

Maine's Model CFL Recycling Program

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ABSTRACT

On June 14, 2007, the Maine Public Utilities Commission and the Maine Department of Environmental Protection announced that Efficiency Maine, a program administered by the Maine Public Utilities Commission, and the Department of Environmental Protection were launching the first statewide compact fluorescent light bulb (CFL) recycling program in the nation. The authors believe that this program merits careful consideration by jurisdictions sponsoring CFL programs.

CFLs contain a small amount of mercury and therefore qualify in many states as hazardous waste when they are ready for disposal. Under some regulations, disposal of hazardous waste requires packaging the waste product, labeling it, and transporting it to a qualified hazardous waste collection site. The burden of packaging, labeling, finding a qualified collection site, and transporting a CFL to the site is expected to severely discourage households' compliance with such regulations. Efficiency Maine's recycling program reduces the household burden of handling a burned-out CFL into a drive to a local lighting retailer. As of May 2008, Efficiency Maine has recruited 208 of the 307 retailers currently participating in its Residential Lighting Program to voluntarily serve as qualified collection sites for burned-out CFLs. It has accompanied this with a public education program using mass communications and marketing collateral at the retailer sites. This paper describes Maine's recycling program and suggests that it serves as a best practice for CFL recycling programs designed specifically for households. Recommended best practice program elements are described.

Introduction

On June 14, 2007 the Maine Public Utilities Commission (MPUC) and the Maine Department of Environmental Protection (MDEP) announced that Efficiency Maine, an umbrella program administered by the MPUC, and the MDEP were launching the first statewide compact fluorescent light bulb (CFL) recycling program in the nation (MPUC 2007). At that time Efficiency Maine had already recruited more than 100 retail stores in Maine to participate in the recycling program. The need for such a program was created by the mercury used in all CFLs. The U.S. Environmental Protection Agency (EPA) has designated mercury as a hazardous waste. This designation makes its disposal subject to federal regulations.

States have had hazardous waste disposal regulations for fluorescent lamps for many years, but the regulations have been enforced primarily for lamps used in commercial and industrial buildings. Because of the cost and inconvenience of properly packaging and transporting household fluorescent lamps, and the relatively small number of fluorescent lamps traditionally used in households, these regulations have largely been ignored in the residential sector. Maine's CFL recycling program is the first formal statewide program targeted

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specifically on managing the disposal of mercury in household CFLs by reducing the cost and inconvenience of complying with the regulations. It is a carefully thought-out program that, in the authors' opinions, merits widespread consideration as a best practice for collecting and recycling household CFLs when they reach the end of their useful life.

How large is the mercury problem in CFLs? EPA reports that the mercury contained within a new CFL's glass tubing ranges from 1.5 to 3.5 milligrams (mg) (EPA 2008a). Prior to late 2007, EPA estimated that older CFLs contain 5 mg, on average—about the amount that would cover the tip of a ballpoint pen. EPA compares the 5 mg to the amount of mercury in medical thermometers present in many households. These thermometers contain about 500 mg of mercury. This is 100 times more than older CFLs and over 140 times the mercury in a 3.5-mg CFL (EPA 2008b).

How does this translate to households with multiple CFLs? A survey conducted in Maine in the spring of 2007 estimated that the average Maine household has thirty-eight sockets that can reasonably accommodate a medium-base screw-in CFL (Lockheed Martin 2007a). If all were filled in the future with modern CFLs containing 3.5 mg each, the total CFL-contained mercury in a household would be approximately 133 mg. That survey also estimated that the average Maine household actually has 7.3 CFLs (Lockheed Martin 2007b). This is the equivalent of 36.5 mg of mercury using the older, higher 5 mg per CFL content.² Therefore, both estimates are well below the amount of mercury present in households with medical thermometers using mercury.³

Mercury will also become an issue as the requirements of the 2007 federal energy bill approach. New light bulbs manufactured in 2012 that produce the lumens of today's 100-watt incandescent bulb must use no more than 72 watts. The law phases in similar wattage reductions for bulbs of other lumens until, by 2020, many believe that CFLs or light emitting diodes (LEDs) will be the only lighting technologies that can meet the federal standards (Mufson 2008). Although new halogen technology will help to meet the 2012 requirements, it will require major breakthroughs in light-emitting diode (LED) technology to avoid heavy reliance on CFL technology to meet the 2020 standards.

