

**DRAFT**  
**Compact Fluorescent Lamp Recycling**  
**Pilot Project Overview**

February 27, 2003

**Background**

Compact fluorescent lamps (CFLs) have been widely promoted by electric utilities and energy efficiency groups because they produce the same amount of light as standard incandescent bulbs while using up to 75% less energy and lasting up to ten times as long. During the energy crisis of 2001, millions of CFLs were sold in stores and given away by electric utilities in Oregon, Washington and Idaho. CFLs help reduce the pollution associated with energy production, but because they also contain about 5 mg of mercury per bulb, it is important that they be disposed of properly. Mercury is toxic to the human nervous system, especially for fetuses and young children. Once released into the environment it can accumulate in the tissues of living organisms and travel up the food chain where it reaches high concentrations in fish and other marine life. Proper recycling can easily eliminate these risks.

**Purpose of the CFL Recycling Project**

- To provide a multi stakeholder process for planning a state/region wide CFL recycling program model
- To evaluate alternative CFL recycling models
- To encourage the safe use of energy efficient products
- To increase economic activity from CFL recycling
- To reduce amounts of one of the sources of mercury to landfills
- To protect the environment for human and ecosystem health

A compact fluorescent lamp recycling pilot project is needed to raise awareness about the need to recycle burned out CFLs, and to demonstrate the feasibility of collecting burned out CFLs from households through retailer sites. The CFL Stakeholder Group<sup>1</sup> is working to develop this pilot project to help ensure the responsible management of burned out residential lamps to minimize the risks posed by this anthropogenic source of mercury. A project focusing on CFLs from households is needed to compliment the collection and recycling efforts centered on commercial sources. This pilot project will aid in determining the form of a larger permanent, potentially regional program. The CFL Stakeholder Group has been reviewing options for the capture and processing of CFLs and funding a pilot.

The CFL Stakeholder Group consists of organizations that include electric utilities, private businesses, government agencies, industry associations, consulting firms, recyclers and non-profit groups. The participants are committed to developing a pilot project in Oregon and/or Washington to test CFL collection and recycling methods with the intent that it may lead to a permanent regional recycling system. This has been a public process open to additional groups that wish to join. The

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<sup>1</sup> The CFL Stakeholder Group is a multi stakeholder group that was convened by the Zero Waste Alliance under funding from Bonneville Power Administration, Clark Pubic Utility District, Eugene Water and Electric Board, Metro Region Government, Northwest Energy Efficiency Alliance, Oregon Department of Environmental Quality, PacifiCorp, and Portland General Electric.

participants of this group have agreed to the following objectives to guide the design and implementation of such a system:

### **CFL Recycling Project Principles**

- **Environmental Protection:** Primary goal is to avoid mercury buildup in the environment associated with the use of CFLs. A specific project goal is to avoid mercury emission during the collection, transportation and recycling of the CFLs.
- **Easy Access:** The recycling system should allow the public to easily recycle their CFLs by providing the most convenient recycling opportunities possible
- **Low Cost:** The costs of the recycling system, such as collection, transportation and recycling, should be minimized.
- **Fair Cost Allocation:** The costs of the recycling system should be allocated fairly so as to minimize impacts to manufacturers, retailers, waste handlers, state and local government and other involved in the collection, transportation and recycling of CFLs.
- **Compliance:** The recycling program must provide for compliance with all applicable regulations, such as RCRA, CERCLA, state solid waste regulations and the Universal Waste Rule.
- **Education:** Education and public outreach are vital components of a successful CFL recycle program. They should point out that CFLs are safe in the home and provide an overall environmental benefit, but if not handled and recycled properly can create environmental and human health impacts.
- **Replicable:** To the extent possible, the program will be designed so that after its implementation in Oregon, it can be easily replicated in other areas, especially in the Western United States.
- **Expandable:** CFLs are only one of several sources of potential mercury emissions. To the extent possible, this program should be expandable so that it may later include the collection and recycling of other mercury bearing items, including increased recycling levels for fluorescent light tubes.
- **Recycling System:** The participants are committed to developing a pilot project to test CFL collection and recycling methods with the intent that it will lead to a sustained recycling system.
- **Sustainable:** the group as a whole should design the system so that it can sustain itself without ongoing involvement.

