

The Light at the End of the Tunnel: Future Directions in Residential Lighting Fixture Programs

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ABSTRACT

The Northwest Energy Efficiency Alliance (NW Alliance) is determining the future direction of its Residential Lighting Fixtures Program, an initiative that promotes Energy Star fixtures and torchieres. To assess its options, the NW Alliance needed to know: (1) What does the residential lighting fixtures market look like? (2) What are the current market barriers to lighting energy efficiency? And (3) What opportunities exist to change the residential lighting market?

This paper addresses these questions, with emphasis on market transformation opportunities. It draws on relevant industry literature, NW Alliance market research, and interviews with industry experts to explore: coordination among regional lighting programs, consumer recognition of the Energy Star label, strategies for leveraging manufacturer and retailer participation, opportunities in the new construction sector, independent equipment testing, and equipment design and performance issues.

Market Overview

The national residential market for lighting fixtures is about 96 million households, with new construction adding over 1.5 million homes per year. Three distinct submarkets can be identified: hard-wired remodel/replacement, portable, and new construction. (PECI et al, 1998) While the potential replacement market far outstrips the new construction market, the cost and effort required to replace existing fixtures are considered major disincentives for homeowners and, particularly, for tenants. Thus, even though new residential construction accounts for only about 1.6% of the U.S. housing stock in a given year, sources estimate that it accounts for upwards of one-half of all residential hardwired fixture sales. (PECI et al, 1998) Portable fixtures account for the majority of sales in the replacement market.

General Characteristics

The residential lighting fixture industry is characterized by numerous competitors producing a wide variety of products that compete for success among style- and price-conscious consumers. Technological changes are introduced slowly in the residential market

(85% of residential lighting is based on a 100-year old technology). Issues of style primarily drive innovations.

Manufacturers target a range of markets and product types. High-volume producers tend to orient toward mass retailers while low-volume, high-quality producers supply home decor retailers. With one exception, all high-volume production takes place overseas while the low-volume, high-end manufacturers are more likely to have domestic production facilities.

Our survey interviews with manufacturers have indicated that production costs for ENERGY STAR fixtures are competitive with standard-efficiency fixtures. (PCS/Feldman,1999) Some manufacturers with off-shore production facilities, however, have noted that per-unit costs of ENERGY STAR fixtures are higher than those of their nonprogram fixtures, due to program distribution requirements. Large retailers normally purchase fixtures "free on board" (FOB); that is, they take legal possession of fixtures at the point of manufacture and then ship them directly to their U.S. stores. The manufacturer thus avoids the cost of shipping, as well as certain taxes, tariffs, and other similar charges, and can offer large retailers an appreciably lower wholesale cost. But because FOB shipping complicates program product tracking, manufacturers in the NW Alliance program must ship ENERGY STAR products to the United States before distributing them to retail customers, incurring the full cost of shipping, taxes, and tariffs.

Hardwired Remodel / Replacement Market

Target Market

The primary market for hardwired fixtures for remodeling or renovation is among homeowners. The permanency of hard-wired fixtures limits their appeal to only those people who have an equity interest in their home.

Selection Criteria

The results of our consumer surveys indicate that people first find the fixtures that meet their style, performance, and safety needs, and then select from among the candidate fixtures based on purchase price and cost to operate. (PCS/Feldman,1998B) Only a very narrow market segment considers energy efficiency benefits important enough to outweigh any limitations in style or performance. This finding is generally consistent with survey results from the Northeast, which found style or appearance to be the most important feature, followed by light output and price. (ODC) It is also consistent with feedback from manufacturers concerning their market research activities. (PCS/Feldman,1998B)

Fixture manufacturers actively monitor style trends to predict popular styles. Style features largely differentiate the vast array of available residential fixtures. While dozens of fixtures may share a basic structure, differently shaped luminaires, colors, and fabrication materials achieve variety in appearance. From 1998 to 1999, the NW Alliance doubled the number of products qualifying for its program. Nevertheless, the lack of a broad range of styles in a variety of price ranges remains an important impediment to market penetration of

energy-efficient products.

Performance concerns are a mixture of reality and perception. While technical problems led to higher-than-normal failure rates in earlier generations of fluorescent fixtures, anecdotal evidence suggests that the rate of equipment failures has dropped appreciably. Fluorescent technologies have clearly shown improvement in the areas of light quality, instant-start capability, color rendition, and dimmability; nevertheless, many people still consider them inferior to incandescent technology. The NW Alliance has attempted to address consumer wariness by pushing for in-store product displays that allow potential buyers to experience fixture operation. Our research has found that consumers judge in-store displays of operating fixtures a credible source of information. (PCS/Feldman,1998B)

Safety is one area in which fluorescent technologies actually have an edge. The longer lifetimes of fluorescent bulbs reduce the risks associated with changing bulbs, such as burns, falls, and electric shock.