Managing the mercury disposal requirements resulting from this massive shift to fluorescent lighting technology will require more effective household disposal and recycling programs than exist today. State governments, utilities, and regional organizations that are promoting CFLs will come under pressure to develop household CFL disposal and recycling programs to help households comply with hazardous waste regulations. In order to succeed, the procedures for getting households to participate will have to be different from those for commercial and industrial buildings.

Maine's Program

Hazardous waste, whatever its source, must be disposed of in accordance with federal and state regulations. Recycling programs that provide compliant disposal have three parts: preparation, transportation, collection and recycling. Typically, a qualified recycling contractor

² The older 5-mg level is used because these CFLs probably would have been purchased before EPA revised its estimate downward in January 2008.

³ This paper will not discuss the relationship of these levels to EPA's "No Risk" level of mercury in a space. The Maine Department of Environmental Protection has examined this issue; a report on its research may be found at www.maine.gov/dep/rwm/homeowner/cflreport.htm (last accessed 3/5/08).

handles recycling. The challenge for compliance is in the preparation of the waste and transporting it to a collection site. When businesses generate the hazardous waste, the normal requirements for business licensing provide leverage for compliance. The relatively small numbers of generating sources facilitate monitoring. When households install CFLs, however, licensing and monitoring are not realistic.

Maine's Department of Environmental Protection has had pre-existing hazardous waste regulations and disposal programs in effect for products containing mercury since January 2001. A disposal ban for household mercury items has been in place since January 1, 2005. Its requirements for disposal of household waste containing mercury comply with EPA's recommendations; however, they are burdensome for households because of the requirements for packaging and transportation to an appropriate collection facility. They are virtually impossible to enforce. The CFL recycling program established on June 14, 2007 facilitates compliance with Maine's pre-existing rules by providing a much more convenient means of collection and by emphasizing public education about the need to dispose of CFLs through the program.

Maine's CFL recycling program comprises six principal elements:

- state agency cooperation
- mass communications
- multiple, convenient collection locations through retail partners
- use of a convenient, safe collection container
- use of a recycling contractor⁴
- training, reporting and monitoring.

State Agency Cooperation

The MPUC assigned operational responsibility for the program to Efficiency Maine, its operator for all of Maine's publicly supported energy-efficiency programs. Within Efficiency Maine's portfolio of programs, the Efficiency Maine Residential Lighting Program (Lighting Program) operates the recycling program.

The Lighting Program offers point-of-sale incentives in the form of instant rebates and manufacturer buydowns to residential consumers and small businesses for purchasing ENERGY STAR[®] CFLs. These incentives are offered statewide in the stores of participating retailers.

The MPUC also ensured that Efficiency Maine coordinated its efforts with the MDEP. The MDEP established and is responsible for the precursor rules for universal waste disposal described above. It ensures that CFL collection sites and recyclers comply with rules established by the state and federal regulations and provides education on the need for proper disposal through its Web site and mass communications. Therefore, each of Maine's principal governmental stakeholders in the implementation of hazardous waste disposal is actively involved.⁵

⁴ Mention in this paper of the recycling contractor used by Maine is not intended to constitute a recommendation that others use the same contractor. Active competition exists among multiple contractors to operate CFL recycling programs. Sponsors are urged to use their standard procurement practices to select a recycling contractor.

⁵ Efficiency Maine and the MDEP are also collaborating on a voluntary mercury thermostat recycling program. They expect to launch this program in mid-summer 2008.

Mass Communications

Efficiency Maine creates and places most of the mass communications for the recycling program. Efficiency Maine placed advertisements in Maine's major newspapers announcing the program and encouraging households to recycle burned-out CFLs at a local participating retailer. The initial ad was a 5.7 x 7-inch color ad that ran three days in each of eight newspapers throughout the state. Efficiency Maine has "branded" its CFL recycling message with a graphic image (a recycling logo) conveying the ideas that the life cycle of a CFL includes recycling and that recycling is related to environmental well being. All of Efficiency Maine's print advertisements for the Lighting Program use this recycling logo or mention recycling or both. Figure 1 shows the initial ad.

Figure 1. Example of an Advertisement Used for the Maine Recycling Program

SAVE MONEY & THE ENVIRONMENT

ENERGY STAR® qualified CFLs (Compact Fluorescent Lights) are among the most efficient light bulbs available today. It's easy to make the switch from a regular bulb to a CFL and you'll save money and energy over the life of the bulb.

