5. Designing and Implementing a Labeling Program

Guidebook Prescriptions for Designing Labels

1. **Decide early which products warrant labeling and whether the program will be mandatory or voluntary.**
2. **Work closely with stakeholders. Elicit broad support from manufacturers and retailers during design of the program.**
3. **Develop a program for testing appliances using either accredited domestic, regional, or international test laboratories. Specify energy- and non-energy-performance tests as well as rules to establish label categories and define tolerances. Consider using international or regional test procedures.**
4. **Develop a system for certifying label testing and registration for each product.**
5. **Conduct some consumer research prior to implementing a labeling program. Use this research as the basis for designing an effective label.**
6. **Use a consistent label format for all product types to make it easier for consumers to understand the label, which will increase its overall effectiveness as a policy measure.**
7. **Budget resources for ongoing program promotion and marketing, policing and enforcement, and updates of test procedures and new technologies on the market.**
8. **Develop an evaluation plan at the beginning of the program. Collect both process and impact data. Use the results to improve the program.**

5.1 The Basics of Energy Labeling

This chapter addresses a range of issues that should be considered when designing an energy-labeling program for appliances, equipment, or lighting products. It also describes the steps to be taken in implementing such programs. Although we do not address building products that do not directly consume energy, such as windows, much of the material in this chapter could apply to the development of labeling programs for these types of products as well. Labels that go beyond individual products and describe the energy consumption of whole buildings and industrial systems are beyond the scope of this guidebook.

5.1.1 Why Energy Labeling?

The goal of an energy-labeling program should be to encourage consumers to purchase the appliance that provides the services they need, using the least possible energy.

Helping consumers use less energy is the most obvious goal of an energy-labeling program. However, it is important that the service provided by the appliance that consumes the energy also be a focus of the program. Energy service is the benefit that a consumer or user receives as the output from an appliance or piece of equipment—for example, comfort, food preservation, clean and dry clothes, cooked food, or light for working. Together, energy use and energy service define the energy efficiency of a product—that is, energy service output per unit of energy input.

The energy efficiency of an appliance is an invisible attribute. Without a credible energy label, a consumer looking at an appliance can tell little or nothing about its energy efficiency. Yet energy consumption determines the operating cost of most appliances and is therefore of concern to the consumer. Consumers are sometimes aware of basic details about a product, such as wattage, and act on that information—for example, by buying 18W compact fluorescent light bulbs instead of 60W incandescent ones. But wattage is no substitute for the information an energy-labeling program provides—information that would not otherwise be available to consumers.

Energy labeling of appliances, equipment, and lighting products helps improve overall energy efficiency. The first evaluation of the impact of the recent EU labeling scheme for refrigeration appliances, washing machines, and lamps, for example, shows a measurable shift toward sales of the more efficient appliances. The sales-weighted average energy efficiency of refrigeration appliances improved by 29% between 1992 and late 1999. It is estimated that 16% of the impact is due to minimum efficiency standards and 10% is due to the impact of labeling (Bertoldi 2000).

5.1.2 How Energy Labels Affect Both Consumers and Manufacturers

An energy label works in three main ways. The label:

- provides consumers with data on which to base informed choices (to select the most efficient and suitable product available),
- encourages manufacturers to improve the energy performance of their models, and
- encourages distributors and retailers to stock and display efficient products.

On the consumer side, energy labels promote the purchase of efficient models. Energy labels provide consumers with information that would otherwise be unavailable and allows them to factor operating costs and energy use into the decision-making process. Even policy makers who oppose government regulation tend to support energy-labeling programs because such programs provide a public good, namely information for consumers, so markets can operate more efficiently.

On the manufacturing and distribution side, labels may have even more impact than on the consumer side. Once a label is seen as having an actual or potential consumer impact, manufacturers tend to (though don't always) respond by removing their worst models from the market and improving the efficiency of their current models. The authors have observed, for example, that many new products being produced in the EU are being designed to barely meet the threshold for one of the higher-efficiency categories. Distributors and retailers also tend to change what products they stock and display in response to labels. These changes result in an improved average efficiency of all products available on the market—not just those sought by energy-aware consumers. The regulatory aspects of an energy-labeling program are relatively non-intrusive, usually requiring that information be presented in a standardized format and that manufacturer claims be accurate.

Energy labels serve an additional purpose: they can provide information and a target that many other energy-efficiency programs will seek to meet or beat. These other programs include utility incentive programs, government procurement efficiency specifications, and building energy codes. These effects of energy-efficiency labels are discussed in Chapter 9.

5.1.3 Elements of a Labeling Program

From a consumer's perspective, the energy label itself is the most important and most obvious element of an energy-labeling program. The label design is critical because it must convey information in a way that is easy to understand and assists the consumer with purchase decisions.

However, the energy label that appears on a product is only the first part of a more elaborate infrastructure of elements and activities that form the foundation of an energy-labeling program. Although consumers may not be aware of many of these elements, the infrastructure is critical to the program's success and must be carefully planned, implemented, and maintained to ensure that the program is effective. Elements required to develop an energy-labeling program include:

- Initial program decisions. Decide which products should be labeled and whether the labeling program should be voluntary or mandatory.
- Product testing. Establish test laboratories; agree on test protocols, reporting, and registration procedures.
- Label and program design. Conduct consumer research, design label format, agree on technical issues such as establishing category boundaries and tolerance limits.
- Implementation. Market and promote the program, monitor and enforce compliance, update test procedures, evaluate regularly to improve program design.

These steps in developing a labeling program are shown in Figure 5-1 and described in the sections that follow.

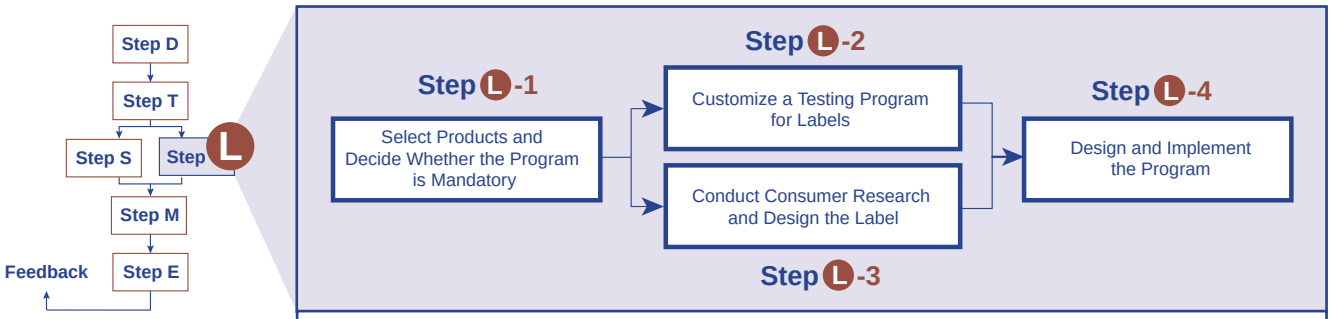


Figure 5-1 Major steps in designing and implementing a labeling program

5.2 Step L-1: Select Products and Decide Whether the Program is Mandatory

5.2.1 Which Products Should Be Labeled?

Before a labeling program can be designed, policy makers need to decide which products should be included in the program.

