

APPENDIX E

**EVALUATION
OF 2011
COMPACT FLUORESCENT LAMP (CFL)
PROGRAM**

**Final Report
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Prepared for:

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1. EXECUTIVE SUMMARY

During 2011, the Ohio Operating companies The Cleveland Electric Illuminating Company (CEI), Ohio Edison (OE), and The Toledo Edison (TE) (collectively “Companies”), implemented the Compact Fluorescent Lamp (“CFL”) Program. The program design provided for 23 watt spiral CFLs to be distributed through four distribution channels:

- **Retail.** Five retail chains composed of 189 stores offered the CFLs at the discounted unit price of 50 cents;
- **Community Organizations.** The Cleveland Clinic distributed complementary CFLs at an Earth Day festival;
- **Low Income.** Ohio Partners for Affordable Energy (“OPAE”) distributed complementary CFLs on request to eligible customers applying for assistance to help pay their gas and electric bills; and
- **Direct Mail.** Power Direct distributed CFL kits by mail to new service customers, high bill complaint customers, small business customers, and general use customers requesting CFLs.

1.1 EVALUATION APPROACH

The 2011 CFL Program evaluation was designed to achieve the following major objectives:

- Determine agency participation in CFL distribution and customer satisfaction with the CFL Program.
- Determine the number of CFLs distributed and installed by customers in 2011.
- Estimate the energy and demand impacts from the CFLs installed.

There were three primary components to the evaluation:

1.1.1 Analysis of Program Data

Statistical reports prepared by the implementation contractors -- Power Direct Energy and OPAE -- detailing CFL shipments and distributions over the 2011 program year were analyzed to determine the number of CFLs requested by customers, the number of CFLs shipped to participating distribution agencies, and the number of CFLs distributed to customers in 2011. An additional report was requested from Power Direct to determine the number of CFLs requested through the Direct Mail channel. Additionally, the OPAE Executive Director was interviewed to confirm understanding of how low income customer requests for CFLs were met by the program.

1.1.2 Collection and Analysis of Customer Telephone Surveys

Three telephone surveys were administered to address evaluation questions about how customers heard of the CFL program, customer satisfaction with the program, and installation of CFL acquired through the direct mail, low income, and retail channels. The surveys were completed by a random sample of 240 customers, stratified by distribution channel and utility operating company. The survey data were analyzed to determine CFL installation and storage rates, which were the basis for estimating energy and demand impacts.

1.1.3 Collection and Analysis of In-depth Stakeholder Interviews

In-depth interviews were carried out with program managers from the Companies, Power Direct, OP&A, and with managers at each of the participating retail chains. A report was prepared on process findings that provided background on the origin of the CFL program, described the program's structure and delivery channels, and addressed concerns about program resources expended on marketing and outreach.

1.2 RESULTS

Estimates of the gross energy savings (kWh) and peak demand reduction (kW) for the program in the three service territories are reported below in Table 1-1.

Table 1-1. Overall Impact Evaluation Results

Utility	<i>Ex Ante</i>		<i>Ex Post</i>	
	<i>Expected Gross Savings</i>		<i>Verified Gross Savings</i>	
	<i>Gross kWh</i>	<i>Gross kW</i>	<i>Gross kWh</i>	<i>Gross kW</i>
Ohio Edison	86,498,327	14,510	78,725,859	12,092
CEI	88,100,948	14,779	80,184,474	12,316
Toledo Edison	31,992,473	5,367	29,117,730	4,472
Total	206,591,747	34,655	188,028,063	28,879

As shown in Table 1-1, verified electric savings were 188,028,063 kWh annually, which represents a realization rate of 91%. The variance between *ex post* verified savings and *ex ante* estimated savings was caused primarily by an 80% ISR *ex post* versus an 86% ISR in the *ex ante* calculations. Evidence from secondary research suggests that 97% to 99% of the stored CFLs should be installed by the end of 2013.

Verified summer peak demand reduction was 28,879 kW, which represents a realization rate of 83%. Additionally, verified first-year (2011) savings were 47,007,016 kWh and verified lifetime savings were 1,504,224,504 kWh.