RECYCLE your CFL properly when it burns out. Visit a participating retailer to recycle your CFL bulb at the store and purchase a replacement bulb while you are there.

Visit www.efficiencyMAINE.com or call 866-376-2463 for a list of participating retailers.

For a complete listing of recycling centers throughout Maine visit at www.maine.gov/dep.

REPLACE
start over
RECYCLE
REDUCE
6-7 YEARS
SAVE \$

efficiency MAINE

Saving energy for Maine
Program of the Maine Public Utilities Commission

efficiencyMAINE.com
1-866-376-2463

Efficiency Maine does not place separate ads just for the recycling program. It includes its recycling messages in its Lighting Program advertising. Efficiency Maine's CFL television campaigns in 2008 have included the recycling message.

Multiple, Convenient Collection Locations through Retail Partners

Households are offered two types of CFL disposal locations. The first of these consist of the public transfer stations operated by the MDEP and selected municipal landfills.⁶ These waste disposal sites have been in operation for many years as disposal sites for a variety of universal hazardous waste including fluorescent tube lamps discarded by contractors and building maintenance staffs. For CFLs, these require packaging CFLs in sealed containers, labeling the container as "Waste Lamps," and transporting them to the disposal site.

These requirements pose inhibiting preparation, transportation, and collection barriers to compliance for all but the most dedicated households. Efficiency Maine's program reduces these barriers by establishing local collection centers at participating retailers where CFLs are bought.

Retailers are encouraged to participate in the program as a means of drawing customers into their stores to purchase CFLs and other products. Retailers identify their participation by displaying a sign in their windows reading, "WE RECYCLE CFLs HERE." Efficiency Maine's incentive program for CFLs provides an added inducement to retailers to participate. Anecdotal evidence from retailers participating in the recycling and incentive programs indicates that consumers who bring in CFLs for recycling are, in fact, also buying CFLs.

Retailers participating in the Lighting Program are recruited for participation in the recycling program by the Lighting Program's field staff. Participation in the recycling program is voluntary. Since the Lighting Program began in 2003, the field staff has developed a rapport with the store managers that has contributed to success in recruiting retailers for the recycling program. Efficiency Maine offers a list of participating retailers on its Web site and by phone or mail upon request.

It costs the retailer almost nothing to participate. Efficiency Maine provides the materials required to serve as a collection center, and the field representatives help the store manager complete the associated paperwork that establishes the store as a RCRA Subtitle C hazardous waste collection site. The retailer must provide a location for a collection container provided by Efficiency Maine, maintain an inventory of the CFLs collected, and prepare and package the collection container for shipment when it is full. Efficiency Maine pays for the collection container and shipping costs.

As of May 2008, the lighting incentive program had 307 participating retailers. Of these, 208 had signed up for the recycling program. This constitutes a 68% participation rate among retailers participating in the Lighting Program. Efficiency Maine is continuing to recruit retailers and believes it can eventually achieve participation by 90% of its residential Lighting Program retail partners.

⁶ The MDEP offers the public a list of all hazardous waste disposal sites in the state and what they will accept. The list is found at www.maine.gov/dep/rwm/hazardouswaste/uwmunicipalmaster.xls (last accessed 3/6/08).

A Convenient, Safe Collection Container

Participating retailers are provided with a specially designed shipping container that includes a heavy plastic liner into which the returned CFLs are placed. The shipping container is a five-gallon pail resembling a commercial adhesive container used by tile contractors. It has a screwed-on lid with a rubber gasket. Figure 2 shows the pail. The recycling program provides instructions on how to use it and prepare it for shipment to the program's recycling contractor. Efficiency Maine provides pre-paid FedEx shipping bills for this purpose.

Figure 2. Special Pail and Liner Used by Retailers to Store Collected CFLs and Ship Them to the Recycling Contractor⁷



Consumers bring unbroken burned-out CFLs to a participating retail store and inquire about turning them in. The retailer will not accept a broken CFL.⁸ The store's retail staff is trained to accept the burned-out CFLs, unscrew the lid from the special pail, and gently place the CFL in the liner in the pail, then replace the lid after ensuring that the rubber seal is still in place.

