Communicating with Whom? The Effectiveness of Appliance Energy Labels in the U.S. and Thailand

Peter du Pont, International Institute for Energy Conservation, Asia Regional Office, Bangkok, Thailand

ABSTRACT

The proliferation of household appliances is a global energy problem, and this comparative study of appliance energy labeling in the U.S. and Thailand offers opportunities to learn from the implementation of programs in countries with different income levels and cultural and political climates. In the U.S., I conducted participant observation in an appliance store and interviewed 16 policymakers, 14 salespeople, and 100 consumers. In Thailand, I interviewed 11 policymakers, 53 salespeople, and 62 consumers, and carried out a national survey of 971 consumers. This study is the first time that energy labels have been examined primarily as a problem of consumer cognition in context — that is, how consumers read, interpret, and think about energy labels in the retail environment.

After just three years of implementation, the Thai appliance labeling program is having a significantly greater impact on the consumer appliance market than is the 20-year-old U.S. program. While Thai salespeople report that more than 60% of consumers ask about or look at the label, the corresponding number for the U.S. is just 20%. Energy efficiency was reported among the top-three purchase priorities by 28% of Thai appliance consumers, compared to just 11% of U.S. consumers. In my in-store tests of label cognition, the U.S. EnergyGuide label fared poorly, and the Thai appliance label was more effective at helping consumers to identify efficient models. Yet both labels suffer from the problem of too much detailed product information, which hinders label comprehension.

Introduction

Appliances will become an increasingly significant contributor to future energy demand worldwide. The trend of appliance uptake established in industrialzied countries is now repeating itself in the developing world, as incomes rise and manufacturers systematically seek out emerging markets. Global sales of "white goods" — refrigerators, dishwashers, clothes washers, clothes dryers, and cooking appliances — are expected to increase by 15% annually during the 1990s, reaching US$77 billion by the year 2000. Roughly 85% of sales of white goods take place in the U.S., Western Europe, and Southeast Asia (*Euromonitor*, cited in Turiel 1997: 3). Thus, the development of effective policies to promote appliance energy efficiency will play an important role in limiting the energy, environmental and economic impacts of the proliferation of appliances worldwide.

It is important to understand the dynamics and interaction of different appliance efficiency policies in order to identify the appropriate role and savings potential for each. For example, appliance

energy labeling policies, which rely primarily on consumer actions to be effective, usually achieve only modest gains in efficiency. By contrast, minimum efficiency standards do not require the consumer to take an active role in selecting an energy-efficient model. Yet the policies are complementary, and a combination of labeling and minimum efficiency standards is often necessary to raise consumer awareness, spur manufacturer competitiveness, and achieve significant, long-term energy savings. Unfortunately, the U.S. and other governments have been slow and less than thorough in their evaluations of the impact of energy labeling programs. Most prior evaluations of energy labeling programs have shown a high level of consumer awareness of the labels (Pirket et al. 1982, Dyer and Maronick 1988, Hill and Larson 1990, SEC Victoria 1991). However, there have been few comprehensive studies of energy labeling programs that have addressed consumer priorities in decision-making, how the label is used, how well it is understood, and the extent to which it influences consumers to buy more efficient appliances.

This paper reports on the results of in-store tests of label comprehension conducted during late 1996 and early 1997 in the U.S. and Thailand. The U.S. has one of the world's longest-running and most effective programs to improve the energy-efficiency of appliances,[1] which include national minimum efficiency performance standards, energy labeling, and demand-side management programs operated by utilities across the country. Yet despite the longevity of its programs, no comprehensive evaluation of the national appliance labeling program has taken place since the early 1980s (Dyer and Maronick 1988, based on 1983 data). Thailand is typical of the many industrializing nations around the world that are rapidly beginning to adopt the type of household appliances that were developed and mass-marketed in the U.S. during the first three-quarters of this century. At the same time, Thailand also recently initiated a major national program to conserve energy, and one of the cornerstones of this program is a voluntary national energy labeling program for appliances that is based on similar labeling programs conducted in the U.S., Europe, and other Asian countries (Cherniack and du Pont 1991; du Pont et al. 1998). This paper focuses on how well consumers understand the labels.

Methodology

I used several complementary social science research techniques in order to gain the most complete perspective possible on the consumer decision-making environment. These included qualitative techniques such as participant observation, unstructured, and semi-structured interviewing, and quantitative techniques such as a large-scale questionnaire survey. My research began in the U.S., where I became a participant observer by working for two weeks as a sales trainee at a New Jersey appliance store. In conducted semi-structured interviews of consumers in both the U.S. (N=100) and Thailand (N= 62). The U.S. samples were collected in the U.S. by doing exit interviews at two appliance speciality stores and two electronic superstores in Delaware and New Jersey in late 1996 and early 1997. Because of the lack of appliance specialty stores in Thailand, the Thai samples were collected using random sampling of consumers in large shopping malls in three large cities in Thailand. All Thai interviews were conducted in the Thai language by a Thai professor. My presence as an active observed provided continuity between the interview format in the U.S. and Thailand.