1.2.1 Process Evaluation Findings

- In 2011, 3.7 million CFLs were shipped to the distributing agencies, which accounts for 98.5% of the stock of warehoused CFLs.
- Most of the CFLs (73 percent of the 3.7 million CFLs, or 2.7 million CFLs) were shipped to the retail channel stores for distribution to customers through discounted sales.
- The retail channel accounted for the majority (70%) of CFLs distributed to the Companies' customers in 2011.
- The retail stores sold 74% of their 2011 program-supplied CFL inventory.
- Retail customers bought the discounted CFLs generally after encountering the CFLs displayed in participating retail stores.
- Direct mail customers typically heard of the CFL program through limited newspaper articles, umbrella marketing announcements received in the mail (e.g., retail flyers and bill inserts) and through contacts with community service agencies.
- Low income customers were typically made aware of the program through their contacts with community service agencies.
- Eighty percent of the program participants registered satisfaction with the 2011 CFL program and 88% of the participants indicated satisfaction with the new CFLs they received from the program.

1.3 RECOMMENDATIONS

Retail sales accounted for the majority of CFL distributions in 2011. The least effective retail chain in 2011 was Discount Drugs, which was able to sell only about half of its program-supplied CFL inventory. Discount Drugs indicated that it would be interested in returning at least part of its unsold inventory so that the program might redistribute its unsold CFLs through other channels that might be more effective. ADM Associates, Inc. ("ADM") therefore suggests that the Companies negotiate with Discount Drugs to redistribute its unsold CFL inventory to one or more of the other retailers in 2012.

2. INTRODUCTION AND PURPOSE OF THE STUDY

Under contract with the Companies, ADM performed evaluation, measurement and verification (“EM&V”) services to confirm the savings and demand reduction realized through the CFL Program that was implemented in 2011. This document is the EM&V final evaluation report for the 2011 CFL Program in Ohio.

2.1 BACKGROUND

The 2011 CFL Distribution Program allowed customers the option of receiving or purchasing CFLs through multiple channels. The distribution channels included discounted retail sales, CFL give-away events sponsored by community organizations, and providing CFLs upon customer request through a direct mail operation and community programs providing energy assistance to low income families.

2.2 EVALUATION QUESTIONS

In evaluating Ohio’s 2011 CFL Program, ADM Associates addressed the following impact and process evaluation questions.

2.2.1 Impact Evaluation Questions

- What was the observed and verified kWh energy savings?
 - Annual Savings
 - First Year Pro-Rata Savings
 - Lifetime Savings

- What was the observed summer peak demand kW reduction?

2.2.2 Process Evaluation Questions

- How did customers hear of the CFL promotion?
- How many customers requested CFLs through the Direct Mail and Low Income channels?
- How many agencies distributed CFLs?
- How many CFLs were provided to agencies for distribution?

- What was the total number of CFLs distributed to customers by the end of 2011?
- What was the total number of CFLs installed by customers by location of installation?
- How satisfied were customers with their new CFLs and the CFL Program?

3. DESCRIPTION OF OHIO CFL DISTRIBUTION PROGRAM

The CFL Program was launched in March 2011 and will continue through December 2012, or until the stock of approximately 3.76 million CFLs is distributed. In the 2011 program year, CFLs were distributed to customers using the following four channels:

1) Five retail chains sold CFLs at discounted prices (\$0.50 each) through 189 stores. Retail chains included:

- Discount Drug Mart
- Marcs
- Anderson's Stores
- Goodwill
- Dollar Tree

2) The Cleveland Clinic distributed CFLs at an Earth Day event and provided energy education materials.

3) Low income customers participating in the Percentage of Income Payment Plan ("PIPP") received CFLs on request along with energy education materials from Ohio Partners for Affordable Energy (OPAE).

4) Power Direct distributed CFL kits¹ by mail to four customer segments that requested CFLs, including:

- High bill complaint customers;
- New service customers;
- General use customers; and
- Small business customers.

¹ The CFL kits were comprised of a six pack of 23 Watt CFLs plus energy conservation literature.

