpfulness	4.83	5.10	4.88	4.35	5.25	1.25	.29
Understanding	4.05	4.65	4.62	4.05	5.05	2.17	.07
Clarity	4.29	4.7	4.67	4.25	4.95	1.13	.35
Adequacy of Information	3.83	4.3	4.58	3.80	4.3	2.48	.05
Air Conditioners:							
Simplicity	4.1	3.42	3.84	3.89	3.9	.75	.56
Helpfulness	4.6	4.63	4.52	4.84	4.7	.14	.96
Understanding	4.65	3.36	4.36	4.26	4.65	2.83	.03
Clarity	4.55	3.79	4.32	4.36	4.50	.84	.50
Adequacy of Information	4.10	3.73	4.21	3.79	4.5	2.23	.07

1. Attitudinal responses were measured on 7 point likert scales. The scales employed were anchored and coded as follows:

   - simplicity: 1 = very complex, 7 = very simple
   - helpfulness: 1 = very unhelpful, 7 = very helpful
   - understanding: 1 = very hard, 7 = very easy
   - clarity: 1 = very confusing, 7 = very clear
   - adequacy of information: 1 = way too much, 4 = neither too much nor too little, 7 = way too little.

   With the exception of the last scale, a higher score reflects positively on the label format.

most favourable reflection on the label format. On this basis (and using average scores for each cell of the experimental design) $/year was rated most favourable (closest to a score of 4) for both products. Also, for both products the index and LCC component formats appeared to have slightly inadequate amounts of information while the total LCC format was slightly excessive on this dimension. The KWH/year format for refrigerators was viewed as slightly deficient in information while it was viewed as slightly excessive by the air conditioner sub-sample.

The following data tabulation summarizes the significant differences from Table 13.

LABEL FORMAT

	$/Yr	KWH/Yr	Index	Total LCC	LCC Components	Notation
REFRIGERATORS						
Simplicity	4	3	2	5	1	(rank of 1 is most favourable)
Understanding	4.5	2	3	4.5	1	"
Adequacy of Information	+.17	-.30	-.58	+.20	-.30	(deviations from scale rating of 4: "neither too much nor too little information")
AIR CONDITIONERS						
Understanding	1.5	5	3	4	1.5	(as for refrigerators)
Adequacy of Information	-.10	+.27	-.21	+.21	-.50	(as for refrigerators)

It is clear from this summarization that respondents reacted more favourably to labels that were perceived to be slightly inadequate in amounts of information than to ones that were viewed as slightly excessive in information. That is, both simplicity and understanding rankings are best for labels that were perceived to have slightly too little information.

On basis of this further analysis, the LCC components label appears to be the superior format for energy consumption disclosure for refrigerators and to be equally as superior as $/year for air conditioners. The total LCC and KWH/year formats appears to be quite inferior methods for both products.

2.4.10 Impact on Perceptions of Most Useful Portion of the Label

Respondents were asked to indicate which piece of information on a given label (energy use number, comparative range, or matrix) was most useful in helping them make a choice. Results are presented in Table 14. Several interesting results occured. Overall, the raw energy use (ie., the number at the top of the label) was the least valued of the three pieces of information. It received only 57 mentions compared to 64 for the comparative range (the bar with the range of costs) and 70 for the matrix of cost data (the numbers that permitted calculation of "your own" energy costs). Though this difference is significant at only the .25 level there appears to be a preference for details on energy costs beyond the raw unit of consumption disclosure. There were, however, some reversals to the overall trend. For example, for the $/year format, the comparative range was by far the least preferred piece of information and the raw

energy use number was slightly more preferred than the matrix of cost data. However, the marked lack of preference for the raw energy use number in the kwh/year and total LCC format conditions resulted in an overall (combined) score which indicated this component of the label was least preferred.

Another interesting observation is that the most preferred piece of label data tended to depend on the product. For refrigerators, there was a slight tendency (P .50) for respondents to indicate that the raw energy use number was the most preferred label component (at 40 mentions). This was followed by the matrix of cost data (at 30 mentions) and the comparative range (at 26 mentions). For air conditioners, the preference order was reversed (40 mentions for the matrix compared to 38 and 17 for the comparative range and raw energy use number, respectively). This difference was significant at the .10 level. Perhaps the cost of energy is more salient in the case of air conditioner purchases since the duration, hence cost of the products use, is directly controllable by the consumer. In contrast, a refrigerator is plugged in year round and its energy use is much less controllable by the consumer. This would appear to explain the increased desire for further details on energy costs (even personalized data) on the part of air conditioner respondents.

Several interesting variations in label component preference occured across disclosure formats within each product type. For example, the kwh/year label for refrigerators produced the fewest preferences for the raw energy use label component. This is in contrast to the general trend for refrigerator respondents. For air conditioners the LCC component label yielded the fewest number of preferences for

TABLE 14

PERCEPTIONS OF MOST USEFUL PORTION OF THE ENERGY LABEL BY DISCLOSURE FORMAT

	Label Condition					
Product/Piece of Information	$/Year	KWH/Year	Index	Total LCC	LCC Components	Total
Refrigerators:[3]						
Energy Use[2]	10[1]	5	8	10	7	40
Comparative[2] Range	3	6	8	3	6	26
Matrix[2]	7	7	3	7	6	30
Total	20	18	19	20	19	96
Air Conditioner:[4]						
Energy Use	7	3	3	2	2	17
Comparative Range	3	7	7	8	13	38
Matrix	8	9	9	9	5	40
Total	18	19	19	19	20	95
Combined:[5]						
Energy Use	17	8	11	12	9	57
Comparative Range	6	13	15	11	19	64
Matrix	15	16	12	16	11	70
Total	38	37	38	39	39	191

1. Reads: Number of subjects in subsample for this cell who felt this piece of label information most useful.

2. Energy use = "the large black number at the top"; comparative range = "the bar with the range of costs"; matrix = "the numbers that allowed you to figure your own energy cost".

3. Chi square = 8.78, $p < .50$

4. Chi square = 13.28, $p < .10$

5. Chi square = 10.49, $p < .25$

the matrix of cost data. This was in contrast to the overall results for air conditioner respondents.