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[1] Only Canada's appliance energy labeling program, which began in 1978, is older.

I also conducted semi-structured interviews with salespeople in the U.S. (N=14) and Thailand (N=53). The interview protocols that I used for both the U.S. and Thai consumer interviews were similar, with minor modifications to account for differences in the culture and the type of programs being offered. I also conducted unstructured interviews with Thai consumers to understand the basis for consumer demand for appliances (especially refrigerators and air conditioners) in rural Thailand. These interviews are described in du Pont (1998). The interview protocols that I used for both the U.S. and Thai sales interviews were also similar, with minor modifications to account for differences in the two countries.

In each country, as part of the semi-structured consumer interviews, I tested label comprehension by showing consumers the energy label and asking a series of questions. My test of label comprehension was more rigorous in the U.S. In the U.S., I tested label comprehension by showing respondents sample labels during a five-minute segment of a 15-minute in-store interview with 85 consumers. In Thailand, I tested label comprehension by showing respondents the labels, asking two questions[2] and then asking for general feedback on the label from 42 consumers, mostly in rural districts.

I also worked with a team of Thai researchers to develop a survey questionnaire, based on the semi-structured interview questions; the research team surveyed 971 Thai consumers in three cities. This survey was based on the semi-structured interview protocol. It provided valuable data on consumer awareness of the appliance label and its role in the appliance purchase. Like the semi-structured Thai interviews, the survey samples were collected by randomly interviewing consumers at shopping malls in three large Thai cities. Because of the larger sample size of the survey, the survey results allowed broader generalizations about consumer information gathering, awareness, and decision-making in the purchase of appliances. At the same time, the results of the semi-structured consumer interviews informed the interpretation of the Thai survey results. This paper relies primarily on data collected from consumers. The entire research project, including an analysis of interviews with policymakers and retailers in both countries is described fully in du Pont (1998).

Prior Research

Understanding Label Design

There have been few micro-level studies of consumer cognition of energy labels. Simple, non-cluttered label designs have been found to be the most effective (Pirkey et al. 1982, BPA 1987, Carswell et al. 1989, Patterson 1991, de Loor et al. 1991, Daamen et al. 1992). Labels that have only text are much less effective than labels with some sort of graphic element (Weenig and Maarleveld 1993). Researchers have also found that it is important for the label to have a primary message or theme conveyed with either a logo or large, bold type that can be seen from a distance (Pirkey et al. 1982). They have also recommended that this primary information not be "masked" by a lot of

[2] First I showed them a single appliance label and asked, "Is this model more efficient than most?" I then showed them two labels at once and asked "Which model is more efficient?"

detailed product information that is extraneous to the label's primary theme (de Loor and Zeelenberg 1991).

There is evidence from one study that energy labels using a categorical rating scheme are easier for consumers to remember than are labels using a continuous scale (Weenig and Maarleveld 1993). Recent research conducted on energy billing designs yielded the surprising result that distribution-type graphs were slightly easier for consumers to understand than bar graphs, suggesting that the bar graph used as a scale of relative energy use on the U.S. EnergyGuide label may not be an optimal design (Egan 1997). And research into the optimal metric for consumer comparisons of energy efficiency is ambiguous. A Canadian study that recommended energy use (kilowatt-hours) as the preferred metric for comparing energy use, also found that kilowatt-hours were "unfamiliar or obscure" to the majority of respondents (Patterson 1991).

Early research conducted at the time that the U.S. EnergyGuide labels were being introduced in 1980 suggested that energy labels alone would have little impact without in-store shopping aids and a "push" from salespeople (Redinger and Staelin 1981, Anderson and Claxton 1982). More recent studies have found that simply training salespeople and providing point-of-purchase information on energy efficiency can increase the priority that consumers place on energy efficiency as a purchase criterion (BPA 1987, DTI 1994, DOE 1995, Bodner 1997).

The most complete evaluation of the appliance labeling program was completed by the Federal Trade Commission in 1986 (Dyer and Maronick 1988). This longitudinal evaluation was based on surveys taken from a sample of several hundred purchasers of washing machines and refrigerators in 1979, 1982, and 1983. Energy use ranked low on the list of consumer priorities in all three surveys. Dyer and Maronick concluded that refrigerator purchasers seemed to be more aware of the labels than did purchasers of washing machines; they also tended to rely on the labels to a greater extent in their purchase decisions. There have been no U.S. studies that have definitively shown that the EnergyGuide label influences consumers to purchase more energy-efficient appliances.

