

The ENERGY STAR® Residential Lighting Program

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ABSTRACT

This paper describes the development, launch and implementation of an Energy Star® Labeling Program for residential luminaires in the United States. The Energy Star programs are voluntary labeling efforts developed by the U. S. Environmental Protection Agency (EPA) in partnership with industry representatives to encourage the production and promotion of energy-efficient technologies that prevent pollution. The goal of these voluntary programs is to recognize the most energy-efficient products in the market with an Energy Star label.

American homes contain approximately 3 billion fixtures and nearly 85% are incandescent. Research indicates that in the United States, barriers to increasing the penetration of energy efficient lighting in the market include consumer dissatisfaction with the quality and reliability of products, the limited experience that lighting specifiers have with successful efficient fixtures, first cost hurdles and little manufacturer incentive for increasing quality and aesthetics. EPA is attempting to move the lighting market towards efficiency by using a cooperative process to develop the performance specifications for both indoor and outdoor residential fixtures. Specific market barriers must be overcome for successful launch of the program. Strategic consumer education opportunities and training efforts aimed at the variety of specifiers for residential fixtures are emphasized, as is EPA's general campaign to promote Energy Star label awareness. Finally, potential measures of market impact, lessons learned and possible areas for international collaboration and/or cooperation are presented.

INTRODUCTION

The Energy Star® Residential Light Fixture Program is a product labeling program in the United States designed to help consumers identify energy efficient products. Residential light fixtures are part of a family of energy-efficient products labeled with the Energy Star® logo, a trade-marked label of the Environmental Protection Agency (EPA) and the Department of Energy (DOE). The Residential Fixture Program was launched in March, 1997, with the first labeled products appearing on the market at the end of June, 1997. This paper highlights the strategic decisions made in the development, launch and implementation of this effort to increase the penetration of efficient technologies in the U.S. residential lighting sector.

MARKET TRANSFORMATION

The DOE and EPA have historically administered separate programs in the areas of energy and environment in the U.S. government. The two agencies now work together to coordinate market-based programs to establish energy efficiency and environmental quality as equal and important priorities. Energy efficiency is promoted because electricity generation contributes to air pollution, including 35 percent of all U.S. emissions of carbon dioxide, 75 percent of U.S. emissions of sulfur dioxide and 38 percent of nitrogen oxides. Carbon dioxide emissions from energy use are also the largest world-wide contributor to global climate change. If the market penetration of efficient equipment can be increased, emissions and pollution will be reduced.

Market-based programs are voluntary efforts that use market forces, rather than laws or regulations, to achieve a desired outcome. EPA's strategy for reducing emissions of



the greenhouse gases is to use market forces to increase the penetration of existing energy-efficient technologies and to invest in, support and stimulate efforts to introduce more highly efficient products. Using the market requires research that is not typical for the more traditional regulation development process. Knowledge of product distribution channels, profit margins, product development cycles, industry leaders and trends for each technology must be addressed. Barriers to increased penetration of an existing technology, such as lack of demand, lack of consumer information, institutional constraints, split incentives, poor performance and high first cost, must also be identified.

THE ENERGY STAR® PROGRAM

The Energy Star® Labeling Program uses a label to designate energy-efficient products (see Figure). EPA research indicated that consumers need to be educated that there is a link between energy use and the environment and to recognize the label as a symbol of energy efficiency. Another essential element of the Energy Star® label is that it is always associated with high quality - the same or better performance as traditional models. This feature was recognized as integral to the success of the program in bringing efficient technologies to the mainstream market where sacrificing performance for energy efficiency had not worked in the past.

In 1992, the Energy Star® Labeling Program was initiated with personal computers. This effort serves to illustrate market transformation success. The technology that allowed computers to power down or "sleep" when not in use existed in 1992 in lap-top computers, but had never been applied to the personal or table top computers that were proliferating in both offices and homes. The sleep mode was developed in lap tops to extend the length of time the computer could be used before the battery needed to be recharged. Research revealed that the trend in personal computers was towards increased functions that incrementally increased the ambient temperature of the computers, a factor that can lead to decreased performance and early equipment failure. The sleep mode helps to reduce the temperature build-up and also reduces the energy wasted by computers that are left on all day. The decreased energy use of computers that are sleeping during periods of inactivity also reduces energy costs for building occupants. All of these factors were important in convincing the computer industry to join voluntarily with the government to develop a sleep mode specification and then to produce and label personal computers that met

this specification. EPA then coordinated the use of the specification as the minimum requirement for federal government procurement of computers and also publicized the concept in magazines read by consumers in the market to purchase computers. It is estimated that more than 70 percent of the personal computers sold today in the U.S. are Energy Star® compliant.