Eight location and project cost scenarios for a potential pilot are discussed in this paper. The Group may chose to select one of the scenarios or recommend a hybrid or combination project that tests more than one location (i.e., urban versus rural collection).

This paper is a summary of the options the Group is currently considering for a potential pilot project. This description is expected to change based on proposals to be submitted by organizations interested in implementing the pilot project, if and when it is funded.

## **Material Considerations**

### **Material Flow**

The fundamental flow of material in a pilot project will be: from manufacturer to retailer for sale to consumers; then back to the retailer for collection and transportation to a recycling facility. A CFL purchaser uses the CFL till it burns out. At that time the CFL user takes the CFL to a retailer participating in the recycling project. The CFL user then either deposits the burnout CFL into a “Do-It-Yourself” collection bin, or gives it to a retailer employee for deposit. When the retailer collects a certain number of burned out CFLs, a recycler will make a pickup and transport the lamps to a facility for recycling. It is important that burned out CFLs are separated from early failures that are still covered under warranty, as Northwest Energy Efficiency Alliance is currently running a residential lighting program with Energy Star – a component of which emphasizes the need for consumers to return CFLs that fail prematurely to retailers for a replacement.

### **Quantities Expected**

Total sales for the region are based on the seven-quarter period from fourth quarter 2000 to second quarter 2002. This sales data is available by county. CFL sales are projected to level off to around 1,000,000 per year from 2003. Approximately 56.8% of the CFLs sold in the region are located in Washington state, 29.2% in Oregon, 9.9% in Idaho, and 4.0% in Montana. The majority of sales throughout the region occurred in the most heavily populated counties.<sup>2</sup> Because data is only available by county, a city population to total county population ratio was used to project burned out CFLs for each pilot location. Results of these calculations are shown in the table below.

*Projected Burnouts 2004; Percentage CFL sales by county*<sup>3</sup>

	<b>Portland Tri-Co</b>	<b>King Co Seattle</b>	<b>Multnomah Co Portland</b>	<b>Eugene</b>	<b>Salem</b>	<b>Hillsboro</b>	<b>Vancouver</b>	<b>Bend</b>
2004 Projected burnouts	234,261	112,292	77,619	26,424	22,671	17,367	15,371	11,482
% Total CFL sales by county (Q2 2000 – Q4 2002)	6.2 + 5.4 + 1.4 = 13%	19.1%	5.4%	3.4%	2.7%	6.2%	2.0%	1.5%

## **Financial Considerations**

### **Anticipated Project Costs**

To estimate pilot project costs, assumptions were made for the following: recovery rate, number of participating stores, number of project pickups per store, number of CFLs per pickup, project transport costs, project management costs, and extent of education outreach and advertising. Annual pilot project management costs and other variable and fixed costs vary based on the size of the project.

Advertising costs will vary depending on location, number of participating retailer sites, and breadth of the campaign. Some considerations include:

- Fostering relationships among sponsors and subsponsors to promote the pilot and reduce advertising costs (e.g., cooperative advertising, sharing of logos in ads in exchange for free public relations, trade-offs, etc.);
- Retail sponsorship; inclusion of project promotion in participating retailers’ advertising;

<sup>2</sup> Source: EcoNorthwest/Northwest Energy Efficiency Alliance

<sup>3</sup> Source: EcoNorthwest/Northwest Energy Efficiency Alliance

- Utility bill stuffers, coupons, and newsletter updates;
- TV, radio, public service announcements (depending on pilot location, TV and radio may or may not be appropriate, for example a project in Hillsboro would not be well served by greater Portland area radio coverage);
- One time design and production effort (may be applied to all participating stores; and regional program if implemented).