While this paper focuses specifically on how consumers read and understand energy labels, it recognizes the important role that retailers must play in a successful energy labeling program. For example, programs in both Denmark and the U.S. have recognized the crucial link played by the appliance retailer in promoting energy efficiency. The Danish energy agency has found that training, information, and sales aids could increase the effectiveness of salespeople in using the new European Union labels as a selling tool for energy efficiency. (DTI 1994; DOE 1995).

The U.S. government has initiated a project called the Energy Star Retail Labeling Program (DOE 1995, Bodner 1997), which consists of promotional activities with utilities, sales training[3], regional and point-of-purchase advertising and promotion, and labeling of products that meet pre-specified criteria. The program has expanded to include more than 1,000 participating and 11 utility partners nationwide (Hazard 1998). Preliminary data from 30 stores over a three-month period indicate that overall sales of qualified Energy Star products increased by 27 % (Bodner 1997). The energy label used in the U.S. program is roughly the same size as the yellow EnergyGuide label and has a large "Energy Star" logo. It is placed only on qualifying appliances – those that exceed the

[3] The initial pilot phase of the program in four cities included sales training. In the expanded program, there is no sales training component operated by the federal government. Rather, a training manual is sent to participating stores, and there are plans for a training video to be developed in 1998 (Hazard 1998).

federal minimum efficiency standards by a specified amount.[4] One successful outcome of the Energy Star Retail Labeling Program is that it has spurred manufacturer interest in the use of the Energy Star logo as a marketing tool for the sale of high-efficiency models. Several manufacturers have petitioned the Federal Trade Commission for the right to voluntarily print a small rendition of the Energy Star logo on the yellow EnergyGuide label, for their qualifying models. The manufacturers' petition is currently being reviewed internally by the Federal Trade Commission and, if approved, will need to go through the process of federal rulemaking and public comment before it can be accepted as an amendment to the current U.S. labeling rules (Mills 1998).

Below, I report on the results of a micro-level study on how consumers read the labels, interpret the different elements, and then draw conclusions from this information that they can use in their purchase decision.

Reading the Energy Labels

One of the most important questions to ask in assessing the effectiveness of any product labeling program is whether consumers actually look at and read the label. I asked this question of salespeople and consumers in both countries in an effort to develop a better estimate of how often the labels are actually read. U.S. salespeople reported than fewer than 20% of appliance shoppers look at or ask about the label. In Thailand, salespeople estimated that more than 60% of consumers look at or ask about the label.

When we asked consumers, their self-reported answers were higher. In the U.S., 71% of respondents indicated that they looked at the label; the corresponding figure for Thailand was 76%. However, only a small minority of all consumers reported that they read the label carefully — 26% in the U.S. and 16% in Thailand. It thus appears that most consumers glance at the label briefly or to read it in passing. The implication of this is that there should be a clearly focused message on the label in large type that conveys one main idea. There can also be additional detail in small print that does not clutter the label and thereby mask the primary message (de Loor and Zeelenberg 1991). This detail can be utilized by the minority (16-26%) of consumers who read the label in detail. It is likely that these consumers who scrutinize the label carefully are the consumer segment most likely to use the label as a decision tool in their purchase.[5]

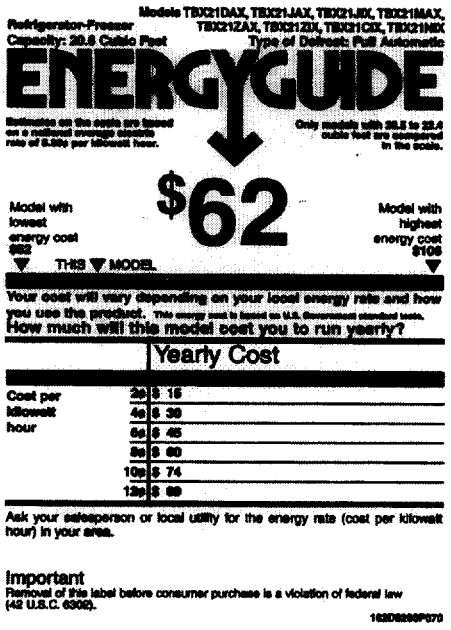
Interpreting the U.S. Label

[4] Qualifying levels are 13% better than federal standards for dishwashers, 15% for room air conditioners, 20% for refrigerators, and 115% for clothes washers (Bodner 1997).

[5] Pirkey et al. (1982) studied the design of the original U.S. Fuel Economy Label for automobiles and discovered that consumers found the label confusing. Pirkey et al. decided that it was important to clearly convey the concept of "fuel economy information" to consumers using a large logo that would be visible from across the car showroom floor. DOE revised the label with a large gas pump logo, and also incorporated two fuel economy ratings — one for city mileage and one for highway gas mileage — set in very large type. Despite these efforts to simplify the label and provide a clear central message, the most recent evaluation of the Fuel Economy Label (completed in 1990) revealed that many consumers and salespeople (percentage not quantified) thought that the label still "contained too much information and was confusing" (Hill and Larsen 1990).