As a general rule, energy labeling will work best for products:

- that use a significant amount of energy,
- that are present in most households (or where rapid growth is predicted),
- for which energy-efficient technology exists that is not being used in most products on the market,
- for which the purchaser pays the energy bills,
- that are purchased by the owner at a retail business (i.e., where the owner inspects items prior to purchase), and
- for which there is (or could easily be) significant variation in the energy efficiency of different units.

If one or more of these conditions are not met, then the effectiveness of energy labeling may be diminished. For products that do not meet these conditions, policy makers should explore alternative program measures.

For some product types, energy-efficiency standards, rather than labeling, may be the best alternative. This is especially true for products like water heaters and central air conditioners that are generally purchased by a third party (i.e., the purchaser does not pay the energy bills). For other products, such as refrigerators, energy-efficiency standards and labels work best together.

There will always be an element of the market that is “energy label resistant.” Many consumers are uninterested in energy use and will ignore the message provided by labels. Still, an energy-labeling

program can achieve significant energy savings even when a large number of consumers ignore the information on the labels.

5.2.2 Mandatory or Voluntary?

Once the products for the labeling program have been chosen, policy makers must decide whether the program should be mandatory or voluntary. Although several countries have implemented voluntary energy-labeling programs, experience suggests that, as a rule, mandatory programs work best. The reason is that manufacturers with poor energy ratings tend not to declare the energy consumption of their products under a voluntary program. If products with a poor energy rating have no labels, some consumers who might avoid these products if they had all the information will end up buying them. Ultimately, labeling programs work best if all products are labeled and if consumers can easily distinguish between poor-, average-, higher-, and highest-efficiency products.

5.3 Step L-2: Customize a Testing Program for Labels

A labeling program is unlikely to be effective unless a testing program is in place. Initiating a testing program requires access to competent testing laboratories, either government-owned or in the private sector. Testing laboratories should be accredited and/or certified to ensure accuracy and confidence in the test results. The results of initial testing of a sample of products can be used to:

- characterize the efficiency of the market,
- estimate the potential savings from the labeling program,
- serve as the basis for developing the label categories, and
- provide the energy-performance results used to label each product.

5.3.1 Design of the Testing Program

The design of the testing program for any given product should include the following three essential elements:

- Energy consumption. A description of the test that must be performed on the product to yield a valid energy consumption value that will be shown on the energy label. For example, the test might specify energy use per day, per hour, per month, or per cycle.
- Performance. A description of other measurements or separate tests that must be performed to establish the product's capacity (e.g., kW cooling capacity for air conditioners, liters internal volume for refrigerators) or function/performance (e.g., a washing and drying index for dishwashers).
- Tolerance. Rules specified by regulators to ensure that values reported by tests are within acceptable error bands and to provide for retesting and resolving any apparent differences in results.

The label design and layout described in Section 5.4 significantly affect the tests that can be usefully performed. The tests must verify all the important information on the label. In parallel with the testing program, specifications should be developed for the energy label (size, color, typefaces etc.), how the energy consumption information for a specific model will be presented on the label (e.g., how to calculate and indicate the category or relative energy use), and how the label will be placed on products.

Energy-test procedures are a critical underpinning for all energy programs that seek to measure and improve the energy efficiency of appliances and equipment (Meier 1997, Meier 1998). Test facilities, test procedures, and the basic elements of a testing program are discussed in Chapter 4.

There is a range of approaches to publishing the rules mentioned above. Some tests and rules may be published as formal standards by a country's standards-setting agency or by an international agency such as the International Standards Organization (ISO) or International Electrotechnical Commission (IEC). Alternatively, lawmakers in any country may publish all energy-related requirements—from the test procedure to the requirements for energy labeling—in an official government regulation. Or they may include little technical information in regulations and instead publish the technical requirements for testing and the regulatory requirements for labeling in local technical standards (which can be issued by the government's standards body).

In practice, there is a continuum between these approaches, and the approach differs in every country. Experience suggests that if large volumes of technical requirements are embedded within regulations, then these requirements can be difficult to change and keep up to date. The other problem with the extensive reliance on regulations is that often the people responsible for writing regulations, usually lawyers, are not experts in energy efficiency, so drafting errors can be common unless the text is verified carefully.

There are also cases in which a number of states, provinces, or countries have separate laws and regulations but are implementing a common labeling program (e.g., the Australian states, Canadian provinces, and European countries). In cases like these, it is preferable to have technical requirements referenced to a single source (e.g., a national or international standard) rather than replicating copies of the requirements in numerous separate acts or in local legislation.

5.3.2 Registration and Test Reports

There is a range of varying requirements for the certification of test results. Often, but not always, certification involves some form of registration or filing of test reports. Many countries, including Europe, the U.S., and Australia, allow manufacturers to self-certify their products. The cost of the testing and certification program depends directly on how stringent the process is. Self-certification only works, however, if the regulatory agency can effectively police compliance. In any case, the total costs associated with product testing for an energy-labeling program are relatively small in comparison to the total costs of product production, although the cost of testing for products exported to multiple countries with differing test requirements can significantly reduce manufacturers' profit margins.

In some countries (e.g., in Australia and the U.S.), manufacturers have to submit test reports for approval of an energy label. These reports are usually submitted as part of the process of product registration. An alternative approach, used by the EU, is to require manufacturers to retain copies of the formal test reports until manufacturing of the model has ceased (or, more commonly, for a period of some years after manufacturing has ceased). The manufacturer is usually required to produce these test reports only if there is a question regarding the validity of the label claims. Although this approach reduces the governmental administrative costs associated with the program, it makes verifying declared performance difficult. It also may make it difficult to track products on the market and to monitor the compliance and accuracy of the information on labeled products.