The CFL Stakeholder Group may deem it appropriate to put together a hybrid or combination project that tests collection in both an urban and rural location (distinct versus diffuse boundary; e.g., ‘Multnomah County, Portland’ and ‘Bend’ or ‘Eugene’ and ‘Vancouver’). Ultimately, the Group will have to decide whether the pilot should focus on a collection method and raising awareness for a future regional program, or on capturing the greatest number of CFLs (i.e., having a pilot in a major metropolitan area such as Portland, where recovery rates and quantities are likely to be greater than in other areas).

*Pilot Location Details; Recycling and Transport Cost Estimates*

	Portland Tri-Co	King Co Seattle	Multnomah Co Portland	Eugene	Salem	Hillsboro	Vancouver	Bend
Project burnouts 2004	234,261	112,292	77,619	26,424	22,621	17,367	15,371	11,482
20% recovery	46,852	22,458	15,524	5,285	4,524	3,473	3,074	2,296
# Retailer sites (assumed)	5	3	3	2	2	1	2	1
# Pickups per store	16	14	10	5	5	7	3	4
# CFLs per pickup	586	535	517	528	452	496	512	574
Total Project transport costs	\$4,000	\$2,100	\$1,500	\$750	\$750	\$525	\$450	\$500
Recycling cost per pickup @ \$0.35/lamp	\$205	\$187	\$181	\$185	\$158	\$174	\$179	\$201
Recycling cost per pickup @ \$0.50/lamp	\$293	\$267	\$259	\$264	\$226	\$248	\$256	\$287
Total Project Recycling / Transport Cost @ \$0.35/lamp	\$20,398	\$9,960	\$6,933	\$2,600	\$2,333	\$1,741	\$1,526	\$1,304
Total Project Recycling / Transport Cost @ \$0.50/lamp	\$27,426	\$13,329	\$9,262	\$3,392	\$3,012	\$2,262	\$1,987	\$1,648

As an example, the estimated cost of a pilot project in Hillsboro is \$44,000, assuming the following:

- Recovery rate of 20% at a recycling cost of \$0.35 per lamp (\$1,200),
- One participating retailer site,
- Project management and other related costs of \$35,000,
- Advertising costs of \$7,000,
- Transport costs of approximately \$525; average pickup of 500 CFLs; 7 pickups during project; @ \$75 per pickup

**Note:** All costs in the example are to serve only as a starting point in facilitating discussion in estimating program costs. It is assumed that these cost estimates may change as the pilot is further developed.

**Funding Sources**

The purpose of a pilot is to raise awareness of the need to recycle CFLs, test a method for collection, and evaluate the project – providing recommendations for considering or rejecting implementation of a permanent, eventually self-sustaining regional program. It is unlikely to expect that legislation, such as a landfill ban, will be passed in the foreseeable future to support a pilot project. For these reasons, there may be minimal value in dedicating time to establish a recycling fee structure for a 12

month-long program. One option for pilot funding is for interested participants in the CFL Stakeholder Group to either directly fund activities or provide in-kind contributions through a Collective Fund.

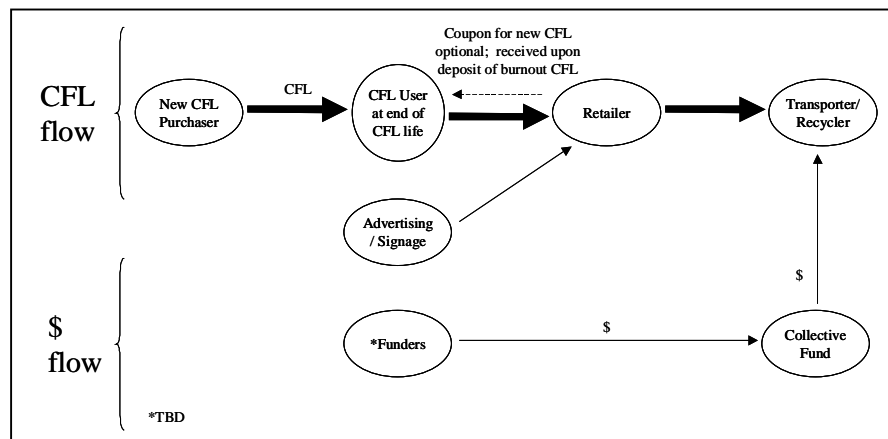
Coupon incentives may aid in informing the public as to the need, and eventual cost of recycling CFLs. Utilities could include a coupon with their bills that allows a customer to return a burnout CFL at no recycling charge (free) to participating retailer sites. This acclimates users to the idea of associated recycling fees so that later, if and when an Advanced Recovery Fee is imposed as part of a potential permanent regional program, they understand why; and the benefits of CFLs are ensured. Coupons could also be provided so that when CFL users deposit their burnout CFLs at retailers, they may purchase a new CFL at reduced cost. This would help ensure sales of new CFLs and the associated energy savings.