In 1994, the Federal Trade Commission issued a final rule that revised the EnergyGuide labels (FTC 1994). The new label was designed to deal with problems arising from discrepancies in annual operating cost that appeared on labels when the national average electricity price changed from year to year. The new label design was specified on the basis of results of mall-intercept interviews with 120 consumers in early 1991. Based on the results of these interviews — as well as on data submitted from a Canadian study that recommended using energy consumption, rather than dollars, as the basis of comparison — the FTC decided to revise the EnergyGuide label so that annual energy use (in kWh) rather than average annual operating cost, is the main comparative indicator.

I tested consumer comprehension of the labels by showing consumers a label and saying, "One of the things I'm doing is studying how easy the energy labels are to understand. Can you tell me what's going on here?" I followed this up by prompting the respondent to describe difficult aspects of the label. This set of questions allowed me to measure the length of time it took the consumer to understand each label as well as the extent to which they were able to accurately interpret five different aspects of information presented on the label: operating cost, efficiency, scale of energy use, and the table showing operating costs at different energy prices (for the old label only). The "old" EnergyGuide label is shown in Figure 1, and the new EnergyGuide label is shown in Figure 2. Today in U.S. appliance stores, there is a mixture of "old" and "new" labels, and eventually the "old" label will be phased out.


Models TBX21DAX, TBX21JAX, TBX21JIX, TBX21MAX, TBX21NIX
Refrigerator-Freezer
TBX21ZAX, TBX21ZDX, TBX21CDX,
Capacity: 20.6 Cubic Feet
Type of Defrost: Full Automatic
ENERGYGUIDE
$62
Model with lowest energy cost $62
THIS MODEL
Model with highest energy cost $106
Your cost will vary depending on your local energy rate and how you use the product.
How much will this model cost you to run yearly?

Cost per kilowatt hour	Yearly Cost
2¢	$ 16
4¢	$ 30
6¢	$ 45
8¢	$ 60
10¢	$ 74
12¢	$ 89

Ask your salesperson or local utility for the energy rate (cost per kilowatt hour) in your area.

Important
Removal of this label before consumer purchase is a violation of federal law (42 U.S.C. 6306).

Figure 1. The "Old" EnergyGuide Label Used in Label Comprehension Test with U.S. Consumers.

Summary of Results. In my tests of detailed label interpretation, the U.S. EnergyGuide label fared poorly. My observations during the interviews indicated that most consumers seemed puzzled

and had difficulty clearly understanding the information provided on the labels (efficiency range, table of operating costs by electricity price, meaning of kilowatt-hours). It took consumers an average of 30 to 40 seconds to understand the "meaning" of the energy label. (I defined this as the amount of time it took for a respondent to explain at least two of the label's main elements, such as operating cost, efficiency, the scale, or the table of operating costs.) Most respondents (59%) were able to interpret operating cost, but fewer than half (42%) were able to interpret whether the label represented an efficient model. And only one-third of respondents were able to interpret the scale of relative energy use without assistance. In addition, one-third of respondents (32%) thought that the large dollar figure on the old label showed the annual *savings* rather than the annual operating costs. This is because the dollar figure is not clearly labeled, and these consumers assumed that the yellow EnergyGuide labels are "energy saving labels" that show you how much you save.

The comprehension scores for the new EnergyGuide label were slightly higher than for the old label on all of these criteria. Unfortunately, the new label was always presented after the old label on the comprehension tests, so I cannot infer how much better the new label is. In addition, a core of 33% of respondents viewing both the old and new labels were unable to "see" the scale and use it as a tool to compare energy use.

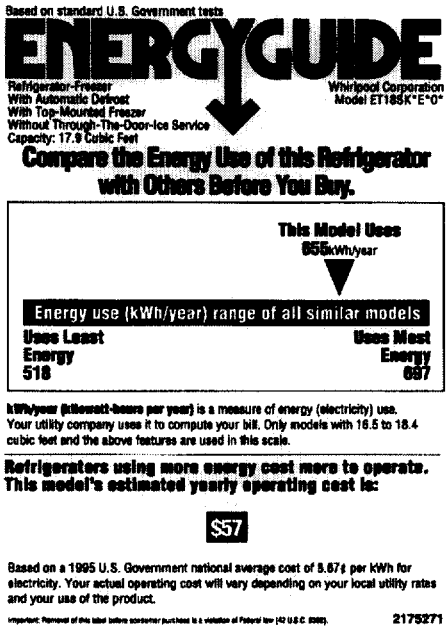


Figure 2. The "New" EnergyGuide Label Used in Label Comprehension Test with U.S. Consumers.