2.4.11 Impact on Desired Type and Format of Disclosure

As final measures of respondent views on appliance energy labels, the following two questions were posed:

> ... which of the following kinds of energy information would you find most helpful when comparing _____ (product)?
>
> ... which of the following ways would you rather have the energy information presented to you?

The response categories and results by label condition are given in Table 15 on the next page.

As indicated, for both products, there was an overwhelming stated preference for yearly dollar cost consumption data. This strong pattern was present regardless of the experimental label condition to which respondents were exposed. This finding is somewhat inconsistent with attitudinal responses reported in Table 13 where, for example, the $/year disclosure format (at least for refrigerators) elicited less favourable ratings for understanding than other formats (eg. LCC components). Perhaps it is unwise to place too much emphasis on what consumers say they want; what is the most preferred method of disclosure may not be the most efficient or effective. On the other hand, the strong preferences indicated for $ cost information in Table 15 is consistent with the general findings reported in Table 14 where respondents preferred the matrix of cost data component of the labels.

TABLE 15

DESIRED TYPE AND METHOD OF PRESENTING PRODUCT ENERGY CONSUMPTION BY DISCLOSURE FORMAT

Product/ Desire	Label Condition					
	$/Year	KWH/Year	Index	Total LCC	LCC Components	Total
Refrigerators:						
(Kind of Information)						
. cost per year	14[1]	13	13	12	9	61
. total lifetime cost	2	1	3	4	3	13
. energy efficiency ratio	2	3	3	1	6	15
. none of these would be helpful	1	0	1	3	0	5
(Method of Presentation)						
. dollars	15	11	14	16	11	67
. kilowatt hours	2	2	1	2	2	9
. energy efficiency ratio	0	3	4	2	5	14
Air Conditioners:						
(Kind of Information)						
. cost per year	9	10	12	13	12	56
. total lifetime cost	5	4	1	3	2	15
. energy efficiency ratio	4	5	2	4	5	20
. none of these would be helpful	0	0	2	0	1	3
(Method of Presentation)						
. dollars	16	15	15	14	16	76
. kilowatt hours	0	2	3	1	1	7
. energy efficiency ratio	3	3	0	4	3	13

1. Reads: Number in cell who indicated this kind of (or method of presenting) energy information would be most helpful (or preferable).

2.5 Discussion

The previous section provided results on consumer response to various LCC and mandated energy label formats. Since the findings were quite detailed and involved many dependent measures it is useful to review the highlights. This is accomplished in Table 16 where the author has summarized the relative performance of each label format for each major aspect of consumer decision making measured in the study. The relative performance of each label disclosure is subjectively rated as good, fair or poor based on the relative magnitude of the data for a particular response measure and disclosure format found in the detailed tables presented in the results section of this report. At the bottom of Table 16 the total number of good, fair or poor ratings for each label format is tabulated.

These subjective summary evaluations permit conclusions to be drawn about the overall effectiveness of each of the five label formats tested in this experimental study. The following general conclusions can be drawn from Table 16:

(1) The KWH/Year label is the least effective disclosure format. It produced zero "good" ratings, four "fair" ratings and six "poor" ratings.

(2) The LCC components label is the most effective disclosure format. It yielded eight "good" ratings, one "fair" rating and two "poor" ratings.

(3) The $/Year label is the second most effective disclosure format. It's ratings were four "good", four "fair" and two "poor".

(4) The index and total LCC labels were quite ineffective; each received only two "good" ratings.

Two response measures are not summarized in Table 16. The two measures are:

TABLE 16

SUBJECTIVE[1] SUMMARY EVALUATION OF IMPACTS OF ALTERNATIVE ENERGY LABEL FORMATS

Measure of Label Impact	Description of the relative performance of the label formats: $/Year	KWH/Year	Index	Total LCC	LCC Components
1. # Choosing most efficient model (refer to Table 5)	fair	fair	good	poor	good
2. Satisfaction and subjective states (refer to Table 6)	(no significant format effects when controlling for most preferred model choice)				
3. Importance attached to energy use (refer to Table 7)	(no significant format effects)				
4. Ability to recall the correct range for various models':					
. price	(no significant format effects)				
. yearly energy cost	good	poor	fair	poor	poor
. total lifetime cost (refer to Table 8)	poor	poor	fair	poor	good
5. Perception of largest component of product cost over lifetime (refer to Table 9)	(for all formats energy is viewed as largest lifetime cost component, but LCC formats appear to facilitate realistic price--energy cost trade-offs hence are rated good)			good	good
6. Ability to recall exact value for chosen model's energy use (refer to Table 10)	good	fair	poor	fair	good
7. Rating of various models' energy use (refer to Table 11)	fair	fair	fair	poor	good
8. (a) Ability to make price-energy cost trade-offs (refer to Table 12)	(some interesting trends)		good	good	
(b) Length of payback period (refer to Table 12)	(some interesting trends) good	poor	poor	fair	fair

TABLE 16, continued

9. Attitudes toward label itself:					
. simplicity	poor	fair	fair	poor	good
. understanding	fair	poor	fair	poor	good
. adequacy of information	good	poor	fair	fair	poor
. overall trend (based on observation that labels slightly deficient in information are most favourably received)	fair	poor	fair	poor	good
10. Performance across all measures:					
. # good ratings	4	0	2	2	8
. # fair ratings	4	4	7	3	1
. # poor ratings	2	6	2	7	2

1. These summary evaluations of label format performance are based on the author's subjective judgements about the relative degree of positive impact indicated by the response measures across both product types (refrigerators and air conditioners) associated with the various label formats.

(1) Perceptions of the most useful portion of the label (results were tabulated in Table 14).

(2) Stated preferences for the kind and format of energy information (results were tabulated in Table 15).