5.3.3 Harmonizing Labels among Neighboring Countries

Energy labels should be designed to provide consumers with a comparative measure of energy efficiency. Where products are compared using a category-type rating scale, such as stars, numbers or letters, algorithms for energy efficiency need to be tailored to regional or national markets based on currently available products and the local test procedure used to determine energy consumption. Although in many ways it is difficult, if not impossible, to translate current energy rating systems from one country to another, the benefits can be large. Often, mutual recognition agreements (MRAs, see Section 3.3) are useful. A common harmonized test procedure and a universal efficiency categorization scheme are worth pursuing to facilitate trade and reduce the cost of regulation.

The design of the energy label does not need to be harmonized. In fact, customization that accounts for local cultural differences is generally believed to be beneficial for facilitating communication and maximizing consumer understanding. For example, reversing the image of the European-style label for use in countries where language is read from right to left, as was done in Iran, is important. It is also likely that maintaining some common design themes within trading regions is worthwhile to facilitate general association and recognition among labels in neighboring countries.

One scheme for harmonizing the energy label internationally is a system where manufacturers would provide a data label with each unit that gives the product's trademark and basic energy-efficiency numbers. Retailers could apply country-specific energy labels to showroom units, and the data label from the manufacturer could be added to the energy label. The energy label would interpret the data on the data label in the language of the country where the product was being sold. This way, individual manufacturers would not have to print an energy label for each unit sent to each country. This system is used in the EU. For this system to work efficiently, test procedures and the data label must be harmonized internationally.

5.4 Step L-3: Conduct Consumer Research and Design the Label

The label design is what consumers actually see when they go to purchase an appliance. Although the details of energy labels for different products may differ slightly, it is important to keep a consistent label

style and format across product types. This makes it easy for consumers, who can learn to understand one type of label to evaluate different products. The sections that follow show how policy makers can draw on consumer research and international experience with labeling programs to design as effective a label as possible.

5.4.1 Deciding on the Type of Label

One of the first steps in label design is to decide what type of energy label to use. Broadly speaking, there are three kinds of energy labels in use around the world (Egan 1999, Harris and McCabe 1996):

- endorsement labels,
- comparison labels, and
- information-only labels.

Endorsement labels

Endorsement labels essentially offer a "seal of approval" that a product meets certain pre-specified criteria. They generally are based on a "yes-no" cutoff and offer little additional information. One example of an endorsement label for energy efficiency is the ENERGY STAR® label in the U.S. The first national energy-efficiency endorsement label was the U.S. Environmental Protection Agency (EPA) Green Lights label. Subsequently, the ENERGY STAR® label was applied to computers that have energy-saving features. The EPA/DOE ENERGY STAR® label's use in the U.S. has now expanded to cover heating, ventilation, and air-conditioning equipment; office equipment; consumer electronics; transformers; lighting and windows; insulation; and some home appliances. The Power Smart label was developed similarly by a Canadian utility to apply to a range of electrical products. Typically, endorsement labels are applied to the top tier of efficient products in a market. Another type of endorsement label is the "eco label." Eco labels indicate that a product or process has superior environmental performance or a minimal environmental impact. Eco-labeling programs are being implemented by a number of governments and NGOs in countries around the world. Some eco-labeling programs include energy efficiency as one component in the label rating scheme, but it is rarely the primary factor in the rating (see Insert Box: *The ENERGY STAR®Program*).

Comparative labels

Comparative labels allow consumers to compare energy use among all available models in order to make an informed choice. Two subcategories of comparative labels have been developed around the world: one uses a categorical ranking system; the other uses a continuous scale or bar graph to show relative energy use.

Categorical—Categorical labels use a ranking system that allows consumers to tell how energy efficient a model is compared to other models on the market. The label may or may not also contain detailed information on the operating characteristics, costs, and energy use of the models. The main

The ENERGY STAR® Program

ENERGY STAR® is a voluntary partnership among the U.S. DOE, the U.S. EPA, product manufacturers, local utilities, and retailers to promote energy-efficient products that qualify for the ENERGY STAR® label. The program was created to educate consumers about energy-efficient products and help them save money and energy while improving the environment through reducing the air pollution and CO_2 emissions associated with energy production.

Since its launch in 1992, the ENERGY STAR® label has become a national, consumer-oriented symbol for energy efficiency. The power of the ENERGY STAR® labeling model results from the fact that it provides a flexible foundation on which many key partners can develop their own individual initiatives. Manufacturers, utilities, retailers, and other organizations that promote energy efficiency have developed efforts around the ENERGY STAR® brand. The impact of each of these individual efforts is magnified by each one's association with the national ENERGY STAR® brand effort. Partners' efforts, along with those of EPA and DOE, related to program development, consumer education, and public recognition of partners' accomplishments blend together to advance a national strategy.

To date, the program has labeled more than 31 product types, including household appliances, compact fluorescent light bulbs, exit signs, consumer electronics (televisions, audio systems, etc.), computers and other office equipment, residential heating and cooling equipment, windows, residential lighting fixtures, utility and customer-owned distribution transformers, roof products, and insulation. Other product labels are still under development. Twenty-five retail partners with more than 4,600 storefronts participate, as do utilities and state administrators that service 60% of American households. For more information, visit www.energystar.gov.

International agreements with Europe, Japan, and other countries promote use of the ENERGY STAR® label in the increasingly global market for office equipment. Although the labeling program initially targeted individual consumers, EPA and DOE have also begun to work with government, corporate, and institutional buyers through the ENERGY STAR® Purchasing Program. A free Purchasing Toolkit as well as on-line information (www.epa.gov/appdstar/purchasing/) provide purchasing specifications and software to help buyers estimate their energy and cost savings. See the end of this chapter for a sample ENERGY STAR® label.

emphasis is on establishing clear categories, so a consumer can easily tell, by looking at a single label, how energy efficient a product is relative to others on the market.

Continuous Scale—Continuous scale labels provide comparative information that allows consumers to see where the labeled unit fits into the full range of similar models without sorting performance into specific categories.

Information-only

Information-only labels provide data on the technical performance of the labeled product but offer no simple way (such as a ranking system) to compare energy performance among products. These types of labels contain purely technical information and are generally not considered to be very consumer friendly.