If a CFL breaks after it is in the pail, the retailer leaves it there and immediately ships the pail to the recycling contractor, then starts a new pail. Should more than ten CFLs break in the pail, the retailer must file an incident report by calling the Maine Department of Public Safety. This has not happened in the recycling program to date.

⁷ The authors thank Marissa Frischetti of Veolia Environmental Services, Inc., for generously supplying the pictures of the recycling collection pail used by Efficiency Maine's recycling program.

⁸ A discussion of the proper procedures for cleaning up a CFL break in the home is beyond the scope of this paper. Maine's DEP has conducted extensive research on mercury levels from broken CFLs in the home and how to handle them. The report cited in footnote 1 describes its findings and recommendations.

The pail must be stored in a location that is not easily accessible by the public, i.e., behind a counter or in a storage area. A space must be maintained around it so that it can be inspected and to protect it and its contents from accidental damage. The storage area must be posted with a sign (provided by the MDEP and Efficiency Maine) reading “Universal Hazardous Waste Storage Area.”

The date the retailer places the first CFL in the pail establishes an “accumulation start date.” See Figure 3. When the pail is full or when one year elapses from the accumulation start date, the retailer seals the closed pail and ships it to the recycling contractor using the shipping bills provided by Efficiency Maine. Efficiency Maine provides the retailer with an inspection checklist to help it prepare the container properly for shipping. The retailer then begins a new pail. The Lighting Program’s field reps ensure on their regular visits that the retailer has an adequate supply of pails and required labels.

Figure 3. Using the Special Pail: the Pail with Associated Labels, Liner, and Plastic Seal; Inserting CFLs in the Pail; and Recording the Accumulation Start Date



Use of a Recycling Contractor

Efficiency Maine and the MDEP chose Veolia Environmental Services to receive the shipped pails of burned-out CFLs and recycle them. Veolia also supplies the collection pails. After recycling, less than a tablespoonful of nonhazardous material remains for the landfill.

Training, Reporting and Monitoring

The Lighting Program field representatives train retailer staff on handling procedures and keeping inventory records of the returned CFLs. The retailer also maintains a record of all shipments.

Efficiency Maine held informal conversations with the lighting retailers participating in its Lighting Program prior to designing the recycling program. Many of them already had working relationships with the MDEP, and their principal concern was whether the recycling program would impose additional random hazardous-waste inspections on them. Efficiency Maine reviewed this concern with the MDEP and determined that the number of inspections would not increase if they became CFL collection centers. Removal of this barrier removed the retailers' principal concern about participation.

Outcomes

Number of CFLs Recycled

Through April 2008, 1,672 CFLs have been turned in to the program for recycling. This constitutes approximately 8.4 grams of recycled mercury using the 5 mg estimate for older CFLs. The collection pails were designed to hold 75 to 80 CFLs; however, the CFLs turned in to date have filled the buckets after only 45 to 60 CFLs. Examination of these CFLs shows that they are larger than CFLs currently on the market. Efficiency Maine interprets this as indicating that older, bulkier CFLs are now reaching the end of their useful life and coming to the program. It estimates their lifetimes to have been five to ten years. It expects that newer CFLs, as they reach their end-of-life, will allow the pails to reach their expected capacity of 75 to 80 CFLs.

Assuming the five- to ten-year lifetime is correct, most of these recycled CFLs were purchased before the Lighting Program began in February 2003. When can Efficiency Maine expect to see the smaller CFLs show up in larger quantities? From February 2003 through mid-April 2008, retailers reported selling over 2,500,000 CFLs using the Lighting Program's incentives (Huber 2008).⁹ The year 2006 marked a major increase in program-related CFL program sales. During 2006, participating retailers reported over 700,000 CFLs sold.¹⁰ The pace continued above 700,000 in 2007 and is on-track to sell 900,000 in 2008. Efficiency Maine assumes an average seven-year lifetime for a CFL. Based on this average lifetime, a rough

⁹ The authors thank GDS Associates for providing data on the number of CFLs sold and benefit-cost ratio information.