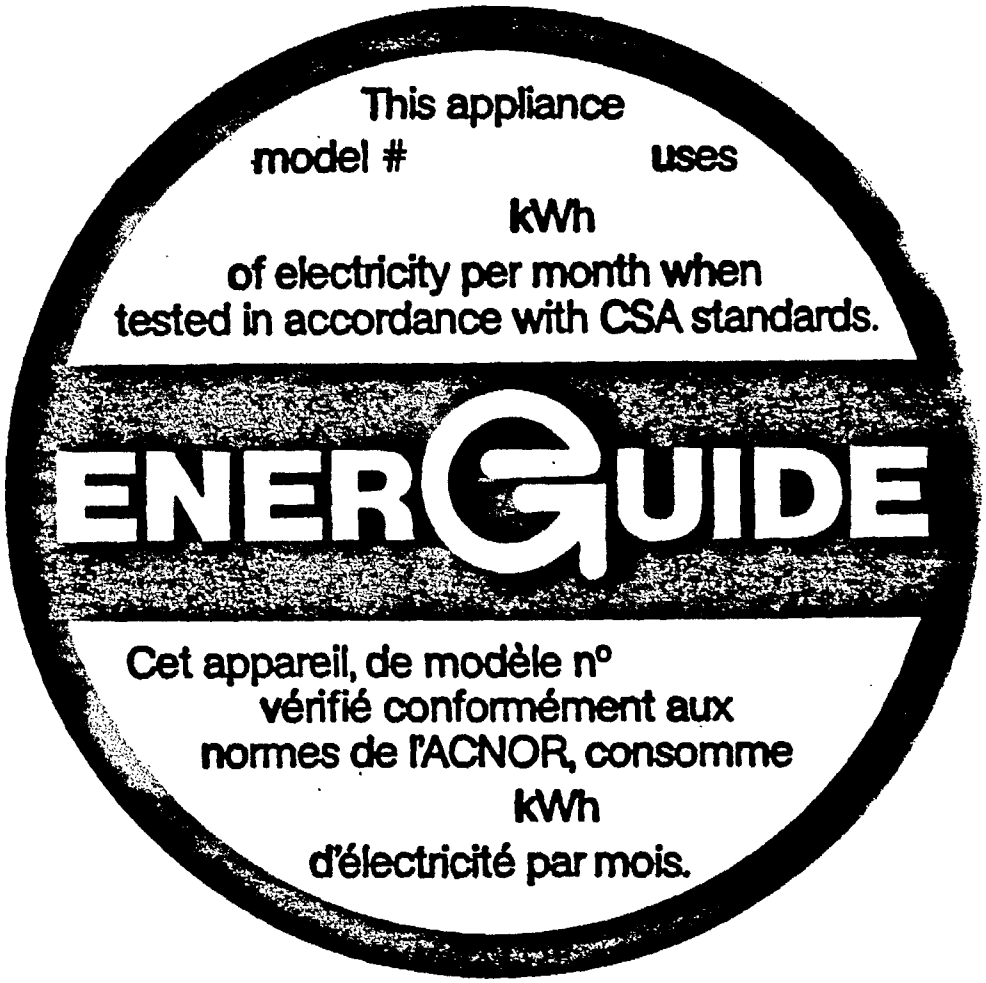
It is not easy to judge whether a particular score (response) on these measures is good, fair or poor. (Hence, they were not included in Table 16).

Considering both the summary results of Table 16 and the responses to the two additional measures in Tables 14 and 15, it is clear that there are some deficiencies in Canada's mandated energy label format, ENERGUIDE. ENERGUIDE labels (see Figure 3) contains only a "raw" energy consumption number (kwh/month). These labels have no comparative range (e.g., a bar indicating this models' energy consumption relative to that of similar models) and no matrix of cost data (e.g., a table of annual dollar energy costs for various utility rates in the case of refrigerators and utility rates and annual hours of usage in the case of air conditioners). The results of this study which suggest the Canadian label is deficient are the following:

- The kwh/year label produced by far the poorest impact of the five disclosure formats tested.
- Consumers value the raw energy number the least overall (ie., for the two products combined).
- The kwh/year label tested in the experiment had the lowest overall preference for the raw kwh/year units of energy consumption (printed at its top) compared to the raw disclosure units used on this portion of the four other test labels.
- Consumers prefer more detailed data on appliance energy use than the simple raw unit of energy disclosure (in particular, they appear to want comparative information on the energy use of similar models and details on the dollar costs of energy use for various end-use situations).
- When asked, consumers overwhelmingly say they want cost per year information expressed in dollars. (Note that Canada's ENERGUIDE label has no mention of dollar costs per year or

FIGURE 3

CANADA'S ENERGUIDE LABEL FOR REFRIGERATORS AND FREEZERS



otherwise).

The mandated U.S. label for refrigerators appears much superior to Canada's ENERGUIDE label in light of the above discussion. The U.S. label contains annual dollar energy cost information, a range of such costs for similar competing models and a matrix to indicate variations in these costs at various utility rates, all of which were more favorably received than simple kilowatt hour data by subjects in this study. In fact, according to results in the summary Table 16 and Tables 14 and 15, the $/year label disclosure was one of the two most effective label disclosures of the five disclosure formats tested. Therefore, in comparison to the current mandated refrigerator-freezer label in Canada, the more "dollar-cost-information-detailed" label mandated in the U.S. is superior in generating positive impact on consumer purchase decisions for this appliance.

The results of this study also suggest there are some superior formats for appliance energy consumption disclosures to those currently mandated in Canada and the U.S. In particular, the life cycle cost label which contained cost components (in contrast to a single LCC aggregate figure) appeared to be the most effective disclosure format across the variety of impact measures employed in the study. This label was particularly effective in producing the following impacts on consumer appliance choice, all of which are desirable from the policy point of view (as discussed in section 1.2 of this report):

- choice of the most energy efficient model
- accurate conception of energy costs and total lifetime costs
- realistic price - energy cost trade-offs

- positive attitudes towards the label itself (e.g., simple and easy to understand)

Study results also suggest there were several deficiencies in the LCC components disclosure format. For example, it was associated with poor recall of yearly energy costs; it was rated as slightly inadequate in information; and, it produced slightly more pessimistic payback expectations than some of the other label formats. On balance, however, the LCC components disclosure appeared superior to currently mandated labels.

3. IMPLICATIONS FOR REVISIONS TO CANADA'S ENERGUIDE LABELING PROGRAM

The results of the present study strongly suggest that the current format for ENERGUIDE labels could be improved. Formats similar to those used on like appliances in the U.S. or a new information form (components of the life cycle costs of the model) appear to produce superior impacts on consumer appliance decisions.