EPA continues to modify the computer labeling program as technology advances, but it is reasonable to characterize the personal computer market as transformed or moved towards higher efficiency. It is important to highlight the government and industry partnership in the specification development and the recognition of the joint opportunity that the sleep technology represented to meet the needs of both parties. Over the past few years, new partnerships and opportunities were realized as the Energy Star® Program expanded into other office equipment such as printers and copiers, residential heating and cooling equipment, new homes, and exit signs.

TARGETING THE RESIDENTIAL LIGHTING MARKET

American homes contain approximately 3 billion fixtures and nearly 85 percent of them use incandescent lamps. EPA estimates that residential lighting accounts for 10-15 percent of the total energy use per home, although higher percentages have been documented in areas where other electrical energy use is modest (Heschong-Mahone 1997). Several studies have shown that a relatively small percentage of sockets in the home (20 - 30 percent) can account for 70 - 80 percent of the lighting energy used (Siminovitch and Mills 1995). For example, in California the top six lighting applications by energy use are outdoor wall mounted, kitchen, bathroom and dining room wall and ceiling mounted, and table lamps in living rooms, and they account for almost 50 percent of lighting energy use (Heschong-Mahone 1997).

If energy efficient fixtures were installed in the high use sockets of homes, 85 billion kWh could be saved annually. Clearly, energy and pollution savings potential exists in the residential lighting market; however there are significant barriers or challenges. In general, these barriers are performance, lack of demand, lack of consumer awareness of the energy savings potential, high first cost, split incentives that exist when those who purchase fixtures are not paying the energy costs (some apartments or public housing) and aesthetics. As described below, the Energy Star® Program attempts to address each of these barriers during program design or implementation.

PROGRAM DESIGN

The EPA began the Energy Star® Residential Light Fixture Program development using two specifications, one for indoor and one for outdoor fixtures, developed by lighting experts working as grantees to the Agency ¹⁾. EPA then engaged the residential light fixture manufacturers in one-on-one discussions intended to elicit their honest comments about the draft specifications and to highlight the collaborative nature of the program. The importance of this trust-building phase can not be overstated in the U.S., where the predominance of environmental programs

still maintain the "command and control" regulatory style. The voluntary nature of the program was also emphasized, recognizing that the program need not be attractive to all manufacturers to go forward.

The residential light fixture market in the United States is characterized by a large number of smaller companies, with some companies family owned. It can be described as a decorative market, with competition based on style, materials and price rather than technological innovation. Many manufacturers purchase components and assemble them into their own fixture designs and often, technical expertise related to efficient sources is not prevalent. Many of the components are a lower quality and durability than those found in the commercial sector.

The Energy Star® Program typically features equipment in the top 10 – 20 percent of efficiency. Some fixtures that could meet the specification already existed in the market, but the goal was to have manufacturers design new fixtures that incorporate high efficiency light sources. Price of the equipment to consumers is a factor in the final decision of how high to set the specifications, as the highest efficiencies may result in equipment so expensive it just does not sell in the market. Discussions with manufacturers were essential in informing EPA as to where the proper balance of efficiency and price should be made. It is interesting to note that energy efficiency levels were not controversial in the specification development; however, some of the other levels included in the specification to distinguish these fixtures as "high quality" in consumers' minds did elicit comment. After several months of deliberations, the final specifications included such features as quick starting, high color rendering index (CRI), quiet operation for indoor fixtures, and warranty for fixture operation for outdoor fixtures. EPA and manufacturers intend that these products would help to improve consumers' perceptions about efficient lighting for the home.

In convincing manufacturers to join the voluntary program, EPA had to show the value of the Energy Star® label. As mentioned before, this is not a traditional government program so initial industry skepticism needed to be overcome. During the specification development process, EPA coordinated with the other efficient lighting fixture activities being developed by electric utilities to communicate the value of a consistent national minimum performance specification. Some of the other Energy Star® products have coordinated procurement efforts for federal and state government using the Energy Star® as the minimum specification. Industry participates in the programs in order to have access to those potentially large markets. Other activities that could be performed by EPA and DOE are promotion of the label through public service announcements and outreach to retailers, training for sales staff, and consumer education.