The choice of which label type to use is not always easy. It certainly depends on local consumer knowledge and attitudes. Endorsement labels require the least thinking by the consumer but also provide the least information. If they are well publicized, they may resonate with environmental sympathies and be quite effective, at least with a segment of consumers. Categorical comparison labels provide more information about energy use and, if well designed and implemented, can provide a consistent basis for buyers to focus on energy efficiency from one purchase to another, across or within equipment categories. Furthermore, they can provide a clear basis for other market-transforming programs such as the utility demand-side management incentives discussed in Chapter 9. Continuous comparison labels can transmit more detailed information on relative energy use, but research has shown that this label format may be difficult for consumers to understand (du Pont 1998, Egan 2000). Information-only labels are generally effective only for the most educated and economically and/or environmentally concerned consumers. They do not allow easy comparison with other models in the marketplace.

5.4.2 Conducting Consumer Research for Label Design

One of the best ways to make sure that an appliance efficiency label will communicate effectively with consumers and will be embraced by policy makers and manufacturers is to incorporate market research into its development. Consumer research can determine how understandable the label is and point out what appeals to and persuades consumers. In addition, sharing research with government and industry officials will acquaint them with consumer preferences and foster buy-in of a label design that is effective for consumers.

Market research can take a number of forms and can be extensive or modest. However, the important idea behind this research is that it encourages a wide set of views to be included in the label development process. It also assures that some level of agreement about the "best" label design will be forged. Given that a good deal of money will likely be spent to develop, implement, and evaluate a labeling program, market research is a small investment to help ensure the program's success.

The best market research approaches are likely to vary somewhat from country to country, and it would be good for those developing efficiency labels to consult with local market research experts to understand the methods available. In general, however, two major types of market research are available:

- Secondary research analyzes and applies the results of past market research to the current situation. Insights from secondary research can be a substitute for gathering new information and can help inform primary research efforts. However, given that label preferences may be quite subjective and may change across cultures, it is important to make sure that the secondary research is valid for the current context.

Research in India

To understand India's diverse consumers and to develop an appliance efficiency label that would attract, persuade, and communicate clearly to consumers, USAID/India sponsored a three-phase, two-year consumer research project. Phase I, a baseline survey, set the stage for many decisions that followed, including whether or not label development should proceed. In-home interviews with 1,833 urban consumers in six major cities revealed that:

- because of their penetration and brand homogeneity, refrigerators would be the best appliance for initial standards and labeling;
- consumers could be reached through a labeling regime and would respond very positively to such a regime;
- the label design needed to appeal to both men and women because both were involved in buying decisions;
- consumers did not connect energy efficiency to appliance purchases even though energy issues (e.g., shortages, quality) were of high concern to many consumers;
- for the labeling program to be effective, a strong marketing/information campaign would need to be coupled to it; and
- program planning should address consumers' distrust of appliance salespeople and resulting heavy reliance on manufacturers and word of mouth in appliance purchase decisions.

Phase 2 convened 10 qualitative consumer focus groups to test 17 label designs constructed from existing successful label formats elsewhere, using design elements meant to appeal to Indian consumers. Consumers reviewed the options and selected the ones they found most understandable, appealing, and persuasive. The groups also "constructed their own favorite label" from the individual label elements. Despite the many label formats and elements, much consensus emerged. Consumers favored and best understood two label types, one using stars as the rating scale and one using a single-bar, sliding scale. Participants also identified many specific likes and dislikes.

Phase 3 consisted of a focus group to factor the opinions of key government and appliance industry experts into the label development process and a quantitative survey of 673 consumers who were placed in a buying context. Consumers rated four "final" labels for their appeal, comprehensibility, and persuasiveness. Although all four labels scored high, some differences in these three areas resulted in the recommendation of the Indian Power Savings Guide label shown at the end of this chapter.

Source: IRG 1999

- Primary research collects new quantitative or qualitative information. Quantitative research uses survey approaches with randomly selected samples of a particular population. Surveys can be done in person, by telephone, or by mail. The results of quantitative surveys can be projected to the whole population from which the sample is drawn. The most common form of qualitative research is called a focus group, in which a small number of people with certain characteristics (e.g., recent buyers of refrigerators) are recruited to participate in a facilitated discussion about a particular topic. Qualitative research provides valuable insights about the in-depth and subjective views of key audiences, and it is particularly useful for gathering responses to visual information such as labels. However, the results of qualitative research cannot be statistically generalized to the greater population.

One good example of using consumer research to develop an effective label design comes from India (see Insert Box: *Research in India*, previous page). Researchers there used a phased approach that included both quantitative and qualitative research methods and involved not only consumers but also other key audiences (IRG 1999). The final label design was therefore based on broad consensus among these various audiences.

The most common type of energy labels shows five, six, or seven categories of efficiency.

Table 5-1 Comparison of Selected Label Types from Around the World

Country	Type of Label	Comments
Australia	Comparative with categories	Six categories range from 1 to 6 stars; 6 stars is most efficient.
Brazil	Comparative with categories	Seven categories range from G to A; A is most efficient.
Canada	Comparative with continuous scale	Scale shows range of models in size class; energy use is the scale metric.
European Union	Comparative with categories	Seven categories range from G to A; A is most efficient.
Iran	Comparative with categories	Seven categories.
Philippines	Information-only label	Labels for air conditioner only; show energy-efficiency ratio (EER) of air conditioner.
South Korea	Comparative with categories	Five categories range from 1 to 5; 5 is most efficient.
Thailand	Comparative with categories	Five categories range from 1 to 5; 5 is most efficient.
United States	Comparative with continuous scale	Scale shows range of models in size class; energy use is the scale metric.

5.4.3 Deciding on a Label Format

The end result of the consumer research should be a label design that is effective and easily understood by consumers. If a comparative label is chosen, it is useful to review the format of similar energy labels that are currently being used in most countries around the world that have undertaken labeling programs (see Table 5-1).

The basic formats in use around the world for comparative labels can be grouped into three basic styles, as follows:

Australian-style label

The Australian style label tends to have a square/rectangular base with a semi-circle or "dial" across the top. The "dial" resembles a speedometer or gauge; the further advanced the gauge is in the clockwise direction, the better the product. This type of label is used in Australia, Thailand, and South Korea and is proposed for India. The number of stars or the "grading" numeral on the scale depends on the highest preset threshold for energy performance that the model is able to meet (there are five, six, or seven rankings in these cases; Australia is moving to half stars). See the end of this chapter for samples of the Australian (old and new), Thai and Indian labels.