Misinterpretations of the U.S. Labels. The problems of interpretation fell into two broad categories: problems that can be fixed by tinkering with the design and typesetting, and problems that require a major design change or removal of an element.

A number of problems with the U.S. label can be corrected simply by better typesetting and using larger fonts. For example, a number of consumers were confused by the words "uses most energy" and "uses least energy" at either end of the scale on the new label. Some of the consumers did not clearly understand these words, since there is no subject to this sentence. What is the subject?

"This model?" "Another model?" Consumer understanding might be improved by using the words: "highest efficiency model uses" at the left end of the scale and "lowest efficiency model" at the right end of the scale. Alternatively, the wording could be "model using the least energy" and "model using the most energy" as appeared on the scale on the old label.

The other category of problem is more fundamental and points to the possible need to rethink the entire design of the label. These problems include the fact that a core of at least one-third of consumers appear not to understand the scale as a means of comparing relative energy use of different models. Perhaps the bar graph is not the optimal way of comparing use among models, as suggested by Egan and colleagues (Egan 1997; Lord et al. 1996), who compared different graphical displays for use in a comparative energy billing format. They found that the rate of comprehension of distribution-curve graphs was significantly higher than for bar-graph scales of energy use. The findings of Egan and the results of this research suggest that the bar-graph scale of energy use on the EnergyGuide label may not be the optimal graphic to use for comparison.

The label comprehension tests revealed at least two other fundamental problems with the design of the new EnergyGuide label. First, the text is too small and there is no variation of font size. A number of consumers remarked that "nothing jumps out at you" on the new label, reflecting the fact that the label conveys no primary focus or message. This problem could be solved by redesigning the label so that there is a primary focal point (either a logo, and a large number figure, or both) at the top of the label, with blocks of detailed product information in smaller type, without clutter, at the bottom of the label. An excellent example of this is the Fuel Economy label used on U.S. automobiles. The label has a gasoline pump as a logo and has two large mileage rating numbers in bold font. Detailed product information is provided in block-style paragraphs at the bottom of the label. This reduces graphic clutter, yet allows those interested to access the detailed technical information.

One of the biggest flaws in the old label is the lack of clear labeling of the elements. There was a tendency on the part of consumers to believe that the yellow label in itself denotes energy efficiency. Also, a substantial number of consumers misinterpreted the meaning of the large dollar figure on the label. Nearly one-third of the respondents (32%) thought that the dollar number referred to the amount that the consumer would *save* each year, not the annual operating costs. Even after extensive prompting (to stimulate a closer look at the label and to get consumers to read the fine print more carefully), nearly one-quarter of respondents (24%) still believed that the label showed *savings*.

The other fundamental problem with the design of the new EnergyGuide label is the use of kilowatt-hours as a metric for comparing energy use. Despite the fact that most consumers whom I interviewed found the new label simpler and easier to look at, there was strong resistance to the use of kilowatt-hours as the primary metric. The majority of consumers felt more comfortable comparing the models based on a dollar amount than a technical measure of energy use (kWh), which most found meaningless.

Interpreting the Thai Label

The Thai DSM office initiated a voluntary energy labeling program for refrigerators in early 1995, and a similar program for air conditioners the following year. It has supported the labeling program with a massive, nationwide advertising campaign to promote energy conservation in general,

and in particular to educate consumers about the appliance energy labels.[6] A sample of the Thai energy label for air conditioners is shown in Figure 3. In practice, manufacturers only place labels on models that are more efficient than average (i.e., that are rated either number 4 (good) or number 5 (better).

In just three years, the appliance energy label appears to have had a modest but significant impact on the efficiency of refrigerators and air conditioners in that country: the average efficiency of refrigerators and air conditioners participating in the voluntary labeling program has steadily increased since the program's inception.