There are, however, several practical barriers to changing the current ENERGUIDE format. First, the appliance industry executives and, perhaps, even the involved government officials, are weary from the protracted battles over the initial label format and its costs vs. benefits. They are, therefore, likely to be resistant to the re-negotiating the issues. Second there is a possibility for consumer dissatisfaction as any revised labels are introduced. Not all manufactured and/or retailer display models could be re-labeled at the same time. Thus, both old and new labels would be present in the marketplace for the changeover period which could last a year or more. Consumers might face comparing one model with kwh/month data to one with, for example, annual cost data. In this situation, comparative shopping on the basis of energy consumption might prove very difficult.

A third practical barrier is the increased difficulty of generating and/or updating energy consumption disclosures that are expressed in non-electrical units, for example, dollars. The beauty of kwh units is their accuracy over time. In contrast, any dollar energy consumption disclosure is subject to becoming inaccurate as energy prices change, which they do over time and from region to region. The life cycle cost component disclosure has the most severe disad-

vantages in this regard as it requires data on model price and service costs, both of which could vary daily, and could be very expensive and time consuming to generate on a model by model basis.

Despite these barriers, ENERGUIDE program managers should not be content with the status quo. Based on the findings of this study and the practical difficulties discussed above, the following action possibilities are listed:

(1) Addition of a matrix of cost data to the present ENERGUIDE labels for refrigerators and freezers. The matrix should contain a range of electricity rates (cost per kilowatt hour) and the associated monthly or yearly dollar cost in a similar fashion to the presently mandated U.S. label for refrigerator-freezers. The possibility of including a column of 10 or 15 year energy costs should also be considered. Consumers react much more favorably to dollar cost (matrix) details than they do to simple units of electricity as the method of disclosing appliance energy consumption. These additions would require a slightly larger label or one with smaller typeface, but the labels would not have to be changed for changes in the electrical utility rates.

(2) Substitution of dollar cost data for kilowatt hours. The results of this study strongly suggest that if a single energy consumption value is to appear on the label it should be dollar cost (annual costs). The dollar cost could be based on the national average electric rate (as for the U.S. labeling scheme). The changeover to dollar costs would not require changes in label size or typeface. However, the accuracy of the information would be affected by changes in utility prices.

(3) Both (1) and (2).

(4) Adoption of the U.S. label format. This would entail a complete reformating of the present ENERGUIDE labels for refrigerators and freezers.

At present, though the disclosure format which features life cycle (price, energy and service) cost components appears to produce very positive consumer response, it is not suggested as a feasible format alternative for Canada's ENERGUIDE labeling scheme. In the short term, there appears to be no easy or inexpensive way of genera-

ting or collecting relevant price and service cost data and reflecting these on the labels on a timely basis. This is not to say that ENERGUIDE program managers should not attempt to educate consumers on the concept of a life cycle costing approach to appliance decisions. Indeed, the concept and its methodology should be communicated to consumers directly via printed booklets and point of sale materials and, indirectly, via training and educational materials directed at retail sales people.

It could be argued that communications support materials, such as those currently used to explain and promote ENERGUIDE labels, are sufficient to achieve the advantages that would be brought about by the format changes listed in items (1), (2), (3) and (4) above. This might be the case if, indeed, consumers are armed with and use the supportive dollar cost data when comparing models' kilowatt hour consumption values at the point of sale. It is unlikely that any significant proportion of appliance shoppers are willing or able to perform in this manner. The major advantage of the format changes outlined in (1) to (4) above is that those consumers who do consult the label will receive information on dollar energy costs, a component of disclosure that the present research has demonstrated to be vastly superior to a raw kilowatt hour figure.

The objective of Canada's ENERGUIDE program is to alter consumer appliance choices in the direction of choosing more energy efficient models. There is clear evidence that this objective is more likely to be achieved if the label format is revised to disclose some information on the dollar energy costs associated with applaince use.

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APPENDIX

Sample Post-Purchase Questionnaires Used in This Study

REFRIGERATOR-FREEZER POST-TEST QUESTIONNAIRE

INTRODUCTION

We would like you to pretend that your refrigerator-freezer is about to wear out. You have already talked with friends and they have recently read a very credible technical report that endorses Ward's refrigerator-freezer line. You have decided to include them in the models under consideration.

Within the Ward's line of refrigerator-freezers, you have narrowed your choice to 4 models.

Since this is your initial visit to the store, you will likely be shopping at other stores to compare different brands. Please conduct this shopping trip as if you can do additional shopping later.

Your task is to evaluate the four available models as if you were going to buy a refrigerator-freezer, and the final decision will be made in the near future, perhaps after you confide with your spouse.

After your shopping trip we will ask you a series of questions about these models. In these questions the models will be referred to by the letters taped on front (A, B, C, D). These letters are for classification purposes and are used only to help you remember the models better.

Now that you have had a chance to shop for your refrigerator-freezer, we would like to know how you feel about each model. Please rank each of the four models you saw in terms of how likely it is you would buy the model (1 = most likely, 2 = second choice, 3 = third choice, 4 = least likely).

	MODEL	RANK
2	A	____
1	B	____
3	C	____
4	D	____

Now think of each model in terms of how satisfactory it is to you in meeting the needs of your family. How satisfactory is each model in relation to the other models? Please rate each of the four models by placing an "x" underneath the adjective that best describes your feelings.

MODEL	VERY SATIS-FACTORY	SATIS-FACTORY	SOMEWHAT SATIS-FACTORY	NEITHER SATISFACTORY NOR UNSATIS-FACTORY	SOMEWHAT UNSATIS-FACTORY	UNSATIS-FACTORY	VERY UNSATIS-FACTORY
A	____ +3 7	____ +2 6	____ +1 5	____ 0 4	____ -1 3	____ -2 2	____ -3 1
B	____ +3	____ +2	____ +1	____ 0	____ -1	____ -2	____ -3
C	____ +3	____ +2	____ +1	____ 0	____ -1	____ -2	____ -3
D	____ +3	____ +2	____ +1	____ 0	____ -1	____ -2	____ -3

Below are a series of questions related to the shopping trip you just completed. Please indicate your feelings by checking one of the seven spaces below each question.