European-style label

The European style label is a vertical rectangle with letters ranging from A (best) near the top of the label to G (worst) at the bottom. There is a bar next to each letter: e.g., short and green for A and long and red for G. All seven grade bars are visible on every label. The grade of the product is indicated by a black arrow marker located next to the appropriate bar (e.g., for a C-grade product the marker carries the letter C and is positioned against the C bar). Because of EU language requirements, the label is in two parts. The right-hand part, which shows the data, is not language specific and tends to be affixed or supplied with the appliance at the point of manufacture; the left-hand part, which gives the explanatory text, is language specific and tends to be supplied and affixed in the country of sale. This label is used throughout Western Europe and in parts of Eastern Europe. Iran uses a variant of the European-style label that is a mirror image because of the direction of Persian script and uses numerals rather than Roman script letters for rankings: i.e., 1 (best) to 7 (worst). Brazil also uses a European-style label. See the end of this chapter for samples of the European and Iranian labels.

U.S.-style label

The rectangular U.S.-style label shows energy cost (based on the national average energy tariff). It also has a linear scale indicating the highest and lowest energy use of models on the market and locates the specific model on that scale. This type of label is used in the U.S. and Canada, where labels are now technically but not visually harmonized (e.g., U.S. labels show energy costs, and Canadian labels do not). In both cases, use of monetary units (dollars) was abandoned in favor of physical units (i.e., kilowatt-hours or efficiency) because variability in energy prices causes labels based on outdated prices to be misleading. See the end of this chapter for samples of the U.S. and Canadian labels.

Variants

There are a number of variants or hybrids of the three types just discussed.

It is important to remember that an energy label is primarily effective at the point of sale and is not designed to affect ongoing consumer behavior and energy use. The label should therefore be designed to influence consumer decisions at the time of purchase. After a product is purchased, the energy label is normally removed. It therefore makes little sense to design an energy label that aims to influence consumer behavior or use of the product during normal operation. Generally, other types of programs can be designed to influence consumer operation of appliances. One caveat to this last point is that a very effective labeling program can help to create an identity or culture for energy efficiency and thus can provide a springboard for broader awareness campaigns aimed at affecting behavior. This is one of the advantages of a program like Thailand's labeling program where, the top-ranking symbol, "# 5," has become synonymous with saving energy.

5.5 Step L-4: Design and Implement the Program

5.5.1 Stakeholder Involvement

One of the first steps in designing a labeling program should be to convene representatives of all interested parties and get input regarding how the program should be designed and marketed. This process of stakeholder involvement can run parallel to the development of the testing program and label design. Stakeholder interviews and meetings should be used to formulate and test the mechanics of how the program will operate. Some program design questions that need to be addressed include:

- Will the labeling program be voluntary or mandatory?
- Which agency will lead the overall program?
- Which agency will manage product testing?
- Will private-sector laboratories be certified for testing?
- Who will issue the labels?
- How will the labels be displayed on the product?
- How will monitoring and enforcement work?
- Who will evaluate the program, and how often?
- How can consumers be convinced that the label is credible?
- How can salespeople be recruited to promote the program?
- Will the labeling program pave the way for minimum efficiency standards?

Most of these questions can be answered through a process of group and individual meetings with key stakeholders. Eventually, if the stakeholder process is well managed, the private sector will buy into and support the program.

Below, we briefly describe the main groups of stakeholders who are typically affected by an energy-labeling program and can be approached to help design and promote the program.

Manufacturers

Manufacturers are key stakeholders. They are the source of the products to be labeled and are generally responsible for testing products and placing energy labels on products they sell. Because they have designed their products and have, in most cases, tested them extensively according to local and international test procedures, it is critical that any labeling program include a full and ongoing dialogue between the manufacturers and the implementing agency.

The primary goal for most manufacturers is to make products that consumers will want to purchase. Manufacturers have to balance a wide range of elements of product design, including quality, reliability, performance, and price. The introduction of energy labeling makes the product's energy efficiency an important design parameter, at least in cases where the label is effective and is used as a decision tool by a significant percentage of consumers. Manufacturers of the most efficient products tend to be more supportive of energy labeling, while those that have large sales of low-efficiency products tend to be opposed to or less supportive of labeling.

The implementing agency

The implementing agency is often a government body, although this need not be the case. Its role in an energy-labeling program includes:

- defining the detailed technical requirements in consultation with other stakeholders;
- developing and maintaining the legal and/or administrative framework for the program;
- registering, policing, and enforcing compliance, if applicable, to ensure that the program remains credible;
- providing information to consumers, including ensuring press and TV involvement in the promotional campaign; and
- evaluating the program.

Retailers

Retailers are often considered to be minor stakeholders in an energy-labeling program. However, salespeople influence the appliance purchase decision in a large percentage of cases. One study found that U.S. salespeople have a significant influence in approximately 30-50% of sales of "white goods" (refrigerators, freezers, dishwashers, clothes washers, dryers, and stoves) (du Pont 1998). Salespeople's

attitudes can range from highly supportive of paying the extra cost for energy-efficiency features to neutral or negative regarding energy efficiency.

Retailers can play a very supportive and positive role in energy-labeling programs if they are actively engaged by the implementing agency to assist in marketing of the programs, if retailer training is provided. On the other hand, retailer impact can be negative if increased energy efficiency reduces profit margins or if there is low regard for energy-saving features. It may be in the interest of retailers to denigrate the credibility of the label or to discount its importance if they believe that this will improve their chances of a sale or increase their profit. Unfortunately, many salespeople work on a commission basis, which may provide them with an incentive to sell models with extra features that use additional energy rather than promoting energy-efficient models.

Consumers and consumer groups

Consumers are a diverse and diffuse group. It takes significant work to obtain reliable information about consumer use and understanding of energy labels. It takes even more effort to determine the changes in consumer purchasing patterns that are likely to result from the presence of an energy label. Nonetheless, consumer involvement is critical in all phases of the program, from market testing of label designs with focus groups to consumer surveys to marketing the program and disseminating information. Consumers cannot be expected to change their purchasing patterns if information is poor or unavailable or if the label is unclear and difficult to use.

Consumer groups can be critical stakeholders. In many countries, consumer organizations have their own internal, independent test laboratories and are able to provide well-balanced input to technical discussions. There is growing awareness among some consumer groups

Asian Consumer Declaration

Worldwide, mainstream consumer groups are taking an active role in campaigning on environmental and energy-related issues. At a recent Asia-wide forum on sustainable energy use and consumer information, the NGO delegates listed appliance labeling as one of their primary policy recommendations. The declaration is excerpted below:

"The Forum gave unanimous support to the establishment of appliance labeling schemes for the widest possible variety of electrical products. While a voluntary system may be adopted initially, it is believed that a compulsory system, based on legislation, is preferable and more effective in the medium to long term. The Forum participants noted the variety of different forms of labels currently in use in different countries, and expressed the strong view that labels should be kept as simple as possible and may include a simple categorical rating scheme (e.g., 1-5 stars, A-G categories). Labels should indicate estimated annual energy use in monetary terms rather than kilowatt-hours. Any categorical system of labeling may need to adjust or recalibrate its rating system periodically so as to distinguish adequately between the efficient and non-efficient products. While consumer organizations need not be directly involved in the implementation of labeling schemes, they should have a role in monitoring compliance by appliance manufacturers."