4. EVALUATION METHODOLOGY

This chapter provides a brief description of the impact and process evaluation methods used to collect and analyze data for the evaluation of the 2011 Ohio CFL Program.

4.1 ANALYSIS OF OHIO CFL PROGRAM DATA

The February 2012 Ohio CFL Program Report and the February 2012 Ohio Low Income Report were both analyzed to answer the evaluation questions about program participation and the distribution of CFLs in 2011. Both of these reports covered the March 2011 through January 2012 timeframe. The January data were removed in analyzing the data for 2011. An additional report was obtained from Power Direct to answer the question about the number of CFLs requested through the Direct Mail channel. The OPAE Executive Director was also interviewed to confirm understanding of the Low Income data reported for 2011 in addressing the question about CFL requests from low income customers.

4.2 CUSTOMER TELEPHONE SURVEYS

Three telephone surveys were administered to address evaluation questions about how customers heard of the CFL promotion, installation of CFLs acquired through the direct mail, low income, and retail channels, and customer satisfaction. One survey collected data from a random sample of customers who had received CFLs through the Low Income channel and a second survey collected data from a random sample of customers who had received CFLs through the Direct Mail channel. Since retail customers were not tracked by the program, the third survey used random digit dialing methodology to obtain a sample of retail customers who had purchased CFLs. All three surveys were stratified by operating company and distribution channel. The sample sizes for each survey exceeded Ohio's standards for achieving relative precision of at least $\pm 10\%$ at the 90% confidence interval. Table 4-1 shows the obtained telephone survey sample.

Table 4-1. Obtained Telephone Survey Samples

<i>Distribution Channels</i>	<i>Service Territories</i>			<i>Total (1.00)</i>
	<i>CEI (.47)</i>	<i>OE (.42)</i>	<i>TE (.15)</i>	
Retail (.70)	50	50	50	150
Direct Mail (.20)	20	20	20	60
Low Income (.10)	10	10	10	30
Total (1.00)	80	80	80	240

The telephone surveys were implemented in November and December 2011. A copy of the Direct Mail Channel version of the survey can be found in Appendix A.

4.3 IN-DEPTH INTERVIEWS OF PROGRAM STAKEHOLDERS

In-depth, semi-structured telephone interviews were carried out with the following respondents:

- The Companies' Ohio CFL Program Manager
- Executive Director of Oho Partners for Affordable Energy (OPAE) who implemented the CFL distribution through the Low Income channel.
- Manager of the program's implementation contractor (Power Direct Energy) and director of the Direct Mail distribution channel.
- Retail chain managers of each of the five participating retailers:
 - Discount Drug Mart
 - Marcs
 - Anderson's Stores
 - Goodwill
 - Dollar Tree

The stakeholder interviews took place in November and December of 2011 and January of 2012. The interviews generally focused on issues related to the design and implementation of the Ohio CFL Distribution Program.

4.4 CALCULATION OF EX ANTE SAVINGS

In this section, the calculations used for *ex ante* estimates of annual kWh and peak demand kW savings are summarized with respect to the 2011 CFL Distribution Program. A time of sale perspective was assumed.

4.4.1 *Ex Ante* Estimates of Annual Savings

Expected annual kWh savings were deemed based on the residential CFL "time of sale" formula specified in the 2010 DRAFT Ohio Technical Reference Manual ("TRM") (see page 11). The deemed value calculated is 71.536 kWh per CFL. It is assumed that a 23 Watt CFL is installed in a residential location in 2011 and replaces an incandescent light bulb. The deemed calculation for estimating annual savings of lighting measures is as follows.

$$\text{Annual kWh savings} = (\text{CFL Watts} * 3.25) * 0.957$$

4.4.2 *Ex Ante* Estimates of Peak Demand Reduction Savings

Expected kW savings were deemed based on the residential CFL "time of sale" formula specified in the TRM (see page 11). The deemed value calculated is 0.012 kW per CFL. The deemed calculation for estimating summer peak savings for lighting measures is as follows:

$$\text{Summer Peak kW savings} = (\text{CFL Watts} * 3.25) * 0.000114 * 1.45$$

4.5 CALCULATION OF EX POST SAVINGS

In this section, the calculations used for estimating *ex post* annual kWh savings, peak demand kW savings, first year savings, and lifetime savings for the 2011 CFL Distribution Program are summarized.