Distribution Channels

Hard-wired lighting fixtures sold to the remodel/replacement market are primarily distributed through large mass retailers, particularly home improvement centers. Rarely do these retailers carry a full range of styles. Their stock is usually a moderate selection of low- to mid-grade products made in large production runs by off-shore manufacturers. However, because they distribute such high volumes of goods, they have been effective participants in the ENERGY STAR fixture program.

The high-end designer lighting fixtures are usually distributed through lighting-only or home décor showrooms. The high-end market is small but important. Style trends are often initiated in the designer markets and then mimicked by lower cost producers. To date, lighting showrooms and home décor stores have resisted compact fluorescent lamp (CFL) technology. Our "mystery shopper" site visits have found that these retailers view CFL fixtures as inferior and devoid of the attributes customers desire. (PCS/Feldman,1998A) Designing program interventions to address this market is complicated by the fact that the smaller retailers are more dispersed and tend to purchase their products from wholesalers or small specialty manufacturers.

Information Sources

By and large, consumers do not spend a great deal of time researching fixture options. Fixtures do not represent a sizeable capital investment, so purchasing decisions are based on minimal advance research. A recent study by Pacific Consulting Services (PCS) found that consumers generally visit two or three stores before selecting a fixture. (PCS/Feldman,1998B) The three sources of information they reported consulting most frequently were all in-store sources: operating fixture displays, product packaging information, and sales clerks.

The poor quality of in-store information sources represents a significant barrier to consumer adoption of fluorescent technologies. During "mystery shopper" site visits, we found little differentiation between the displays of energy-efficient and standard-efficiency

products, as well as limited sales staff knowledge of CFL technology. Poor staff training was particularly evident in high-volume stores with rapid employee turnover, but true also among specialty shops. The NW Alliance program has sought to address these information barriers by hiring circuit riders to recruit new retail outlets into the program, train their staff to promote ENERGY STAR products, and ensure program product visibility in participating stores.

A related but distinct barrier to the adoption of energy-efficient lighting products is that of asymmetric information. Simply put, consumers perceive that sales clerks have a greater interest in selling products than in providing unbiased information. Thus consumers are somewhat skeptical of sales clerks' claims. Our surveys have found that sales clerks, who ranked third in terms of information sources, fell to sixth place when ranked for credibility. Product packaging fell even more dramatically—from second to eighth place. The Environmental Protection Agency's (EPA) ENERGY STAR label was established as an independent and credible indicator of product performance and energy efficiency to address such asymmetry. Unfortunately, recent evidence of apparently inflated claims on packaging may make greater scrutiny of labeling necessary to protect the credibility of ENERGY STAR products.

Portable Fixture Market

Target Market

Portable fixtures have a broader appeal than hardwired fixtures, being suitable for homeowners as well as more mobile demographic groups such as renters and students. Some low-income housing projects do not install hard-wired fixtures, forcing tenants to rely on portable fixtures.

Selection Criteria

Consumers apply the same selection criteria to portable fixtures as they do to hard-wired fixtures. One distinction is the safety advantages of portable compact fluorescent fixtures. Specifically, compact fluorescent torchieres are safer than halogen torchieres, which pose a serious fire hazard due to their high bulb temperatures. Not surprisingly, residential lighting programs have scored their most important successes in educating the public about the safety advantages of compact fluorescent torchieres and convincing people to switch.

Distribution Channels

Portable fixtures are distributed through a great variety of retail outlets, such as hardware stores, variety shops, furniture, discount, and department stores. Low- to mid-grade portable fixtures are generally distributed through mass merchandisers; high-end designer lighting fixtures, through lighting-only or home décor showrooms. The portable fixture market provides a clear example of the value of the high-end stores as trendsetters.

When first introduced, halogen torchieres sold at prices in excess of \$100 and were available only in lighting showrooms. Within a short time, the success of this design resulted in off-shore production of low-cost versions for sale through mass retailers at a fraction of the initial product's price.

Portable fixtures have a more cyclical sales cycle than permanent fixtures. For example, the start up of school in fall generates a spike in sales. Sales are also tied to general furniture sales trends. This is largely because of redecorating efforts that include new desk and floor fixtures.

Consumers are also more likely to "experiment" with portable fixtures because they can be easily returned or replaced if they do not perform as expected. As a "less risky" investment, portable compact fluorescent fixtures may serve to introduce CFL technology to otherwise wary buyers. To date, the ENERGY STAR program has achieved its greatest sales penetration rates in the portable fixture segment.