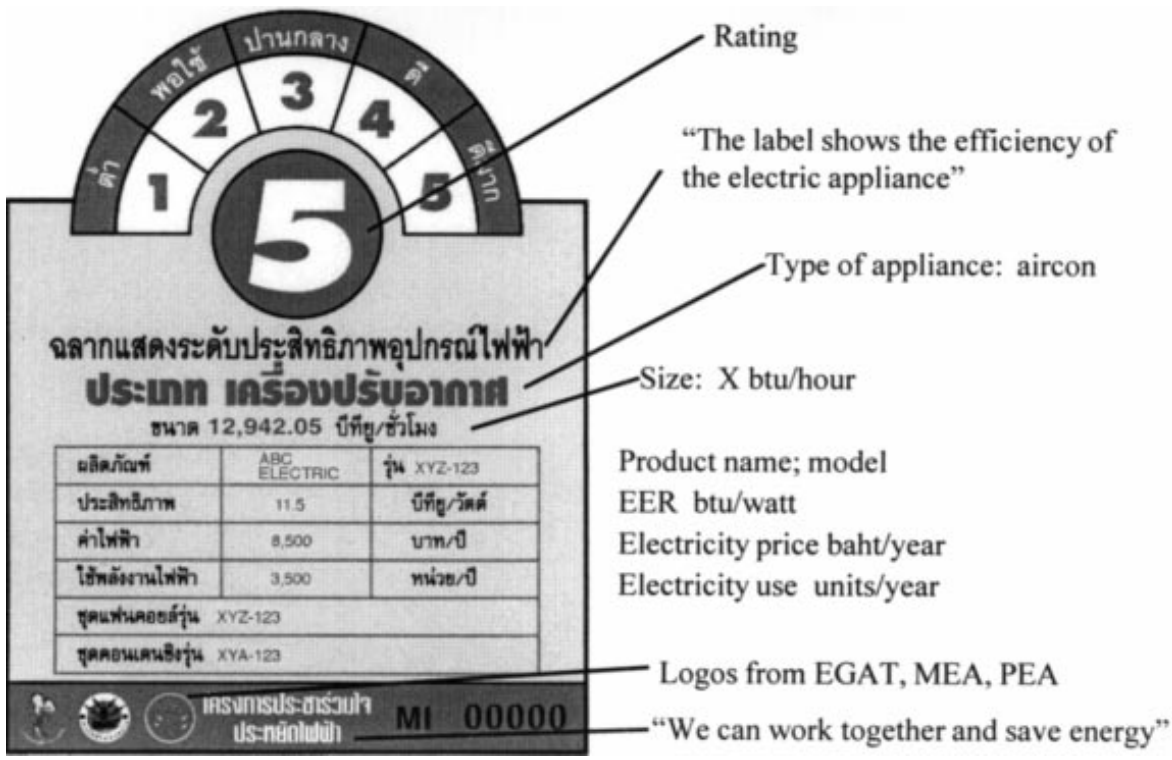


Figure 3. The Thai Energy Label for Air Conditioners.

Consumer Recall of Label Contents

We tested the recall and comprehension of the Thai energy label as part of our survey of 633 recent appliance purchasers. In one survey question, without showing them an actual label, we asked respondents to verbally list what type of information was on the energy label. Table 1 shows the results. More than one-half of respondents stated correctly stated that the label showed the efficiency of the appliance (55%) or its operating cost (53%). Smaller percentages were able to provide additional details, and the average number of items listed was 1.8, indicating that the respondents were not very familiar with the detailed information on the appliance label.

[6] The electric utility has the country's largest television advertising account, and the vast majority of the advertising is for the DSM programs.

Table 1. Recall of Label Contents among Thai Consumers Who Recently Purchased an Appliance

What information is on the appliance energy label?	% of 421 respondents who recalled label detail
Efficiency	55%
Electricity cost of appliance	53%
Size of appliance	32%
Electricity units	21%
Other information	13%
Don't know what is on label	18%
Average number of label details recalled?	1.8

We got a more revealing response to another question in which we asked how well consumers felt they understood the label. Eighty-five percent said they either didn't understand the label (22%) or only understood it somewhat (63%) (see Table 2). Only 16% felt that they understood the label well. This response is explained by our semi-structured interviews, in which many consumers said that they only looked at the large, 1 to 5 rating system at the top of the label and did not look at, or did not understand the technical details on the bottom half of the label.

Table 2. How Well Thai Consumers Understood the Appliance Energy Label

How well did you understand the appliance energy label?	% of 421 responses
Didn't understand	22
Understood somewhat	63
Understood very well	16
Understood extremely well	<1%

Notes: Column total exceeds 100% because of rounding.

Strengths of the Thai Label

In Thailand, we only tested one label design, since there is only one style of energy label in Thailand. First, we would show the respondent a number 4 label and ask whether they could tell if it was more efficient than most models. After they responded to this question, we would show them two labels side by side, a number 4 and a number 5, and ask which was more efficient. The Thai label was very effective at conveying the message of energy efficiency. Ninety-one percent of recent buyers were aware of the appliance energy label, and virtually all of these were familiar with the number 1 to 5 rating system, due to the national television advertising campaign to promote the program.

More than half of the Thai respondents (55%) were able to tell that the number 4 label represented an energy-efficient model. When comparing a 4 and a 5 label, three quarters (76%) of

respondents answered correctly that the number 5 model was more efficient than the number 4. In the Thai label comprehension test, our sample was heavily weighted toward rural respondents: 33 of the 42 respondents to this question were from rural districts, where the population tends to be poorer and less well-educated. Since eight of the 9 urban consumers we tested (5 in Bangkok and four in Khorat), responded correctly to both questions, we can safely infer that the actual rate of efficiency comprehension for the urban Thai population would be significantly higher than 55%. Based on the above results, I conclude that it is cognitively somewhat easier for Thai consumers to recognize an efficient Thai label than it is for U.S. consumers to recognize an efficient U.S. label.