4.5.1 Calculation of Ex Post Annual kWh Savings

ADM analyzed the data obtained from the telephone surveys to verify annual *ex post* energy savings attributable to the program. The formula used to calculate annual kWh *ex post* savings, as specified in the TRM, is:

$$\text{kWh Savings} = \Delta\text{kWh} = \left(\frac{\Delta\text{Watts}}{1,000} \right) * \text{ISR} * \text{Hours} * \text{WHFe}$$

Where:

$\Delta\text{Watts} = \text{CFL watts} * \text{delta watts multiplier}$;

- CFL watts = wattage of installed CFL
- Delta watts multiplier = factor to adjust for change in baseline conditions resulting from Energy Independence and Security Act of 2007. For 2011, this multiplier is 3.25.

$\text{ISR} = \text{In Service Rate}$

- Percentage of CFLs distributed that are actually installed, as estimated by the telephone survey

$\text{Hours} = \text{Average hours of use per year}$;

- Based on deemed values from Duke Energy associated with the location of installation, as estimated from the telephone survey

$\text{WHFe} = \text{Waste Heat Factor for energy}$

- To account for cooling savings from efficient lighting
- Set at a value of 1.07 by the TRM

To calculate *ex post* verified energy savings, ADM needed to determine the following five variables:

- Watts per CFL = 23 (deemed)

- Hours of Use = 1,015 (annualized mean computed from the survey data)²
- Delta Watts Ratio = .07475 (see computation below)
- Waste Heat Factor for energy (WHFe) = 1.07 (deemed)
- In Service Rate or ISR = .80 (computed from the telephone survey data)

Methodologies used to determine Hours of Use and ISR from the survey data are described in the remainder of this section.

4.5.2 Hours of Use (HOU)

ADM determined the quantities of CFLs installed in specific rooms and usage areas through the follow-up telephone surveys. CFL daily hours of use were estimated based on deemed values associated with installation locations provided in the 2010 Duke Energy Report of the Ohio Residential Smart Saver CFL Programs.³ Table 4-2 presents the predicted average daily hours of use by room or usage area, according to the Duke Energy Report.

Table 4-2. Average CFL Hours of Use per Day

<i>CFL Hours of Use by Room</i>	
<i>Room</i>	<i>Hours/Day (HOU_i from Duke Energy (2010))</i>
Kitchen	3.42
Living room	3.85
Entryway	2.10
Garage	1.11
Bedroom	1.96
Bathroom	0.88
Hallway	3.52
Basement	2.68
Dining room	2.54
Office	9.00
Den	0.69
Stairway	0.54

The following algorithm was used to determine ex post weighted average daily hours of use per CFL (“**HOU/CFL**”):

² Weighted mean = 2.78 hours of use per day

³ Final Report. Ohio Residential Smart Saver CFL Program: Results of a Process and Impact Evaluation. Prepared for Duke Energy by TecMarket Works and BuildingMetrics. June 29, 2010. (see Table 9)

$$\frac{HOU}{CFL} = \sum_{i=1}^N HOU_i Q_i + \sum_{i=1}^N (Q_i)$$

Where:

HOU_i = daily hours of use for usage area i , as provided by the Duke Energy 2010 Report (e.g., $HOU_{\text{kitchen}} = 3.42$; $HOU_{\text{livingroom}} = 3.85$; etc.), according to the room locations identified in Question 2 of the ADM survey by the 240 customers surveyed about CFL installation.

Q_i = the actual quantity of CFLs installed in usage area i , as determined by Question 2 on the ADM survey completed by 240 customers.

For each *usage area I*, ADM computed the product of HOU_i and Q_i , summed the product terms, and divided the sum of the products by the total actual quantity of CFLs reported by the survey to have been installed. The result of this calculation was the *ex post* weighted average CFL hours of use. This quantity was computed to be 2.78 hours of use per day. The average hours of use per day was annualized by multiplying by 365, the result of which was 1,015 hours.