Source: UNESCAP 1999

that energy use is a central element in the environmental problems that many countries face. These groups can provide important input on a range of issues including testing, labeling, program marketing, and public awareness (see Insert Box: *Asian Consumer Declaration*).

Environmental groups and NGOs

In cases where non-government bodies are large and sufficiently well funded to actively participate in the process of developing and maintaining energy labels, they can provide valuable input. Environmental NGOs are taking an especially keen interest in energy efficiency as concern over climate change spreads. Increasingly, NGOs are developing the skills to analyze and advocate energy-efficiency policies. In cases where NGOs have relevant expertise, they can play an important role in advocating an aggressive and effective labeling program. In this sense, NGOs can help keep implementation agencies focused on broad goals and program outcomes.

5.5.2 Program Marketing and Promotion

Placement of an energy label on a product is only the first step in attempting to influence consumers' purchase decisions. Research has shown that education and promotion are valuable aids in making the label effective. There are a number of related program measures that increase the effectiveness of an energy label. These include:

- retailer support for the program (hostile retailers can neutralize the impact of labels),
- government promotion of the program (e.g., frequent public service announcements and annual efficiency awards),
- publication of lists of current models on the market (e.g., a brochure and an Internet site that are easily accessible), and
- point-of-sale information and support.

Promotional marketing is most effective when consumers are subject to numerous, consistent messages regarding energy efficiency, not just as part of the energy-labeling program but also in other, related energy programs that may be running in parallel. These repeated messages reinforce a culture of energy efficiency among consumers and industry and help to create an energy-efficiency ethic within the country.

5.5.3 Policing and Enforcement

For a mandatory labeling program to be truly effective, there needs to be some mechanism to ensure that manufacturers, distributors, and retailers comply. For a mandatory labeling program, it is usually necessary to have some sort of a policing and enforcement scheme to assess the extent to which labels are not displayed on products. Violation of the labeling requirement must be penalized to discourage continued noncompliance.

If an energy-labeling program is to be credible to the public, it is necessary to ensure that claims made on any energy label are reasonable and accurate. This requires verification of the claims made on labels (capacity, performance, and energy consumption, as applicable) through independent testing. In a competitive market, much of the policing of this nature can be undertaken by competing manufacturers. More discussion of policing and enforcement can be found in Chapter 7 (Sections 7.4 and 7.5).

5.5.4 Program Evaluation

To assess whether energy labels are effective, a policy maker can ask three basic questions:

- Are consumers aware of the label?
- Do they understand it?
- Do they change their behavior because of it?

Measuring awareness, understanding, and impact

Awareness is fairly easy to measure through consumer surveys, which are a commonly used proxy measure of the effectiveness of labels. Unfortunately, surveys do not provide useful information about consumer understanding or decision making.

Consumer understanding is more difficult to measure than awareness and requires a mixture of research techniques, including in-person interviews and surveys. Wherever possible, this critical research should be conducted in a field environment under actual purchase conditions rather than in a laboratory removed from the retail environment. The important variables to measure are the relative importance of the label (compared to other features of the appliance) in the purchase decision, how well consumers understand the label's central message as well as its individual elements, the amount of time required to respond to and understand the label, and the degree to which consumers recall the label's elements.

Policy makers often fail to measure the most important label impact: whether the label can be linked to consumer decisions to purchase more efficient appliances. This effect can be assessed by surveying consumers to see whether those who are aware of the label rely on it to select efficient products. The effect on purchase decisions can also be assessed broadly by tracing shipment-weighted average efficiencies in the market and attempting to correlate them over time with the introduction of a labeling program.

How effective are energy labels?

Most prior evaluations of energy-labeling programs have shown a high level of consumer awareness of labels. Generally, awareness tends to increase during the life of the labeling program, and the vast majority of shoppers are aware of labels after they have visited stores to make purchases.

Evaluations have found that simple, uncluttered label designs are the most effective for conveying information about energy efficiency. These evaluations have used focus groups and interviews with consumers and salespeople and laboratory tests designed to measure consumers' understanding of different label designs. Recent studies suggest that categorical comparison labels tend to be more readily understood by consumers than continuous comparison labels (du Pont 1998).

How important is energy in the purchase decision?

Past research in the U.S. has shown that, despite years of campaigns and nearly two decades during which energy labels have been prominently displayed on U.S. appliances, energy use is typically not a high priority during the consumers' decision making. For example, a 1983 survey of U.S. homes showed that energy use and yearly energy costs ranked fifth on a list of important attributes in the purchase of a refrigerator or washer. In a more recent U.S. survey, "low operating cost" ranked seventh on a list of factors that would influence consumers' decisions to buy a new appliance. Consumers considered other factors, such as brand, price, features, and size, to be more important (Brown and Whiting 1996). Some U.S. studies and a study in Denmark have found that 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.

Other international studies have shown energy efficiency to be a higher priority. For example, when 1,500 consumers in five Chinese cities were surveyed in 1997, energy efficiency was third on the list of desired features. Another survey in 1999 of 1,500 customers on the topic of air conditioners showed the same result. A recent study compared the effectiveness of appliance energy labels in the U.S. and Thailand. This study found that, among U.S. consumers, energy efficiency ranked ninth in order of priority, with only 11% of respondents ranking efficiency as one of their top three priorities. Among Thai consumers, efficiency ranked fifth, and 28% of consumers ranked efficiency as one of their top three priorities (du Pont 1998).

However, there is a strong potential for bias in this type of research. If the consumers being tested know that the survey is being done by an organization that promotes energy efficiency, they may bias their responses to please the interviewer. For example, a 1991 Australian study showed that energy efficiency and operating costs ranked second in importance after unit capacity and that running costs and efficiency were reported as the most important attributes in the choice of a dishwasher. Because the researchers introduced themselves as energy researchers conducting a study for the local utility on energy efficiency, the results must be viewed with skepticism; a response bias in favor of energy efficiency may well have been generated by the interviewers' introduction (SEC Victoria 1991).