### Financial Flow

As previously mentioned, funding for a pilot project may come from participants in the CFL Stakeholder Group. A Collective Fund may be established to cover costs of a pilot, including project management, advertising and marketing, collection, recycling, and transport costs. Additionally, stakeholders may make in-kind contributions (e.g., coupons, bill stuffers, promotion design etc.).

Phase II discussions and recommendations on financial flow, and funding sources will be included in the CFL Recycling Project final report by the Zero Waste Alliance.

### Pilot Project Materials and Financial Flows



### Management of Project

#### Structure

A pilot project would likely be managed by one implementing organization, chosen through a request for proposal process. This organization would be in charge of the following phases:

- Phase I: Building and fostering relationships with pilot project participants and developing a promotion plan and materials
- Phase II: Organizing pilot project(s) promotion and start-up / kick-off event(s)
- Phase III: Ongoing managing of pilot project(s) activities
- Phase IV: Evaluating and reporting on pilot project progress and results

Each phase would include specific tasks, as described in the sample budget estimate section below.

## Management

Because the pilot project will be managed by one implementing organization, oversight responsibilities may be incorporated into existing job descriptions. Management and advertising planning of a pilot in the Portland Tri-County area would require greater time commitment than a project in Bend because of the greater number of participating retailer sites. Extra time is needed to coordinate with stores and recyclers regarding bin placement, scheduling of pickup, placement of signage, etc.

## Costs

Eighteen-month project management costs, other variable and fixed costs, and advertising costs vary by pilot location. These costs decrease depending on the size of the pilot and the number of participating retailer sites. Detailed management costs estimates are presented below.

### Pilot Project Costs

	Portland Tri-Co	King Co Seattle	Multnomah Co Portland	Eugene	Salem	Hillsboro	Vancouver	Bend
Phase I	\$8,075	\$8,075	\$8,075	\$8,075	\$8,075	\$7,075	\$7,075	\$7,075
Phase II	\$8,250	\$8,250	\$8,250	\$8,250	\$8,250	\$8,250	\$8,250	\$8,250
Phase III	\$23,750	\$18,750	\$18,750	\$13,750	\$13,750	\$13,750	\$13,750	\$13,750
Phase IV	\$4,900	\$3,600	\$3,600	\$3,600	\$3,600	\$3,600	\$3,600	\$3,600
<b>Total Project Mngt Cost</b>	<b>\$43,975</b>	<b>\$38,675</b>	<b>\$38,675</b>	<b>\$33,675</b>	<b>\$33,675</b>	<b>\$32,675</b>	<b>\$32,675</b>	<b>\$32,675</b>
Advertising & Marketing Cost	\$25,000	\$15,000	\$15,000	\$10,000	\$10,000	\$7,000	\$6,000	\$5,000
Recycling & Transport Cost	\$21,398	\$10,060	\$6,933	\$2,600	\$2,525	\$1,741	\$1,526	\$1,179
Other Costs	\$2,374	\$5,265	\$2,374	\$3,294	\$2,834	\$2,374	\$2,506	\$4,608
<b>Total Project Cost (low end)</b>	<b>\$92,747</b>	<b>\$69,000</b>	<b>\$62,982</b>	<b>\$49,569</b>	<b>\$49,034</b>	<b>\$43,790</b>	<b>\$42,707</b>	<b>\$43,462</b>

**Note:** All costs in the example are to serve only as a starting point in facilitating discussion in estimating program costs. It is assumed that these cost estimates may change as the pilot is further developed.