4.5.3 Delta Watts Ratio

The formula for computing the Delta Watts ratio is:

$$\Delta Watts/1000$$

Where:

$$\Delta Watts = CFL \text{ watts} * \text{delta watts multiplier}$$

Plugging in the values previously identified for the Delta Watts Ratio calculation gives the following equation:

$$\Delta Watts \text{ Ratio} = (23 * 3.25) / 1000 = 0.07475$$

4.5.4 In-Service Rate (ISR)

The CFL installation rate or ISR for 2011 was determined from the telephone survey data collection. ISR was computed from three quantities:

- (A) The total number of CFLs that had actually been installed in a room location, based on survey responses to survey Questions 2.1 through 2.13;
- (B) The total number of CFLs stored that will be installed by the end of 2011, based on responses to survey Question 3; and

(C) The total number of CFLs that had actually been distributed or sold to customers in 2011, based on the sum of CFLs identified in survey Question 2 as installed or stored.

The ISR for 2011 was computed as $(A+B)/C$; where the survey gave the following values:

$$A = 977; B = 153; \text{ and } C = 1,680$$

Plugging the survey values into the ISR formula yields the following equation:

$$ISR = (977 + 153)/1,680 = 1,130/1,680 = .673; \text{ or an installation rate of } 67.3\%.$$

The TRM assumes that 43% of the shelved CFLs, which is 30% of the CFLs distributed in 2011, will be installed in the short term (i.e., 2012), which accounts for an additional 13% of the distributed CFLs.⁴ Thus, the projected ISR for the CFL program through 2012 is expected to be 80% (i.e., $.67 + .13 = .80$). Inserting the appropriate values into the formula for computing kWh savings (see below) yields the following equation:

$$\text{kWh Savings} = \Delta\text{kWh} = \left(\frac{\Delta\text{Watts}}{1,000} \right) * \text{ISR} * \text{Hours} * \text{WHFe}$$

$$\text{kWh Savings} = (23*3.25)/1000 * .801 * 1015 * 1.07 = 65.108 \text{ per CFL bulb}$$

4.5.5 Calculation of Ex Post Summer Peak Demand Savings

The formula for computing summer peak demand savings is:

$$\Delta kW = \left(\frac{\Delta\text{Watts}}{1000} \right) * \text{ISR} * \text{WHFd} * \text{CF}$$

Where:

ΔWatts = CFL watts * delta watts multiplier:

- CFL watts = wattage of installed CFL
- Delta watts multiplier = factor to adjust for change in baseline conditions resulting from Energy Independence and Security Act of 2007 referenced in the TRM. For 2011, the multiplier is 3.25.

ISR = In Service Rate

- Defined as the percentage of units rebated that are actually installed according to the telephone survey

$WHFd$ = Waste Heat Factor for Demand

- to account for cooling savings from efficient lighting

⁴ See footnote 8 on page 13 of the TRM.

CF = Summer Peak Demand Coincidence Factor

Values specified in the Joint Utility Objections document were used for $WHFd$ and CF in calculating summer coincident peak demand savings, with $WHFd = 1.07$ and $CF = 0.16$.

Inserting the appropriate values into the peak demand savings formula yields:

$$\Delta kW = \left(\frac{23 * 3.25}{1000} \right) * 0.802 * 1.07 * 0.16 = 0.010 kW$$

4.5.6 Calculation of First-Year Pro-Rata Savings

First-year pro-rata kWh savings were calculated based on CFL installation dates, prorated from the month of installation in 2011. A new variable measuring the month of installation across all installation locations was created and this variable was used to examine the distribution of installation months for all CFL installations. This examination revealed a negatively skewed distribution, with installations taking place from February through November and piling up toward the end of the year. The median installation month was September. This left three months in which to accumulate savings for customers who installed their CFLs in 2011. Annualized values of first-year pro-rata savings were calculated by dividing the annual savings by 12 and multiplying that quantity by three.