1. Based on your evaluation of these four models, how sure are you that you made the best choice among the models in order to meet your family's needs and budget?

Very Uncertain	Uncertain	Somewhat Uncertain	Neither Certain nor Uncertain	Somewhat Certain	Certain	Very Certain
1						7

2. How helpful did you find the cost information in deciding on the model you preferred most?

Very Unhelpful	Unhelpful	Somewhat Unhelpful	Neither Helpful nor Unhelpful	Somewhat Helpful	Helpful	Very Helpful
1						7

3. How complex did you find the cost information for each of the models?

Very Complex	Complex	Somewhat Complex	Neither Complex nor Simple	Somewhat Simple	Simple	Very Simple
1						7

4. How likely is it you would want or need to shop at other stores before deciding on your refrigerator-freezer?

Very Unlikely	Unlikely	Somewhat Unlikely	Neither Likely nor Unlikely	Somewhat Likely	Likely	Very Likely
1						7

5. How difficult was it to shop among these four models of refrigerator-freezers?

Very Difficult	Difficult	Somewhat Difficult	Neither Difficult nor Easy	Somewhat Easy	Easy	Very Easy
1						7

6. How likely is it you would desire more information about these models?

Very Unlikely	Unlikely	Somewhat Unlikely	Neither Likely nor Unlikely	Somewhat Likely	Likely	Very Likely
1						7

While you were shopping among the four models, what were the four (4) characteristics that you felt were the most important in helping you arrive at your decision? Please list each factor to the right of the ranking.

20. Most important _____

21. Second most important _____

22. Third most important _____

23. Fourth most important _____

Even though you have just seen the models for the first time, we are interested in what you remember about them. Since we did not ask you to specifically remember any particular information, do not feel bad if you cannot recall exactly. We are still interested in your ideas, so please give us your best estimate in every case.

For this first set of features, please indicate whether a model had the feature included by circling YES if it was included or NO if it was not included under the model.

FEATURE		MODEL									
		A		B		C		D			
Automatic Ice Maker	24	Yes	No	29	Yes	No	31	Yes	No	33	Yes	No
Glass Shelves	25	Yes	No	30	Yes	No	32	Yes	No	34	Yes	No
Frost Free	26	Yes	No	31	Yes	No	33	Yes	No	35	Yes	No
Deluxe Insulation	27	Yes	No	32	Yes	No	34	Yes	No	36	Yes	No
Vegetable Bin	28	Yes	No	33	Yes	No	35	Yes	No	37	Yes	No

Now that you have given us some information about each model, we would like to know a little more about how you feel regarding the specific characteristics of each model.

Please indicate your feelings by checking one of the seven (7) numbered spaces below each alternative. For example, if you feel the purchase price for Model A is very good, place a check (✓) above +3. If you feel it is very bad, you would place your check (✓) above -3. If you feel it is good, mark +2, or if it's bad, mark -2. If it is only somewhat good, mark above the +1 or somewhat bad, mark above -1. If you feel it is neither good or bad, place your check (✓) above 0.

MODEL A

In my opinion:

The purchase price is:

44

Good							Bad
7	6	5	4	3	2	1	
+3	+2	+1	0	-1	-2	-3	

The energy use is:

45

Good							Bad
7						1	
+3	+2	+1	0	-1	-2	-3	

The features are:

46

Good							Bad
7						1	
+3	+2	+1	0	-1	-2	-3	

The warranty is:

47

Good							Bad
7						1	
+3	+2	+1	0	-1	-2	-3	

MODEL B

In my opinion:

The purchase price is:

48

Good							Bad
7						1	
+3	+2	+1	0	-1	-2	-3	

The energy use is:

49

Good							Bad
7						1	
+3	+2	+1	0	-1	-2	-3	

The features are:

50

Good							Bad
7						1	
+3	+2	+1	0	-1	-2	-3	

The warranty is:

51

Good							Bad
7						1	
+3	+2	+1	0	-1	-2	-3	

MODEL C

In my opinion:

The purchase price is:

52 Good 7 / +3 ___ +2 ___ +1 ___ 0 ___ -1 ___ -2 1 / -3 Bad

The energy use is:

53 Good 7 / +3 ___ +2 ___ +1 ___ 0 ___ -1 ___ -2 1 / -3 Bad

The features are:

54 Good 7 / +3 ___ +2 ___ +1 ___ 0 ___ -1 ___ -2 1 / -3 Bad

The warranty is:

55 Good 7 / +3 ___ +2 ___ +1 ___ 0 ___ -1 ___ -2 1 / -3 Bad

MODEL D

In my opinion:

The purchase price is:

56 Good 7 / +3 ___ +2 ___ +1 ___ 0 ___ -1 ___ -2 1 / -3 Bad

The energy use is:

57 Good 7 / +3 ___ +2 ___ +1 ___ 0 ___ -1 ___ -2 1 / -3 Bad

The features are:

58 Good 7 / +3 ___ +2 ___ +1 ___ 0 ___ -1 ___ -2 1 / -3 Bad

The warranty is:

59 Good 7 / +3 ___ +2 ___ +1 ___ 0 ___ -1 ___ -2 1 / -3 Bad

The next three features may have any one of a number of values. Please indicate the appropriate value for each model (A, B, C, and D) by placing the letter of the model above the range of values you feel most closely represents that model. For example, if you feel the price of model A was $450, place an 'A' above the range $351 - $450. If B's price was $290, you would place a 'B' above the $251 - $350 range, and so on.

	1	2	3	4	5	6	7
Price	$150-$250	$251-$350	$351-$450	$451-$550	$551-$650	$651-$750	$751 or higher
Yearly Energy Cost	$10-$20	$21-$30	$31-$40	$41-$50	$51-$60	$61-$70	$71 or higher

Another way to think about the cost of an appliance is in terms of all the dollars spent to buy and run the appliance over its useful life. Assuming an average lifespan of 15 years, a refrigerator-freezer's total lifetime cost would include price, lifetime energy cost, and lifetime maintenance cost. What would you guess the total lifetime cost of each model (A, B, C, D) to be?