¹⁰ Part of the incentives that year included a special Ten-percent Challenge program by a major wholesale power supplier who offered a bill reduction to Maine residential customers who could reduce their electric bill from the previous winter by ten percent. This was an effort to forestall anticipated brownouts in parts of the state. Households bought many CFLs to help achieve their reduction.

estimate using an assumed probability of failure suggests that by the year 2015, the recycling program might be receiving almost 204,000 CFLs annually.¹¹

Retailer Satisfaction

Efficiency Maine attributes the success of its recycling program to the retailers participating in its Lighting Program. As of the end of April 2008, none of the 217 retailers who had volunteered to participate in the program have dropped out or expressed any issues with the program. Nine of these, however, are no longer in business leaving 208 active participants.

The two major national home-improvement chains, whose stores in Maine are participating in the Lighting Program, have so far declined to participate in the recycling program. They cite as concerns the need to have their corporate legal and environmental offices conduct a thorough review of the program and their potential liability. Their concerns also include establishing a take-back precedent that could be extended to other products. In contrast, Wal-Mart has been an enthusiastic participant.

Program Cost

Efficiency Maine's target cost for the recycling program is \$0.75 per recycled CFL. At present it is paying about \$0.99 per CFL, with a range of \$1.23 to \$0.72. It attributes the higher cost to two factors. First, the program is seeing a smaller number of CFLs per collection bucket than was assumed. As noted, the program attributes this, in part, to fact that the older, larger CFLs currently being recycled take up more space in a pail. This has driven up the number pails required and increased the program cost per CFL. As the older CFLs burn out and are replaced with newer, smaller CFLs, Efficiency Maine expects the number of CFLs per bucket to increase and the cost per CFL to decrease. Second, some retailers ship their buckets on a regular schedule, e.g., every three months, rather than wait until they are full. Efficiency Maine is working to encourage retailers to ship their buckets only when they are full.

For the purpose of benefit-cost analysis, Efficiency Maine treats the recycling program as a marketing activity of the Lighting Program because one of its purposes is to sell more CFLs by bringing more retail traffic into the Lighting Program's partner stores. Efficiency Maine accounts for program performance on a July 1 to June 30 fiscal-year basis. It purchased several years' worth of recycling buckets during FY 2007 in preparation for the program launch in June 2007. The Lighting Program's benefit-cost ratio of 5.87 for FY 2007 included the cost of these buckets. This 2007 ratio compares favorably to the Lighting Program's FY 2006 benefit-cost ratio of 5.68 and suggests that the added cost of the recycling program did not significantly affect the Lighting Program's benefit-cost ratio.

The recycling program began in June 2007 so the effects of its cost on the Lighting Program's 2008 benefit-cost ratio will not be known until after June 30, 2008. However, because the buckets were expensed in FY 2007 and the only additional cost for the recycling program in FY 2008 may be \$20,000 for an additional advertising push for recycling, the effect should be

¹¹ Technical note: this estimate assumed (1) a logistic function (S-shaped curve) can be used to approximate the cumulative probability distribution for failure of a year's CFL sales; (2) the distribution function is symmetrical about a seven-year average CFL lifetime; (3) all of a year's CFL sales will have burned out by age 14 years; (4) 40% of the CFLs that burn out in any year are turned in for recycling, and (5) the effect of the federal bulb-wattage regulations on CFL turn-in rates will not be significant in 2015. The estimate was developed for illustration purposes and the assumptions are those of the first author. Newer CFLs may last longer in normal use.

minimal. If, in fact, the recycling program acts as a marketing program, the additional CFLs sold because of it may more than offset its costs.

Thoughts on Using System Benefit Charge Funds for a Recycling Program

Maine's program is funded from system benefit charge (SBC) funds. The funding policy for efficiency programs in some states may prevent the use of SBC funds for recycling programs. New York is one of these states; we compared the rationales and circumstances behind the policies in Maine and New York. Table 1 describes illustrative rationales for the two policy positions.¹²

Table 1. Illustrative Rationales for Funding or Not Funding a CFL Recycling Program with SBC Funds

Maine (SBC-funded)	<p>A CFL recycling program that creates collection centers at lighting retailer sites will serve to bring consumers to the store when their CFLs need recycling. This helps to:</p> <ul style="list-style-type: none"> (1) sell more CFLs and (2) stimulate the consumer to replace a burned-out CFL with another CFL, thereby promoting sustainability. <p>The recycling program is, therefore, an energy-efficiency marketing program.</p>
New York (Not SBC funded)	<p>The purpose of the SBC funds is to increase energy efficiency. A CFL recycling program does not produce a net increase in the energy efficiency of households; therefore, it is not within the scope of SBC funding.</p> <p>By contrast, the operator of New York's energy efficiency programs, the New York State Energy Research and Development authority (NYSERDA), is authorized to conduct a recycling program that pays a bounty to consumers who recycle an old, working room air conditioner and replace it with an ENERGY STAR air conditioner. Such a program provides a net increase in the energy efficiency of households; therefore, it is in the scope of SBC funding.</p>