4.5.7 Calculation of Lifetime kWh Savings per Lighting Measure

Lifetime kWh savings for CFLs distributed in 2011 were calculated by multiplying annual kWh savings by the deemed life for the measure, as determined in the TRM. The lifetime value specified in the TRM for CFLs is eight years.⁵

⁵ See footnote 3 on page 12 of the 2010 *Ohio Technical Reference Manual*.

5. DETAILED EVALUATION FINDINGS

The Impact Evaluation component of the study addressed the following questions:

- What was the observed kWh energy savings?
 - Annual Savings
 - First Year Pro-Rata Savings
 - Lifetime Savings

- What was the observed summer peak demand kW reduction?

5.1 EX POST ENERGY IMPACTS

Verified electric savings were 188,028,063 kWh annually, which represents a realization rate of 91%; 47,007,016 kWh saved during the 2011 calendar year on a pro-rata basis; and 1,504,224,504 kWh saved over the expected life of the installed CFLs. Verified peak demand savings were 28,879 kW, which represents a realization rate of 83%. The energy impact findings are based on *ex post* analyses of a sample of 240 customers who acquired CFLs through the CFL Program and analyses of the CFL Program's data on CFL distribution in 2011. Conclusions drawn from these analyses exceed the requirements for ± 10 percent precision at the 90 percent confidence level.

The following subsections contain detailed results pertaining to:

- Annual and summer peak demand energy savings
- First year pro-rata and lifetime energy savings

5.1.1 Annual and Summer Peak Demand Energy Savings

Ex ante and *ex post* annual and summer peak demand savings for the total CFL Program in 2011 are presented in Table 5-1 below along with variances and realization rates. See Appendix B for summary of *ex ante* and *ex post* estimates of CFL distribution, annual savings, and peak demand savings by operating company.

Table 5-1. Energy Impact Summary

<i>Savings Indicator</i>	<i>Ex Ante</i>	<i>Ex Post</i>	<i>Variance</i>	<i>Realization Rate</i>
Annual Savings	206,591,747	188,028,063	-18,563,684	91%
Peak Demand Savings	34,655	28,879	-5,776	83%

The variance between *ex post* and *ex ante* annual and peak demand savings is caused by the following factors.

- **A smaller savings impact per CFL.** The expected CFL impact was 71.536 kWh per bulb whereas the actual CFL impact was 65.108 kWh per bulb. This discrepancy can be directly traced to a lower than expected in-service rate (i.e., 80% vs. 86%), which in turn, is attributable to a 33% first-year CFL storage rate.⁶ In other words, for every three CFLs distributed, customers put one CFL on the shelf for later installation (beyond 2011).
- **Expected vs. actual ISR.** Similarly, the variance between *ex post* and *ex ante* estimates of summer peak demand savings was caused by the difference between the expected and actual ISR values.
- **Summer Peak Coincidence Factor.** Additionally, the summer peak coincidence factor recommended in the Joint Utility Objections document (CF = .16) was used in the *ex post* calculations rather than the CF value listed in the TRM (CF = .11).

5.1.2 First Year Pro-Rata and Lifetime Energy Savings

Table 5-2 below summarizes first-year pro-rata kWh impacts and lifetime energy savings estimates. As stated in the methodology section, first-year pro-rata kWh impact is prorated from the month of installation and lifetime savings are based on an estimated CFL life of eight years.

Table 5-2. First-Year and Lifetime Energy Savings

<i>First-Year (2011) kWh Savings</i>	<i>Annual kWh Savings</i>	<i>Effective Useful Life (EUL), years</i>	<i>Lifetime Energy Savings, kWh</i>
47,007,016	188,028,063	8	1,504,224,504

5.2 PROCESS EVALUATION

The process evaluation component of the study addressed the following questions:

- How did customers hear of the CFL promotion?
- How many customers requested CFLs through the Direct Mail and Low Income channels?
- How many agencies distributed CFLs?