	1	2	3	4	5	6	7
Total Lifetime Cost to Operate	$1100-1200	$1201-1300	$1301-1400	$1401-1500	$1501-1600	$1601-1700	$1701 or higher

NEW CARD

I would like you now to consider just the energy label.

1. Did you feel that, in general, the label was:

1	2	3	4	5	6	7
Very Complex	Complex	Somewhat Complex	Neither Complex nor Simple	Somewhat Simple	Simple	Very Simple
1						7
Very Unhelpful	Unhelpful	Somewhat Unhelpful	Neither Helpful nor Unhelpful	Somewhat Helpful	Helpful	Very Helpful
1						7
Very Hard to Understand	Hard to Understand	Somewhat Hard to Understand	Neither Hard nor Easy to Understand	Somewhat Easy to Understand	Easy to Understand	Very Easy to Understand
1						7
Very Confusing	Confusing	Somewhat Confusing	Neither Confusing nor Clear	Somewhat Clear	Clear	Very Clear
1						7
Had Way Too Much Information	Had Too Much Information	Had Somewhat Too Much Information	Had Neither Too Much nor Too Little Information	Had Somewhat Too Little Information	Had Too Little Information	Had Way Too Little Information

2. For you, what was the most useful piece of information on the label in helping you make a choice?

1 The large black typed number at the top

2 The bar with the range of costs

3 The numbers that allowed you to figure your own energy cost

Now I would like you to think about the bar that showed the range of costs on it for a moment. For each model, indicate where the energy costs were in the range by circling the arrow that most closely approximates the place where the arrow was for that model. In order to help you remember better, a brief description of each model follows.

Model A - top freezer style costing $545.00

Model B - top freezer style costing $515.00

Model C - top freezer style costing $550.00

Model D - top freezer style costing $425.00

MODEL A

MODEL B

MODEL C

MODEL D

The most energy efficient refrigerator-freezer had a price of $545.00. The least energy efficient model had a price of $425.00. Do you think that the savings in energy would offset the higher price of the more energy efficient model? That is, do you think you could recover the extra price in the energy savings you would have over the life of the refrigerator-freezer?

Yes 1

No 2

How long do you feel it would take you to make up the difference in price of the two models through savings in energy costs?

1	2	3	4	5	6	7
0 - 1 Year	2 - 3 Years	4 - 5 Years	6 - 7 Years	8 - 9 Years	9+ Years	Never

Please answer the following general information questions.

18 1. How long has it been since your household purchased a refrigerator-freezer?

1	2	3	4	5	6	7
0-1	2-4	5-7	8-10	11-13	14-16	17 or more years

9 2. Approximately how long before you purchase your next refrigerator-freezer?

1	2	3	4	5	6	7
0-1	2-4	5-7	8-10	11-13	14-16	17 or more years

20 3. Age: 18-22 1 : 23-28 2 : 29-33 3 : 34-38 4 : 39-44 5 : 44-55 6 : 55-65 7 : 66 8 :

21 4. Sex: M = 1, F = 2

22-23 5. The last year of school I completed was: (Please circle the last year completed)

1 2 3 4 5 6 7 8 9 10 11 12
Grade School

B 14 15 16
1 2 3 4
College

24 6. Earnings of household, after taxes, in 1979:

1	2	3	4	5	6
0-$4999	$5,000-$9,999	$10,000-$14,999	$15,000-$19,999	$20,000-$24,999	$25,000-above

5 7. What is your occupation? _____

6 8. If married, spouse's occupation? _____

1 = Homemaker
2 = Mgmt. or P
3 = Sales
4 = student
5 = Educator
6 = Nurse
7 = Secretary
8 = other

27 9. Do you have children living at home at least 9 months a year? Yes 1 No 2

Some people have proposed that various kinds of energy information be made available to consumers when they are comparing refrigerator-freezers. Which of the following would you find MOST helpful?

2

1 ☐ Cost per year (Example: $67.50 per year)

2 ☐ Total lifetime electricity cost (Example: $945 total energy cost)

3 ☐ Energy efficiency ratio (Example: 7.6 where higher numbers indicate greater efficiency and lower numbers indicate less efficiency for that model)

4 ☐ I find none of these to be very helpful

There are also a variety of ways to give the energy information. Which of the following ways would you rather have the energy information presented to you?

21

1 ☐ Dollars (Example: $450.00)

2 ☐ Kilowatt hours (Example: 180 kwh)

3 ☐ Energy Efficiency ratio (Example: 7.6 where higher numbers indicate greater efficiency and lower numbers indicate less efficiency for that model)

REFRIGERATOR-FREEZER POST-TEST QUESTIONNAIRE

INTRODUCTION

We would like you to pretend that your refrigerator-freezer is about to wear out. You have already talked with friends and they have recently read a very credible technical report that endorses Ward's refrigerator-freezer line. You have decided to include them in the models under consideration.

Within the Ward's line of refrigerator-freezers, you have narrowed your choice to 4 models.

Since this is your initial visit to the store, you will likely be shopping at other stores to compare different brands. Please conduct this shopping trip as if you can do additional shopping later.

Your task is to evaluate the four available models as if you were going to buy a refrigerator-freezer, and the final decision will be made in the near future, perhaps after you confide with your spouse.

After your shopping trip we will ask you a series of questions about these models. In these questions the models will be referred to by the letters taped on front (A, B, C, D). These letters are for classification purposes and are used only to help you remember the models better.

Now that you have had a chance to shop for your refrigerator-freezer, we would like to know how you feel about each model. Please rank each of the four models you saw in terms of how likely it is you would buy the model (1 = most likely, 2 = second choice, 3 = third choice, 4 = least likely).

	MODEL	RANK
6	A	____
7	B	____
8	C	____
9	D	____

Now think of each model in terms of how satisfactory it is to you in meeting the needs of your family. How satisfactory is each model in relation to the other models? Please rate each of the four models by placing an "x" underneath the adjective that best describes your feelings.