Information Sources

Consumer information sources on portable fixtures are largely the same as for the hard-wired remodel/replacement market. The same patterns exist of consumer reliance on in-store information, inadequate sales staff training and high turnover rates, and asymmetric barriers due to reliance on information from sources with suspect motives.

New Construction Market

Target Market

The market for hardwired fixtures in new construction is among prospective homeowners. However, equipment selection decisions are generally made by a representative of the home builder, based on perceived preferences of homebuyers in general. Thus, incremental changes in homebuyer preferences are aggregated, and it may take large shifts in homebuyer preferences to generate any change at all in the installed lighting stock.

Distribution Channels

Fixtures sold for new construction projects are usually distributed through lighting equipment wholesalers and are purchased in large quantities. From a program perspective, the interjection of home builders and wholesalers into the distribution chain complicates the process of tracking program products and establishing communication channels between manufacturers and consumers.

Selection Criteria

Selection criteria include installation ease to reduce labor costs, reliability to prevent future repairs, and customer acceptance to ensure unimpeded home sale. Home builders do

not consider energy efficiency an important design criterion. A recent survey showed they rate energy efficiency far behind such factors as price, location, style, floor plan, and size. (B&C,1997) This disinterest can be attributed to financial influences: the home builder does not pay the energy bills once the home is occupied and also believes customers will not pay more for an energy-efficient home.

The barriers to energy-efficient lighting in new construction projects are particularly high. Fixtures are often installed near the very end of a new home construction project, and builders are focused then on trying to ensure completion on time and within budget. Not surprisingly, the energy efficiency of specified lighting fixtures receives little attention.

Information Sources

Home builders tend to develop relationships with their product vendors. Because the vendors tend to be relatively knowledgeable about their products, trust in these relationships minimizes any asymmetric information barriers. Prospective homebuyers, however, rely almost exclusively on information from the builder's sales agent, who typically lacks any specialized training in lighting. At this level, information costs and asymmetric information barriers are significant. Furthermore, the strategy of product labeling to minimize information asymmetries is of little value when the fixtures have already been installed and the packaging discarded.

To date, the NW Alliance program has not focused on the new construction market for lighting fixtures. The remodel/replacement and portable fixture markets have posed less daunting barriers and offered more opportunities for market influence.

Market Barriers. The market barriers described in the previous section are summarized in Table 1.

Table 1. Summary of Market Barriers for CFL Technology

Performance Uncertainties	Negative marketplace image. CFLs perceived as offering inferior performance. Underperforming products on the market reinforce negative perceptions.
Information Costs	Consumers unaware of CFL benefits and can't distinguish high-efficiency from standard fixtures. Retail sales staff do not understand CFL technology and its benefits. High-efficiency products are generally poorly displayed and typically shunned altogether by high-end retailers.
Asymmetric Information	Buyers use in-store sources for information but do not trust manufacturer's claims or sales staff recommendations.
Split Incentives	In new construction, builders and those selecting lighting equipment lack direct incentive to specify high-efficiency equipment and do not believe such equipment would add much to a home's market value.
Product Inseparability	In new construction, the considerations driving a home purchase decision dwarf any related to lighting energy efficiency.

PROGRAM DESIGN ISSUES

Coordination with Other Regional Lighting Programs

Expert interviews identified a lack of coordination among regional programs as a problem limiting manufacturer participation. Manufacturers who participate in numerous regional programs must comply with diverse region-specific rules and paperwork requirements. Better coordination is also necessary to deliver a consistent message to the consumer. Currently, the Consortium for Energy Efficiency (CEE) is making an effort to address some of these communication issues by holding quarterly meetings and creating subcommittees for each issue.

Energy Star Label Recognition and Consumer Awareness of Lighting Efficiency

Experts interviewed for this project concurred that a lack of appropriate marketing and promotion budgets for ENERGY STAR products means consumers still do not know what "ENERGY STAR" signifies and the label does not factor into their decision-making process (especially for lighting fixture decisions).

The NW Alliance could meaningfully intervene by launching a multi-region branding and awareness campaign in coordination with the EPA. Consumer surveys in the Pacific Northwest show that recognition rates for the ENERGY STAR logo have been growing, primarily due to successful campaigns displaying the logo on computer monitors and large

household appliances. A generalized message tying the ENERGY STAR logo to quality, performance, and economy is needed to embrace all products, including lighting fixtures.

Lighting product performance should be given greater visibility in product promotional efforts. Performance is one of consumers' top selection criteria. Operational displays of fixtures demonstrate characteristics such as the quality of light, brightness, instant on/off capabilities, and dimming features, but convey little about the longevity of pin-based lamps, one of the most important features of compact fluorescent technologies. As long as independent performance testing is in place to validate claims, we believe lamp longevity can be an important consumer "hook" for both CFLs and fixtures.