⁶ The first-year ISR was 67%, leaving a first-year storage rate of 33%. The TRM assumes a lifetime ISR of 97%, meaning that 3% of CFLs on the average will probably never be installed. This consideration factored into ADM's estimate of the ISR over the life of the CFL program (i.e. through 2012), which was used in calculating CFL impact. Thus, the lifetime storage rate was adjusted from 33% to 30% for purposes of calculating CFL impact. However, the first-year ISR was observed to be 33%, not 30%.

- How many CFLs were provided to agencies for distribution?
- What was the total number of CFLs distributed to customers by the end of 2011?
- What was the total number of CFLs installed by customers by location of installation?
- How satisfied were customers with their new CFLs and with the CFL Program?

Each of these questions is answered below.

5.2.1 How Customers Heard of the CFL Promotion

The Ohio CFL program was generally not actively promoted or advertised to attract customers. However, there was some degree of retail newspaper advertising and in-store advertising that attracted the direct mail and retail customers (see Table 5-3 below). The low income customers were primarily made aware of the CFL program through their contacts with community service agencies or when they signed up for services such as discounted heating and cooling services.

Table 5-3. How Customers Heard of the CFL Program

<i>How did you hear about the CFL Program?</i>	<i>Distribution Channel</i>			<i>Total</i>
	<i>Direct Mail</i>	<i>Low Income</i>	<i>Retail</i>	
Newspaper	19.3%	7.1%	21.5%	19.1%
Radio ad	-	-	1.5%	0.9%
TV ad	8.8%	-	14.6%	11.2%
Retail Store ad	-	-	32.3%	19.5%
FirstEnergy Call Center	21.1%	14.3%	1.5%	8.4%
When signed up for service	22.8%	21.4%	2.3%	10.2%
Word of Mouth	10.5%	21.4%	10.0%	11.6%
Bill Insert/Flyer/Mail	8.8%	7.1%	7.7%	7.9%
HEAP/PIPP	7.0%	14.3%	-	3.7%
Saw the CFLs in the store	-	-	5.4%	3.3%
Community Action Program	5.3%	10.7%	-	2.8%
Website	1.8%	3.6%	1.5%	1.9%
N	57	28	130	215
Percent	100%	100%	100%	100%

The data in Table 5-3 show that low income customers were primarily made aware of the CFL program through their contacts with community action programs and related community service that provided discounted heating and cooling services (e.g., HEAP and PIPP). Low income customers also used the direct mail channel to obtain CFLs after learning of the promotion through their contact with various community assistance services. Bill inserts, flyers, and mail announcements were effective in connecting customers to all three CFL distribution channels. Retail customers often just happened upon the CFLs in one of the participating retail stores and decided to purchase the CFLs because of the discounted price. One retail customer put it this way: “I saw them in the store. They were cheap, so I bought them.”

The program provided the retailers with signage to display on their store shelves to promote CFL sales. The signage contained information about the CFL program, details about the CFLs, incandescent equivalency, and prices. Most of the retailers promoted the CFLs on their own as a special sale item in their store circulars. One of the retailers ran a newspaper ad two to three times to promote sales of the CFLs. Another retailer posted an electronic version of the program announcement on its website. Website and radio ads were least effective in promoting awareness of the CFL program.

5.2.2 Customer Requests for CFLs

Customers requested CFLs through the Direct Mail and Low Income distribution channels. According to the OPAE executive director, all low income customers who requested CFLs were provided with CFLs. Similarly, all customers who called in to the Power Direct call center requesting CFLs were sent a CFL kit consisting of six CFLs and a brochure on energy conservation. However, approximately 1.5% of the CFLs shipped to customers through the Direct Mail channel were returned because of faulty address information (i.e., 11,160 CFLs according to Power Direct). Table 5-4 shows the number of requests for CFLs received through the Direct Mail and Low Income channels in 2011.

Table 5-4. CFLs Requested by Customers in 2011

<i>Distribution Channel</i>	<i>OE</i>	<i>TE</i>	<i>CE</i>	<i>Total</i>
Direct Mail	347,082	106,962	267,822	721,866
Low Income	104,344	15,068	41,877	161,289
Total	451,426	122,030	309,699	883,155

5.2.3 Agencies Distributing CFLs and CFLs Shipped to Distributing Agencies

The agencies involved in distributing CFLs in 2011 are summarized in Table 5-5 along with the number of CFLs shipped to them for distribution to customers. The total number of CFLs shipped to the distributing agencies in 2011 accounts for approximately 98.5% of the stock of warehoused CFLs that the program was designed to distribute to the Companies' customers. This suggests that only about 56,000 CFLs remained in the warehouse at the end of 2011. The majority (73%) of the 3.7 million CFLs were shipped to the 189 participating retail stores.