The issue of who operates the program not as urgent in New York as in Maine because New York does not require households to separate fluorescent lamps for disposal as hazardous waste (Michalski 2008, DEC 2008). Nonetheless, NYSERDA is promoting development of a state recycling program by the New York Department of Environmental Conservation (DEC). NYSERDA has taken the position that, because it cannot operate such a program and because of potential citizen concern, the DEC should develop and operate a recycling program.

The authors examined the advantages and disadvantages of operating a recycling program by an efficiency program administrator or by the state's environmental protection office. Table 2 provides our views on the pro's and con's for each.

¹² The observations in Tables 1 and 2 are a combination of the authors' opinions and the views expressed in an interview with NYSERDA's Products Program Manager, as interpreted by the primary author (Michalski 2008). Any errors in interpretation are the sole responsibility of the primary author.

Table 2. Arguments For and Against Operating a CFL Recycling Program by an Efficiency Program Administrator or State Environmental Protection Office

Operate by an efficiency program administrator	<p>Pro:</p> <ol style="list-style-type: none"> (1) The efficiency program already has contacts and good will with the market distribution channels, including the retailers, and can more easily set up the collection centers and necessary controls. (2) The efficiency program understands the product and its use. <p>Con:</p> <ol style="list-style-type: none"> (1) Use of program funding and manpower to operate the recycling program will dilute the resources available for the efficiency program.
Operate by the state's office of environmental protection (OEP)	<p>Pro:</p> <ol style="list-style-type: none"> (1) The OEP already has contacts with recyclers and has the protocols for issuing RFPs for a recycling vendor and for monitoring performance. <p>Con:</p> <ol style="list-style-type: none"> (1) The OEP will be less familiar with the product and how it is marketed. (2) The OEP may not understand the level of the mercury hazard in CFLs and may establish more stringent requirements than are necessary. (3) The OEP typically does not have the information needed to educate the public on the safety of CFLs. (4) Retailers may resist participating if they believe the OEP is going to impose additional reporting requirements and inspections.

Concluding Thoughts on Best Practices for a Recycling Program

Regardless of who operates the program or how it is funded, Maine's experience suggests several best practices for states and utilities considering a CFL recycling program.

- Most states will have an environmental protection office equivalent to the MDEP. In the absence of a separate efficient lighting incentive program, this office may be selected to operate a CFL recycling program. If another office operates the program, that office should work closely with the environmental protection office. It will already be implementing hazardous waste disposal procedures that comply with state and federal regulations and can ensure that the program complies with these regulations as well.
- A prior Lighting Program with participating retailers will facilitate establishing more convenient, local, retailer-centered CFL collection centers.
- A pre-existing efficient-lighting incentive program will offer retailers an incentive to participate in the recycling program. Such a lighting incentive program gives them a reason to use the recycling program to bring more customers into their store. Otherwise, a special incentive may be required to recruit them for the recycling effort or strong evidence must be available to show that offering a collection center increases sales.
- As many collection centers as possible should be established to reduce the burden to households of transporting their CFLs to an approved location.

- The issue of additional state hazardous waste collection inspections should be addressed to retailers' satisfaction.
- Use of a qualified commercial recycler should allow the program to operate more efficiently.
- Encourage retailers to ship their recycling pails only when they are full.
- Field staff should be developed and used to recruit retailers and help them fill out the paperwork required to establish a hazardous-waste collection center. The ability to establish good rapport with the retailers should be a performance criterion for field staff.
- A safe, compliant method of transporting the CFLs from the collection centers to a qualified recycling contractor is required.
- The recycling program should include a strong consumer education program to provide instructions on (1) the hazard posed by mercury in CFLs, (2) how to dispose of them through the recycling program, and (3) how to clean up broken CFLs. For the consumer market segment that is persistently dubious about the safety of CFLs, the availability of a recycling program and an education activity should increase the penetration of CFLs by encouraging these consumers to buy CFLs.

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