Types of evaluation

There are two main types of evaluation of labeling programs: process evaluation and impact evaluation. These are covered in detail in Chapter 8. In addition, we see growing interest in some countries

in theory evaluation, a variant of process evaluation. Below, we briefly examine the main elements of each type of evaluation.

Process Evaluation—Process evaluation is often qualitative in nature and measures how well the program is functioning. Unfortunately, process elements are sometimes seen as relatively less important by policy makers. In reality, however, process elements are critical to the implementation and success of a program. Process elements include:

- assessing consumer priorities in purchasing an appliance,
- tracking consumer awareness levels,
- monitoring correct display of labels in retail outlets,
- evaluating administrative efficiency (e.g., registration times), and
- checking and verifying manufacturer claims (maintaining program credibility).

Impact Evaluation—Impact evaluation is used to determine the energy and environmental effects of a labeling program. Impact data can be used to determine cost effectiveness as well. Impact evaluations can also assist in stock modeling and end-use (bottom-up) forecasting of future trends. Impact elements include:

- influence of the label on purchase decisions,
- tracking of sales-weighted efficiency trends, and
- determination of energy and demand savings.

Impacts can be very difficult to determine accurately, especially for a labeling program. One of the fundamental problems is that, once an energy-labeling program has been in place for a period of time, it becomes increasingly difficult to determine a "base case" against which to compare the program impact.

Theory Evaluation. Program designers are increasingly using theories with hypotheses about how a program might affect market players. These designers benefit from evaluations that test their hypotheses both through interviews and by tracking market indicators, which can then be translated to impacts. In addition, there are short-term theories of how a market will evolve so that private actors might shift toward promoting more efficient products in the absence of a program. A theory-based approach, similar to a process evaluation, would test many of the hypotheses presented in this chapter, such as "most/some/all consumers will use labels as part of their purchase decisions" or "labels will encourage manufacturers to improve the energy performance of their products" (Blumstein et al. 2000).

Evaluation timing

It is important to plan the evaluation before an energy-labeling program is implemented. Data collection strategies can then be built into the program design and operation. It is simpler, more reliable,

and less expensive to plan and collect data during a program's implementation; retrospective data collection is more difficult, more expensive, and sometimes impossible.

5.5.5 Updating Test Procedures

Once an energy test procedure is selected, there is an ongoing need to keep it up to date. Elements of this process include keeping up with changes in any related international test procedures and addressing new products and technologies that come onto the market and that may not be adequately addressed by the published testing methods. For example, it may be necessary to make special provisions for new

Redesign of the Australian Label

The Australian government is finalizing the first update of its 14-year-old appliance energy-labeling scheme, partly in response to the introduction of mandatory minimum energy performance standards for certain appliances that will render the current efficiency rating system obsolete. This is the first time that a categorical energy label (one that ranks an appliance's efficiency into one of a number of graded categories) has been revised and the efficiency categories "ratcheted" upward. The experience may provide insight for other countries facing the same issue. In addition, model regulations have been formulated to promote harmonized implementation of the program, and Australian national test standards (known as "Australian Standards") have been modified to conform to labels and efficiency-standards requirements. These actions are part of a broader set of measures aimed at reducing greenhouse gas emissions and energy use.

As part of the labeling review, market researchers were commissioned to benchmark consumer understanding and acceptance of the current energy label. The response was clear and strong: the label in its current form was well liked and had a high degree of credibility. It quickly became clear that there was a substantial amount of investment in the current label in terms of consumer understanding and image recognition, so the label redesign transformed into an attempt to improve how the label communicates to consumers. A number of new designs were tested with a series of focus groups. It was found that the basic design was well recognized, but there were areas where information could be more clearly presented. There were also calls for limited amounts of additional information, such as a website to find further information and the inclusion of water consumption data for products that use water. The new label is similar to the old label in color and appearance, but the design is simplified, and the font size and text positions are clearer to facilitate consumer understanding. There was also a conscious decision to visually separate the star rating at the top of the label (the part most commonly used by consumers) from the more technical data at the bottom of the label (energy, capacity, and so on) to make the label as friendly as possible. See the end of this chapter for samples of old and new Australian Energy Rating labels.

Source: Appliance Efficiency 1999, Artcraft Research 1998

technologies, such as smart refrigerator defrost cycles, that save energy in actual use but not when tested using the selected test procedure. However, before such provisions or credits are made, there needs to be a high degree of certainty that any such "in-use" savings are, in fact, real.

5.5.6 Updating Label Design

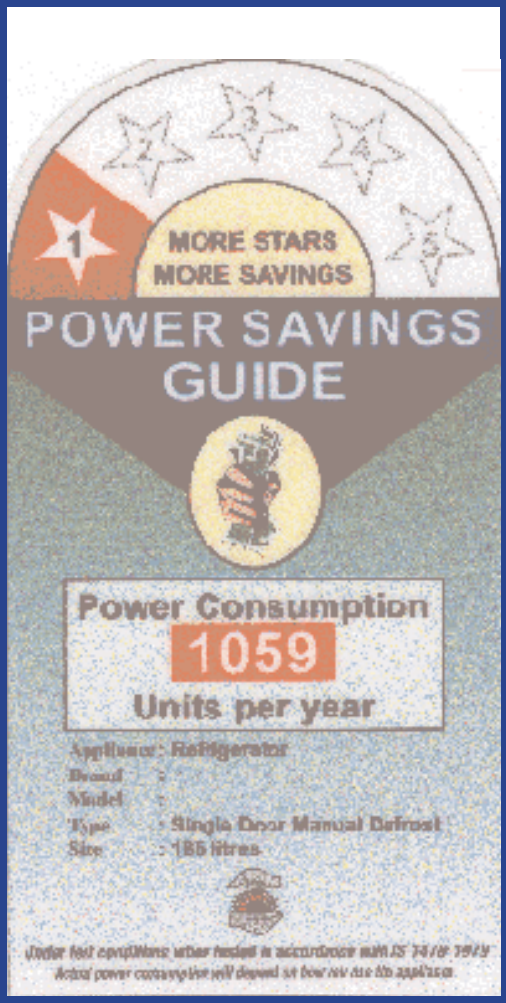
It is important to periodically evaluate the label design to determine whether it is well understood by consumers and is having an impact on consumer decision making. Australia and the U.S. have recently decided to consider redesigning their appliance energy labels although neither has completed its redesign (Appliance Efficiency 1999, Artcraft Research 1998, Egan 2000b). The experiences of these two efforts to date suggest that an opportunity for significant improvement in program effectiveness is likely from label redesign after a label has been in use for several years (see Insert Box: *Redesign of the Australian Label*, previous page, and Insert Box: *Redesign of the United States Label*).