Finally, the concept of taking advantage of opportunities as they arise is exemplified in one fixture type that has received a great deal of attention in the United States: the halogen torchiere. Press accounts of the safety issues surrounding this fixture caught the attention of consumers and manufacturers. The introduction of a safer and energy

efficient alternative began to garner more interest. The Energy Star® program recognized the consumer benefits of featuring the alternatives as Energy Star® products; the manufacturers recognized an extra marketing opportunity they could use to draw attention to these new products.

The Energy Star® program was launched on March 25, 1997 with twelve manufacturers as Charter Partners. These first Partners represent a cross-section of the lighting fixture manufacturers in the U.S. – both large and small companies, offering high, medium and low cost products. Some will be designing new products to meet the specification, while others already have fixtures that meet the specification in their product lines. EPA is continuing to recruit partners. As of August 25, 1997, six additional Partners have joined the Program.

PROGRAM IMPLEMENTATION

Promotion of the Energy Star® label to help consumers connect energy use and environmental effects is essential, as is the fact that energy efficiency can save consumers money. EPA cannot pay to place advertising; however, we developed a consumer awareness campaign for television and print that is used by media outlets as public service announcements. This helps increase the visibility of the label. The consumer awareness campaign was launched in August in several large west coast cities.

Experience with past labeled products also highlighted that consumers need the information about products at the point of purchase. Sales training for lighting showroom personnel and promotional material in stores helps to sell efficiency, which is especially important when the price tag for the efficient product is higher than the traditional model, yet the product costs less to use over time. Sales training can also help to overcome the perceived poor performance barriers. The Energy Star® specification assures high quality so the sales staff must be trained to help consumers recognize that these products are different.

EPA develops material for partners that can help them to promote their new Energy Star® products. Ad copy, facts, draft press releases and opinion articles are all part of the partnership relationship we have developed. We also coordinate our work with the other important organizations, such as utilities and state energy organizations, that can affect the market. Promotion and support regionally is essential to reach the widest audience possible.

The importance of the aesthetics issue, both how the efficient fixtures look and the light they put out, must be addressed if the program is to be successful. Partners with the expertise and interest in designing residential decorative fixtures around efficient sources are essential. EPA plans to engage the lighting design community in dialogue with the intent of developing projects that maximize the potential for efficient sources to be utilized in residential applications.

PROGRAM EVALUATION

Initial program evaluation statistics are simply tabulations of the number of manufacturers participating and the number of fixtures labeled. Over time, sales data can be gath-

ered, although this information is proprietary and sensitive unless aggregated to remove individual company identification. Eventually market penetration statistics may be collected.

Consumer awareness will continue to be monitored periodically to judge the effectiveness of the general label awareness campaign. This is accomplished primarily through focus groups, some limited surveys and potential comment cards that could be included with products.

CONCLUSION

The Energy Star® Program is an important effort in increasing the market penetration of efficient lighting in the U.S. residential market. Initial goals for manufacturer participation were met and we anticipate increasing consumer awareness and manufacturer participation in the coming year. Lessons learned in the development of the program include the importance of understanding the character of the market and the distribution chain. Discussions with manufacturers early in the development process are key to encouraging their participation. The label used must have perceived value in the marketplace and efforts to promote the label and protect it from misuse are essential. Finally, the process must always be balanced with clear long term goals, in this case, increasing the penetration of energy efficiency in the residential lighting market. ●

ENDNOTES

1) Natural Resources Defense Council, San Francisco, California and Lighting Research Center at Rensselaer Polytechnic Institute, Troy, N.Y.

REFERENCES

Calwell, Chris, Chris Granda, Charlie Stephens and My Ton. 1996. *Energy Efficient Residential Luminaires: Technologies and Strategies for Market Transformation*. Final Report. Submitted to the U.S.E.P.A., Office of Air and Radiation, Energy Star Programs, under grant #CX824685. San Francisco, CA: Natural Resources Defense Council.

Heschong, Lisa, Douglas Mahone, Ken Parris, John Sugar. 1997. *California Residential Lighting Baseline*. Paper 86, Illuminating Engineers Society Annual Conference August 16-18, 1997, Seattle, Washington, U.S.A.

Leslie, Russell P. And Kathryn M. Conway. 1996. *The Lighting Pattern Book for Homes*. 2nd.ed. New York: McGraw Hill (1st ed.1993.Troy, N.Y.: Rensselaer Polytechnic Institute.)

Mills, Evan and Michael Siminovitch. 1995. *Dedicated CFL Fixtures Bring Savings Home*. International Association for Energy Efficient Lighting Newsletter, issue 10, vol.4.