Strategies for Leveraging Participation from Manufacturers and Retailers

The 1999 NW Alliance Program involved retailers and manufacturers. The program was driven to explore creative outreach strategies by the need to obtain product sales and consumer recognition in the rural and small-market areas east of the Cascade mountains. The outreach strategy adopted incorporated basic in-store support for participating retailers; general consumer education, promotion, and outreach services; and intensive retailer support through the Small Retail Promotion.

Store-specific support activities were complemented by more general promotions. The program periodically ran regional advertisements of ENERGY STAR lighting products that listed participating stores. Participating stores were offered the use of the ENERGY STAR logo through a special agreement with the NW Alliance. Circuit riders also met with utility staff periodically to inform them of program activities and support utility-sponsored promotional activities such as torchiere turn-in events. Finally, the Program published the *Northern Lights* newsletter, which went to utilities and retailers.

The Small Retail Promotion, based east of the Cascades, focused on clearing slow-moving products from retailers' shelves to make room for competitively priced qualifying products. Retailers received financial incentives to turn over their existing stock and \$200 in new product inventory. Participating retailers also received promotional assistance in the form of in-store promotions, cooperative advertising support, and regional advertisements of ENERGY STAR products.

West of the Cascades, the program conducted store visits but placed particular emphasis on staff training, point-of-purchase educational displays, and torchiere turn-in events.

Pitfalls and Opportunities in the New Construction Sector

Sources report that the new construction market makes up over 50% of new lighting fixture sales. (PECI et al, 1998) It is a huge market segment that has yet to be addressed by the NW Alliance program (or other regional programs, such as Northeast Energy Efficiency Partnership) and merits intervention.

One approach would be to include lighting in a whole-house program, along with other energy-efficient technologies. Currently, lighting is not a required element in the ENERGY STAR

whole-house program, which sends a message to builders that even the lighting community (e.g., EPA, NW Alliance) does not consider lighting important. Including lighting would be a first step toward addressing the new construction market as well as the stigmas that plague compact fluorescent technology. In addition, builders and lenders might be more inclined to build and finance ENERGY STAR homes—using the entire package of energy-efficient features as a marketing tool and selling it to consumers as an “upgrade.”

A few experts argue that a lighting program should stand alone, to give it due emphasis in the new construction market. Respondents to our survey concluded the only way to make such a program successful would be to couple it with specific changes in lighting energy codes. The National Resource Defense Council (NRDC) is currently researching this idea and determining how best to proceed.

Given the information learned through market actor interviews, as well as our previously accumulated knowledge of the lighting and new construction industries, we conclude that a whole-house program would have the best prospects of success. In our assessment, the main barrier with the new construction market is that home builders and home buyers do not value energy efficiency. Considering that lighting is a small part of a home's overall energy budget, a lighting-only program will not sufficiently address this value issue.

The Need for Independent Equipment Testing

Manufacturers interviewed for this study pointed out that it is easy it is to get around the ENERGY STAR performance specifications. They suggested that some manufacturers may be “cheating” by placing ENERGY STAR labels on products that might not actually meet the specifications.

The National Lighting Product Information Program reports that CFL life is highly dependent on cycle frequency. Lamps left on in 15-minute cycles last only 30% as long as lamps left on for three hours (the standard testing cycle). Under standard testing, lamps from different manufacturers lasted anywhere from 4,000 to 18,000 hours. (NLPIP, 1999) Most CFLs are rated for 10,000 hours. Clearly, without testing that is both independent and performance-based, consumer experience of energy-efficient lighting products may be greatly at odds with published claims, thus undermining the credibility of both proponents and energy efficiency labels.

We recommend the NW Alliance encourage establishment of a national performance testing program for residential lighting products. Both the reputation of energy efficiency programs and the equity of the ENERGY STAR brand depend on product performance and brand credibility. It is unwise to assume that adherence to EPA and Department of Energy standards can be accomplished through simple manufacturer self-certification and product bench tests.

Strategies to Address Ongoing Equipment Design and Performance Issues

The Northeast Energy Efficiency Partnership is sponsoring a design competition for

sealed recessed cans, and the EPA has awarded grants to commercialize a sealed recessed can once it is developed. NRDC has also proposed a national competition whereby manufacturers compete for large amounts of money (up to \$500,000) for new and innovative fixture designs. Competitions such as this stimulate manufacturers to “think out of the box” in terms of new technology, as well as encourage new players to enter into the market. Retailers will have more products to offer and consumers will have a greater selection of products from which to choose.

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