## Sample Budget Estimate

In the sample budget below, project management costs vary slightly, but are comparable by project; and vary depending on the number of participating stores. Recycling costs can be a major cost issue for a pilot project. For example, for the Portland Tri-County area, depending on recovery rate and recycling costs per lamp, estimates for recycling range from approximately \$16,000 to \$87,000, whereas recycling costs for a project in Hillsboro range from \$1,216 to \$3,256. A pilot project may help predict recovery rates for a regional program. Advertising costs will also vary depending on locations, how many retailers participate and which media sources are used to market the project to the public. These costs are to be considered as a starting point for finalizing costs of a pilot project and are subject to change based on Group discussions.

### Sample Pilot Project Budget

Option 6 Hillsboro Project Management	Hours			Cost		
	Sr Staff	Staff	Total	Sr Staff	Staff	Total
<b>Phase I: Building and fostering relationships with pilot project participants and developing a promotion plan and materials</b>						
Confirming project participants	3	20	23	\$75	\$50	\$1,225
Designing advertising and marketing strategies (assume free graphics)	4	20	24	\$75	\$50	\$1,300
Determining location of recycling bins, signage, information at retailer site		6	6	\$75	\$50	\$300

Scheduling pickups for recycling bins by recycler		4	4	\$75	\$50	\$200
Setting up telephone/web support for CFL users with questions and information requests	4	20	24	\$75	\$50	\$1,300
Establishing protocols for distributing pilot project(s) funds	4	20	24	\$75	\$50	\$1,300
Creating a system for monitoring/measuring pilot project progress	6	20	26	\$75	\$50	\$1,450
<b>Phase I Subtotal</b>	<b>21</b>	<b>110</b>	<b>131</b>			<b>\$7,075</b>
<b>Phase II: Organizing pilot project(s) promotion and start-up / kick-off event(s)</b>						
Project promotion (flyers, stuffers, PR)	10	40	50	\$75	\$50	\$2,750
Implement kick-off events(s)	10	40	50	\$75	\$50	\$2,750
Collaborate with community/special interest groups	10	40	50	\$75	\$50	\$2,750
<b>Phase II Subtotal</b>	<b>30</b>	<b>120</b>	<b>150</b>			<b>\$8,250</b>
<b>Phase III: Ongoing managing of pilot project(s) activities</b>						
Ongoing project promotion (2 days/mo)	50	200	250	\$75	\$50	\$13,750
Flyers, stuffers, PR						
Store / Recycler liaison						
Data collection						
Reporting						
<b>Phase III Subtotal</b>	<b>50</b>	<b>200</b>	<b>250</b>			<b>\$13,750</b>
<b>Phase IV: Evaluating and reporting on pilot project progress and results</b>						
Evaluate project results	4	20	24	\$75	\$50	\$1,300
Prepare final project report with recommendations	4	40	44	\$75	\$50	\$2,300
<b>Phase IV Subtotal</b>	<b>8</b>	<b>60</b>	<b>68</b>			<b>\$3,600</b>
<b>Project Management Subtotal</b>	<b>109</b>	<b>490</b>	<b>599</b>			<b>\$32,675</b>
<b>Advertising</b>						
Advertising and Marketing						\$7,000
Design						
PSAs, TV, radio, newspaper						
Quarterly Flyers (1/5 residents)						
Stuffers, PR						
<b>Advert and Marketing Subtotal</b>						<b>\$7,000</b>
<b>Recycling / Transportation</b>						
Recycling (assuming 20% CFL recovery rate @ \$0.35/lamp)						\$1,216
Transport (20% recovery = ~3,400 CFLs; 1 store; 500/pickup; 7 pickups @ \$75 each)						\$525
<b>Recycling / Transport Subtotal</b>						<b>\$1,741</b>
<b>Mngt/Advert/Recy/Trans Total</b>	<b>109</b>	<b>490</b>	<b>599</b>			<b>\$41,416</b>
<b>Other Costs</b>						
Office Expenses @ \$100/mo						\$1,800
Travel 1 trips/mo for 18mo @ 60mi/trip \$0.365/mi						\$394
Telephone @ \$10/mo for 18mo						\$180
<b>Other Costs Subtotal</b>						<b>\$2,374</b>
<b>Project Total</b>	<b>109</b>	<b>490</b>	<b>599</b>			<b>\$43,790</b>