MODEL	VERY SATIS-FACTORY	SATIS-FACTORY	SOMEWHAT SATIS-FACTORY	NEITHER SATISFACTORY NOR UNSATIS-FACTORY	SOMEWHAT UNSATIS-FACTORY	UNSATIS-FACTORY	VERY UNSATIS-FACTORY
10 A	____ +3 7	____ +2 6	____ +1 5	____ 0 4	____ -1 3	____ -2 2	____ -3 1
11 B	____ +3	____ +2	____ +1	____ 0	____ -1	____ -2	____ -3
12 C	____ +3	____ +2	____ +1	____ 0	____ -1	____ -2	____ -3
13 D	____ +3	____ +2	____ +1	____ 0	____ -1	____ -2	____ -3

Below are a series of questions related to the shopping trip you just completed. Please indicate your feelings by checking one of the seven spaces below each question.

1. Based on your evaluation of these four models, how sure are you that you made the best choice among the models in order to meet your family's needs and budget?

Very Uncertain	Uncertain	Somewhat Uncertain	Neither Certain nor Uncertain	Somewhat Certain	Certain	Very Certain
1						7

2. How helpful did you find the cost information in deciding on the model you preferred most?

Very Unhelpful	Unhelpful	Somewhat Unhelpful	Neither Helpful nor Unhelpful	Somewhat Helpful	Helpful	Very Helpful
1						7

3. How complex did you find the cost information for each of the models?

Very Complex	Complex	Somewhat Complex	Neither Complex nor Simple	Somewhat Simple	Simple	Very Simple
1						7

4. How likely is it you would want or need to shop at other stores before deciding on your refrigerator-freezer?

Very Unlikely	Unlikely	Somewhat Unlikely	Neither Likely nor Unlikely	Somewhat Likely	Likely	Very Likely
1						7

5. How difficult was it to shop among these four models of refrigerator-freezers?

Very Difficult	Difficult	Somewhat Difficult	Neither Difficult nor Easy	Somewhat Easy	Easy	Very Easy
1						7

6. How likely is it you would desire more information about these models?

Very Unlikely	Unlikely	Somewhat Unlikely	Neither Likely nor Unlikely	Somewhat Likely	Likely	Very Likely
1						7

While you were shopping among the four models, what were the four (4) characteristics that you felt were the most important in helping you arrive at your decision? Please list each factor to the right of the ranking.

20 . Most important _____

21 . Second most important _____

22 . Third most important _____

23 . Fourth most important _____

Even though you have just seen the models for the first time, we are interested in what you remember about them. Since we did not ask you to specifically remember any particular information, do not feel bad if you cannot recall exactly. We are still interested in your ideas, so please give us your best estimate in every case.

For this first set of features, please indicate whether a model had the feature included by circling YES if it was included or NO if it was not included under the model.

FEATURE		MODEL							
		A		B		C		D	
Automatic Ice Maker	24	Yes	No	29 Yes	No	31 Yes	No	33 Yes	No
Glass Shelves	25	Yes	No	30 Yes	No	32 Yes	No	34 Yes	No
Frost Free	26	Yes	No	31 Yes	No	34 Yes	No	36 Yes	No
Deluxe Insulation	27	Yes	No	32 Yes	No	35 Yes	No	37 Yes	No
Vegetable Bin	28	Yes	No	33 Yes	No	36 Yes	No	38 Yes	No

Now that you have given us some information about each model, we would like to know a little more about how you feel regarding the specific characteristics of each model.

Please indicate your feelings by checking one of the seven (7) numbered spaces below each alternative. For example, if you feel the purchase price for Model A is very good, place a check (✓) above +3. If you feel it is very bad, you would place your check (✓) above -3. If you feel it is good, mark +2, or if it's bad, mark -2. If it is only somewhat good, mark above the +1 or somewhat bad, mark above -1. If you feel it is neither good or bad, place your check (✓) above 0.

MODEL A

In my opinion:

The purchase price is:

44 Good | 7 (+3) | 6 (+2) | 5 (+1) | 4 (0) | 3 (-1) | 2 (-2) | 1 (-3) | Bad

The energy use is:

45 Good | 7 (+3) | ___ (+2) | ___ (+1) | ___ (0) | ___ (-1) | ___ (-2) | 1 (-3) | Bad

The features are:

46 Good | 7 (+3) | ___ (+2) | ___ (+1) | ___ (0) | ___ (-1) | ___ (-2) | 1 (-3) | Bad

The warranty is:

47 Good | 7 (+3) | ___ (+2) | ___ (+1) | ___ (0) | ___ (-1) | ___ (-2) | 1 (-3) | Bad

MODEL B

In my opinion:

The purchase price is:

48 Good | 7 (+3) | ___ (+2) | ___ (+1) | ___ (0) | ___ (-1) | ___ (-2) | 1 (-3) | Bad

The energy use is:

49 Good | 7 (+3) | ___ (+2) | ___ (+1) | ___ (0) | ___ (-1) | ___ (-2) | 1 (-3) | Bad

The features are:

50 Good | 7 (+3) | ___ (+2) | ___ (+1) | ___ (0) | ___ (-1) | ___ (-2) | 1 (-3) | Bad

The warranty is:

51 Good | 7 (+3) | ___ (+2) | ___ (+1) | ___ (0) | ___ (-1) | ___ (-2) | 1 (-3) | Bad

MODEL C

In my opinion:

The purchase price is:

52 Good 7 / +3 ___ / +2 ___ / +1 ___ / 0 ___ / -1 ___ / -2 1 / -3 Bad

The energy use is:

53 Good 7 / +3 ___ / +2 ___ / +1 ___ / 0 ___ / -1 ___ / -2 1 / -3 Bad

The features are:

54 Good 7 / +3 ___ / +2 ___ / +1 ___ / 0 ___ / -1 ___ / -2 1 / -3 Bad

The warranty is:

55 Good 7 / +3 ___ / +2 ___ / +1 ___ / 0 ___ / -1 ___ / -2 1 / -3 Bad

MODEL D

In my opinion:

The purchase price is:

56 Good 7 / +3 ___ / +2 ___ / +1 ___ / 0 ___ / -1 ___ / -2 1 / -3 Bad

The energy use is:

57 Good 7 / +3 ___ / +2 ___ / +1 ___ / 0 ___ / -1 ___ / -2 1 / -3 Bad

The features are:

58 Good 7 / +3 ___ / +2 ___ / +1 ___ / 0 ___ / -1 ___ / -2 1 / -3 Bad

The warranty is:

59 Good 7 / +3 ___ / +2 ___ / +1 ___ / 0 ___ / -1 ___ / -2 1 / -3 Bad

The next three features may have any one of a number of values. Please indicate the appropriate value for each model (A, B, C, and D) by placing the letter of the model above the range of values you feel most closely represents that model. For example, if you feel the price of model A was $450, place an 'A' above the range $351 - $450. If B's price was $290, you would place a 'B' above the $251 - $350 range, and so on.