The national advertising campaign appears to be very effective and the majority of appliance purchasers are aware of the labeling program and know that they should look for a number 5 model in order to save energy (see results in Chapter 7). At the same time, most consumers only appear to be reading the numerical rating system at the top of the label, and feel uncomfortable with the technical details displayed in smaller print at the bottom of the label. Consumer reluctance to spend time understanding detailed technical information on the label — a reluctance we found among both Thai and U.S. consumers — will be discussed later in this chapter.

Misinterpretations of the Thai Label

In Thailand, I performed in-store tests of label comprehension with 42 consumers. The label comprehension test was shorter and less rigorous that the U.S. label test. I asked two questions. First, while showing the respondent a number 4 label, I asked, "Is this more efficient than most models?" Then I held up a number 5 label next to the number 4 label and asked which label represented a more efficient model. I then asked for general feedback on the design of the label.

Because of the way I performed the test, the only direct comparison I can make between the U.S. and Thai label tests is on their effectiveness at conveying the concept of efficiency. This comparison shows that a higher percentage of Thai consumers were able to use a single energy label as an indicator of whether a model was energy-efficient. While more than half of the Thai consumers (55%) whom we interviewed could tell that a number 4 label was energy-efficient, and three-quarters (76%) could tell that a number 5 was more efficient than a 4, a small minority of those interviewed, mostly in rural districts, had misconceptions about the label. These misconceptions fell into two categories.

The Dial Inside the Refrigerator. We found one misconception exclusively among villagers who had either not been exposed to the nationwide television advertising campaign on the appliance labels, had not paid attention to it, or who only knew about it vaguely. These respondents (4 out of 32 villagers with whom we tested the label) were applying their mental model of the thermostat dial inside the refrigerator to the similarly numbered energy label developed by the Thai DSM Office.

The villagers were clearly very conscious of the cost of operating their refrigerator and prefer to set the thermostat dial in the refrigerator at the lowest (i.e. warmest) levels, 1 and 2. The dial thermostats in Thai refrigerators go from either 1 to 5, or sometimes 1 to 6. It is thus natural for them to link this same numerical rating scheme to the 1 to 5 rating they see on the new energy labels. The result is the opposite of that intended by the DSM Office: these women think that a number 1 refrigerator will use the least energy, and a number 5 will use the most. They are aware of the

television advertisements and assume that the number 4 and number 5 units are being advertised because of their quality, because of their greater cooling ability, and this uses more energy.

Conflation of Efficiency and Quality. In our interviews with both rural and urban Thai consumers, we found a tendency for some consumers to interpret the label as a indication of quality. This tendency is fostered, at least in part, by the text above the numbers which indicates quality and not efficiency: the word "good" appears above number 4, and "better" above number 5. A Thai policymaker recounted to me a revealing anecdote about how the number 5 label had come to confer the idea of "quality" for Thai consumers. In the Thai air conditioning market, imported air conditioners are typically much more expensive than domestically produced models. Prior to the introduction of the energy labelling system, Toshiba's one-ton, wall-type air conditioners sold for about 50,000 baht ($2,000). After the labelling program began, sales of Toshiba units began to fall. Apparently, consumers who had previously bought Toshiba air conditioners because they knew that the imported, Japanese models would be high-quality, were convinced that number 5 rating on some Thai-produced air conditioners meant that these units were of equally high quality. Yet the domestic units sold for about 40% less than the Toshiba models, or around 30,000 baht (US$1,200). In order to avoid losing market share, Toshiba was forced to reduce the price on its one-ton imported air conditioners by 25%, to 40,000 baht ($1,600).

A Common Problem: Too Many Details

Previous research by de Loor and Zeelenberg (1991) has warned of the danger of "masking" a primary message about energy use or energy efficiency with detailed product information. Consumers in both countries often seemed overwhelmed by the technical nature of the information presented in the labels. In the U.S., respondents often replied in frustration that they would have to be technical specialists to fully understand the label:

> [When asked if he could tell whether the label represented an energy-efficient model:] Not as a simple citizen, if I would be a, a electrician or something, I'd be more able (59-year-old cabinet maker with a high school education).

> [When asked how he would compare two models to see if the energy-efficient model would pay for itself over time:] I'm sure there's a mathematical equation that you could punch in to figure that out (32-year-old electrician with a high-school education).

Thai respondents voiced similar concerns about the presentation of too many technical details on the Thai energy label. This comment came from a 32-year-old soldier with a high-school degree and two years of higher education in marketing:

> I don't understand it very well, some points I don't understand. Like it says, efficiency 240.08 cubic decimeters per kWh, right? For regular people, this will be difficult to understand. But for students or technicians, they'll know what the word "decimeters" means and how big it is ... But for the most part, they won't be that interested.