In a Hillsboro pilot assuming one participating store, total project implementation costs assuming 50% CFL recovery rate @ \$0.75/lamp is estimated at \$45,830. This is approximately \$2,000 more than in the above budget assumption of 20% recovery rate @ \$0.35/lamp. In a larger project such as Portland Tri-County area or Multnomah County Portland, this difference increases to approximately \$70,000 and \$20,000 respectfully. This illustrates how recovery rate and recycling cost can impact project costs.

## **Summary**

A pilot CFL project is a first step in gauging the feasibility of a permanent, regional CFL recycling program. It is important that the millions of residential CFL burnouts currently projected are managed responsibly at their end of life to ensure that this source of mercury is captured and prevented from entering the environment. Although each lamp contains only 5mg of mercury, it only takes between 100 and 200 lamps to contaminate a 20-acre lake. Proper recycling can help prevent this threat to human and environmental health. And as household hazardous wastes facilities are not experiencing large numbers of CFL returns from households, a pilot project provides a means for raising awareness and evaluating the effectiveness of a new system for recycling CFL burnouts from residents.

The pilot scenarios in this paper focus on counties that experienced high sales during 2000-2002; and the majority of the CFLs in use in the region are in the larger metropolitan areas. Collection through retailer sites provides a convenient method for return of burned out CFLs. An effective pilot project would likely expand to include fluorescent tubes generated by households, in addition to CFLs. Though the Group decided to include tubes as an option in the pilot, estimating the costs of incorporating the collection of tubes needs further Group discussion.

Project costs are dependent on several factors such as, CFL recovery rate, recycling costs, pilot location, number of stores participating in the project, breadth of advertising and education outreach, etc. The Group will have to decide whether the pilot will focus on collection methods and raising awareness or on capturing the greater number of returns. This will largely dictate pilot location.

One option for covering pilot cost is to have interested participants in the CFL Stakeholder Group contribute funds directly or in-kind. It is generally recognized that CFL users will ultimately pay for a recycling program. Establishing a fee structure for a 12 month-long program pilot project may not be cost effective. One approach is to offer recycling for free during a pilot and, if and when a permanent regional program is put place, gradually introduce an Advance Recovery Fee to make the program eventually self-sustaining. However, seed money would be needed to cover this initial regional program implementation and management cost.

## Estimated Timeline

### Estimated Pilot Project Timeline

Activity	Month																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<b>Phase I: Building and fostering relationships with pilot project participants and developing a promotion plan and materials</b>																		
Confirming project participants	■																	
Designing advertising and marketing strategies	■	■																
Determining location of recycling bins, signage, information at retailer site		■	■															
Scheduling pickups for recycling bins by recycler			■															
Setting up telephone/web support for CFL users with questions and information requests		■	■															
Establishing protocols for distributing pilot project(s) funds		■	■															
Creating a system for monitoring/measuring pilot project progress with indicators		■	■															
<b>Phase II: Organizing pilot project(s) promotion and start-up/kick-off event(s)</b>																		
Project promotion	■	■	■		■			■			■			■				
Hold kick-off event(s)				■														
Collaborate with community/special interest groups	■	■	■															
<b>Phase III: Ongoing managing of pilot project(s) activities</b>																		
Ongoing project promotion				■	■	■	■	■	■	■	■	■	■	■	■	■		
Store / Recycler liaison				■	■	■	■	■	■	■	■	■	■	■	■	■		
Data collection				■	■	■	■	■	■	■	■	■	■	■	■	■		
Reporting				■	■	■	■	■	■	■	■	■	■	■	■	■		
<b>Phase IV: Evaluating and reporting on pilot project progress and results</b>																		
Evaluate project results and report			■			■			■			■			■			■
Prepare final project report with recommendations																		■