Label redesign is an involved process and takes time, but it does not require nearly the same number of steps as creating a labeling program from the very beginning. Making initial program decisions (what products to label? mandatory or voluntary?), customizing the testing program, conducting the research and deciding on a label design, and, finally, implementing the program have all been described in this chapter. Chapter 6 looks at similar steps for setting the standards, while Chapter 7 addresses the maintenance and enforcement of both labeling and standards programs.

Redesign of the United States Label

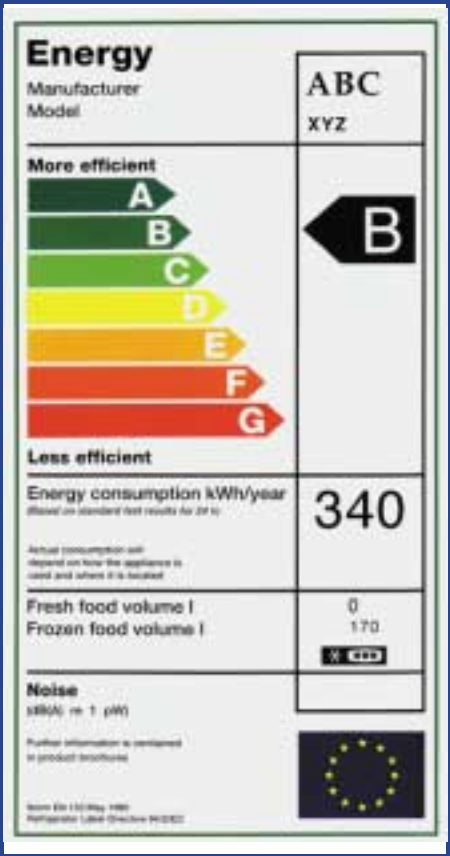
In the U.S., recent research has shown that the EnergyGuide label is not well understood by a majority of consumers (BPA 1987, Carswell et al. 1989, du Pont 1998). In response, the American Council for an Energy-Efficient Economy (ACEEE) is leading a multi-tasked, interdisciplinary research effort to document how U.S. consumers perceive and use the current EnergyGuide label and to explore options for improving the label design by building on successful label designs elsewhere in the world. The project focuses on products currently covered by the Federal Trade Commission's EnergyGuide label program, including white goods, water heaters, and, to a lesser degree, heating and cooling equipment. The task force is conducting primary and secondary research along with extensive stakeholder outreach. The goal of this project is to develop an EnergyGuide label that is easy to understand by the vast majority of consumers; provides motivating and comprehensible information on appliance efficiency; and positively impacts the consideration of energy efficiency in consumer appliance purchase decisions. The project includes two major activities: research and communications. See the end of this chapter for a sample U.S. EnergyGuide label.

ENERGY STAR ® Label



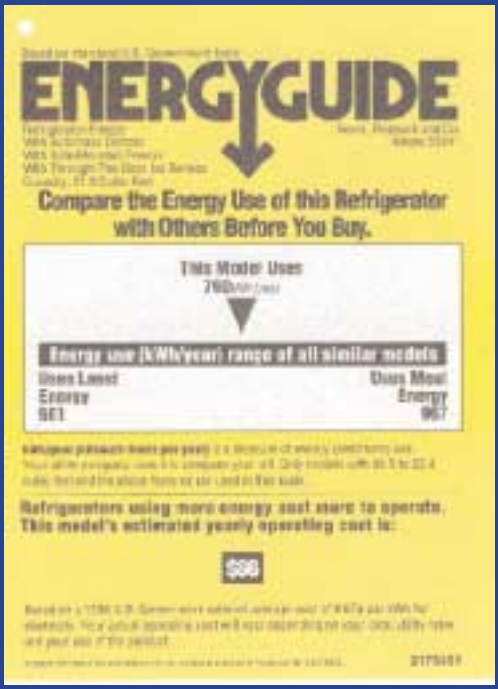
Indian Label

Thai Label

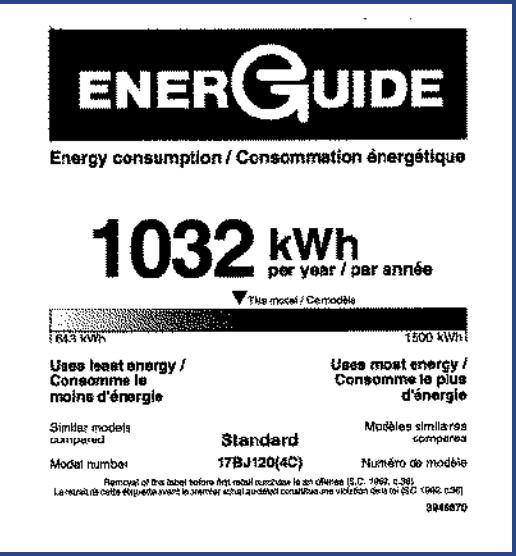


European Union Label

Iranian Label

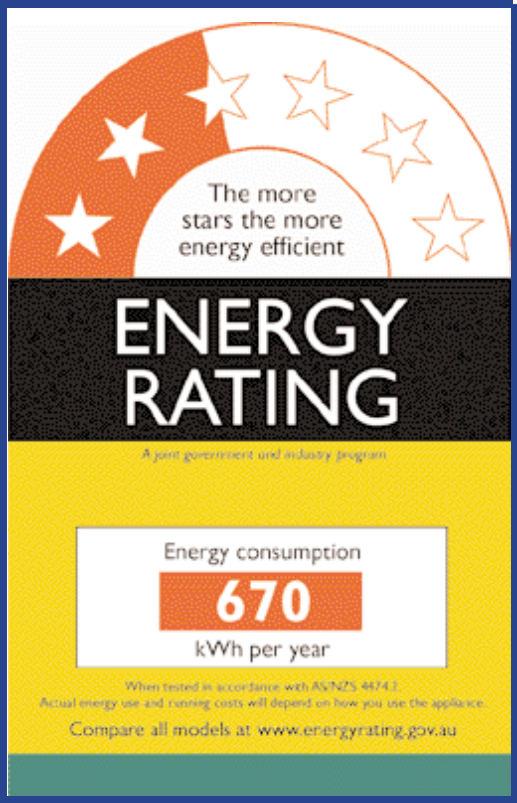


United States Label



Canadian Label

Australian (Old) Label



Australian (New) Label

Swiss Label