	1	2	3	4	5	6	7
Price	$150-$250	$251-$350	$351-$450	$451-$550	$551-$650	$651-$750	$751 or higher
Yearly Energy Cost	$10-$20	$21-$30	$31-$40	$41-$50	$51-$60	$61-$70	$71 or higher

Another way to think about the cost of an appliance is in terms of all the dollars spent to buy and run the appliance over its useful life. Assuming an average lifespan of 15 years, a refrigerator-freezer's total lifetime cost would include price, lifetime energy cost, and lifetime maintenance cost. What would you guess the total lifetime cost of each model (A, B, C, D) to be?

	1	2	3	4	5	6	7
Total Lifetime Cost to Operate	$1100-1200	$1201-1300	$1301-1400	$1401-1500	$1501-1600	$1601-1700	$1701 or higher

NEW CARD

I would like you now to consider just the energy label.

1. Did you feel that, in general, the label was:

1	2	3	4	5	6	7
Very Complex	Complex	Somewhat Complex	Neither Complex nor Simple	Somewhat Simple	Simple	Very Simple
1						7
Very Unhelpful	Unhelpful	Somewhat Unhelpful	Neither Helpful nor Unhelpful	Somewhat Helpful	Helpful	Very Helpful
1						7
Very Hard to Understand	Hard to Understand	Somewhat Hard to Understand	Neither Hard nor Easy to Understand	Somewhat Easy to Understand	Easy to Understand	Very Easy to Understand
1						7
Very Confusing	Confusing	Somewhat Confusing	Neither Confusing nor Clear	Somewhat Clear	Clear	Very Clear
1						7
Had Way Too Much Information	Had Too Much Information	Had Somewhat Too Much Information	Had Neither Too Much nor Too Little Information	Had Somewhat Too Little Information	Had Too Little Information	Had Way Too Little Information

2. For you, what was the most useful piece of information on the label in helping you make a choice?

1 The large black typed number at the top

2 The bar with the range of costs

3 The numbers that allowed you to figure your own energy cost

Now I would like you to think about the bar that showed the range of costs on it for a moment. For each model, indicate where the energy costs were in the range by circling the arrow that most closely approximates the place where the arrow was for that model. In order to help you remember better, a brief description of each model follows.

Model A - top freezer style costing $545.00

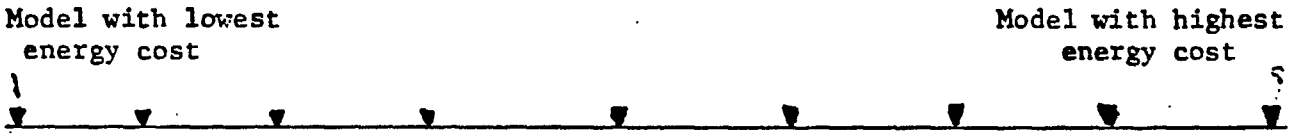
Model B - top freezer style costing $515.00

Model C - top freezer style costing $550.00

Model D - top freezer style costing $425.00

MODEL A

MODEL B



MODEL C

MODEL D

The most energy efficient refrigerator-freezer had a price of $545.00. The least energy efficient model had a price of $425.00. Do you think that the savings in energy would offset the higher price of the more energy efficient model? That is, do you think you could recover the extra price in the energy savings you would have over the life of the refrigerator-freezer?

16

Yes 1

No 2

How long do you feel it would take you to make up the difference in price of the two models through savings in energy costs?

17

1	2	3	4	5	6	7
0 - 1 Year	2 - 3 Years	4 - 5 Years	6 - 7 Years	8 - 9 Years	9+ Years	Never

Please answer the following general information questions.

18 1. How long has it been since your household purchased a refrigerator-freezer?

1	2	3	4	5	6	7
0-1	2-4	5-7	8-10	11-13	14-16	17 or more years

19 2. Approximately how long before you purchase your next refrigerator-freezer?

1	2	3	4	5	6	7
0-1	2-4	5-7	8-10	11-13	14-16	17 or more years

20 3. Age: 18-22 1 :23-28 2 :29-33 3 :34-38 4 :39-44 5 :44-55 6 :55-65 7 :66 8 :

21 4. Sex: M = 1 F = 2

22-23 5. The last year of school I completed was: (Please circle the last year completed)

1 2 3 4 5 6 7 8 9 10 11 12
Grade School

B 14 15 16
1 2 3 4
College

24 6. Earnings of household, after taxes, in 1979:

1	2	3	4	5	6
0-$4999	$5,000-$9,999	$10,000-$14,999	$15,000-$19,999	$20,000-$24,999	$25,000-above

25 7. What is your occupation? _____

26 8. If married, spouse's occupation? _____

1 = Housewife
2 = Mgmt. or prof.
3 = Sales
4 = student
5 = Education
6 = Nurse
7 = Secretarial
8 = other

27 9. Do you have children living at home at least 9 months a year? Yes 1 No 2

28 Some people have proposed that various kinds of energy information be made available to consumers when they are comparing refrigerator-freezers. Which of the following would you find MOST helpful?

1 ☐ Cost per year (Example: $67.50 per year)

2 ☐ Total lifetime electricity cost (Example: $945 total energy cost)

3 ☐ Energy efficiency ratio (Example: 7.6 where higher numbers indicate greater efficiency and lower numbers indicate less efficiency for that model)

4 ☐ I find none of these to be very helpful

29 There are also a variety of ways to give the energy information. Which of the following ways would you rather have the energy information presented to you?

1 ☐ Dollars (Example: $450.00)

2 ☐ Kilowatt hours (Example: 180 kwh)

3 ☐ Energy Efficiency ratio (Example: 7.6 where higher numbers indicate greater efficiency and lower numbers indicate less efficiency for that model)