Conclusions

This paper assesses the extent to which consumers look at energy labels during the purchase of appliances in the U.S. and Thailand. Most consumers in both countries reported looking at the label while they were shopping for an appliance. However, only a small minority of consumers in either country reported that they read the labels carefully, suggesting that most consumers are likely to glance at the label briefly and read it only in passing. This finding argues for the need to provide a clear, simple message on the appliance label in large, bold font, and to supplement this with detailed information that does not detract from or mask the primary message.

In my tests of detailed label interpretation, the U.S. EnergyGuide label fared poorly. Most respondents were able to interpret operating cost, but fewer than half were able to interpret whether the label identified an efficient model. And one-third of respondents were unable to "see" the comparative scale of energy use and thus uses this as a basis of comparison with other models. The comprehension scores for the new EnergyGuide label were slightly higher than for the old label on all of these criteria. Unfortunately, the new label was always presented after the old label on the comprehension tests, so I cannot assess with confidence how much better the new label is.

In an effort to understand how well the old and new EnergyGuide label designs are received by consumers, I asked consumers which label they preferred and which was easier to understand. The majority of consumers said that the new label was easier to understand because it was simpler, and because they could more easily see where the model fell on a scale of relative energy use, compared to other models. However, there was strong resistance among most consumers to the use of kilowatt-hours, rather than dollars, as the primary metric on the new label. Consumers' suggestions on how to improve the new label fell into two categories: to put a single dollar figure in very large font at the top of the label above the scale; and to use dollars, instead of kilowatt-hours as the metric on the scale.

Compared to the U.S. respondents, Thai consumers had fewer misconceptions about the meaning of the label. Most of the Thai respondents focused exclusively on the 1 to 5 ranking at the top of the label, but few were comfortable reading the technical details on the bottom half of the label. This aversion to reading the technically oriented bottom half of the label is supported by the finding that the vast majority of Thai consumers responded that they either did not understand the label (~22%) or understood it only somewhat (~63%). While the Thai label appears to succeed at conveying the concept of energy efficiency through the 1 to 5 rating system, the label also appears to intimidate many consumers who do not feel fully comfortable interpreting the technical details on energy use, operating cost, and size at the bottom.

A comparison of the results from the U.S. and Thai label comprehension tests indicates that a higher percentage of Thai than U.S. respondents were able to tell whether the energy label represented a model that was more efficient than most models. I conclude that the Thai label is more effective at conveying the concept of efficiency than is the U.S. label.

We found two types of misinterpretations about the label among a small proportion of the villagers we interviewed in upcountry Thailand. A number of consumers — mostly rural, but some urban —viewed the label as a quality rating and assumed that the models with higher-ratings, such as 4 and 5, were the highest quality available. While this is good from the point of view of an energy advocate, it has the potential to mislead and disappoint consumers if the energy-efficient product is not

actually a high-quality product. We found another misinterpretation among respondents in one village. They confused the numbering system for labels, with the similar numbering system on the thermostat inside the dial with the numbering system on the label, indicating that they preferred to keep their refrigerator at 1 or 2 and that a refrigerator rated 4 or 5 would be too cold for their needs.

A common response from consumers in both countries was that the labels were too detailed and not easy enough to read. Consumers often seemed overwhelmed by the technical nature of the information presented in the labels. This finding is consistent with research previous research in the Netherlands (de Loor and Zeelenberg 1991) which has shown that information not essential to the primary message of the label often has the effect of "masking" the primary information and reducing, or slowing, consumer understanding.

In summary, after just two years of program implementation, the Thai label appears to be more effective than the U.S. EnergyGuide label, which has been on appliances for nearly 20 years. The Thai label is more effective at conveying the concept of energy efficiency, and consumers are less likely to misinterpret information on the label. One reason for the relative success of the Thai energy label is that the Thai policymakers who developed it used a marketing framework; they developed a national television advertising campaign to promote the label and the accompanying message that it is important to save energy and protect the environment. It is possible that, in part, the high level of consumer understanding of the Thai label is due to the advertising campaign as opposed to the label itself. By contrast, the U.S. label has no outreach program, either through the media or retailers, to promote the label as a tool for improving energy efficiency.

Despite the success of the Thai label, it has some weaknesses in common with the U.S. label: it has too many details, suffers from information clutter, and is not carefully read by the majority of consumers. There was also a tendency among a minority of consumers to misinterpret the label, which limited its effectiveness with these buyers. The lesson to be learned by policymakers is that consumer research using some of the techniques described in this paper — e.g., participant observation, in-store interviews, and surveys — is an essential element to the development of effective energy labelling programs.

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