Table 5-5. Agencies distributing CFLs in 2011

<i>Distribution Channel</i>	<i>Agency</i>	<i>CFLs shipped to Agencies for Distribution in 2011</i>	<i>Percent of CFLs Shipped in 2011</i>
Direct Mail	Power Direct	710,718	19%
Low Income	OPAE	269,761	7%
Community Organizations	Cleveland Clinic	6,000	<1%
Retail: 5 Chains	189 retail outlets	2,717,495	73%
• Goodwill	10 stores		
• Discount Drug Mart	53 stores		

• Dollar Tree	69 stores		
• Marcs	53 stores		
• Anderson Stores	4 stores		
Total		3,703,974	100%

5.2.4 CFLs Distributed to Customers

A total of 2,887,941 CFLs were distributed to the Companies' customers through the CFL Program in 2011. Table 5-6 shows the actual distribution of CFLs in 2011 by distribution channel and operating company.

Table 5-6. Total CFL Distribution to Customers in 2011 by Channel and Operating Company

<i>Distribution Channel</i>	<i>Operating Company</i>			<i>Total</i>	<i>Percent of Total</i>
	<i>OE</i>	<i>TE</i>	<i>CE</i>		
Retail	765,688	326,914	917,332	2,009,934	70%
Low Income	104,344	15,068	41,877	161,289	6%
Community Organizations	0	0	6,000	6,000	<1%
Direct Mail	339,126	105,240	266,352	710,718	25%
Total	1,209,158	447,222	1,231,561	2,887,941	100%

As shown in Table 5-6, the retail channel accounted for the majority of CFLs distributed to the Companies' customers in 2011. Marcs accounted for the majority of CFLs sold through the retail chain (see Table 5-77) and was able to distribute approximately 78% of the CFLs shipped to its stores. The other retail chains were able to sell at least 90% of their CFL program inventory with the exception of Discount Drugs which was able to sell only about half of the CFLs received from the warehouse. Overall, the retail channel was able to distribute approximately 74% of the CFLs received in 2011.

The direct mail channel was able to successfully distribute CFLs to approximately 98.5% of the customers requesting CFLs. The 1.5% shortfall was due to faulty address information that resulted in some shipments being returned to the warehouse. The Cleveland Clinic distributed all of the 6,000 CFLs it received for an Earth Day festival in April 2011.

The Low Income channel distributed approximately 60% of the CFLs shipped to OPAE in 2011. This result was due, in part, to the fact that CFL distribution did not take place until the fall of 2011 to coincide with the period when OPAE receives the majority of applications for energy assistance.

Table 5-7. CFL Distribution by Distribution Channel as a Percentage of CFLs Received

<i>Distribution Channel</i>	<i>CFLs Distributed</i>	<i>Distribution of CFLs Received</i>
Low Income	161,289	59.79%
Community Organizations	6,000	100%

Direct Mail	710,718	98.45%
Retail	2,009,934	73.96%
• Anderson	308,398	92.96%
• Goodwill	155,520	100.00%
• Marcs	1,133,362	77.66%
• Discount Drugs	337,118	49.08%
• Dollar Tree	75,536	89.92%

5.2.5 CFLs Installed by Customers

The Companies' customers who obtained CFLs from the CFL program most commonly (median) installed 3 CFLs in 2011. The telephone survey showed a 2011 in-service rate (ISR) of 67.3% with customers storing the balance of the CFLs (33%) for installation sometime after 2011. Most of the installed CFLs (89%) replaced incandescent light bulbs. Most often (45% of the time), the incandescent light bulbs were replaced while they were still operating.

Approximately 63% of the new CFLs replaced incandescent light bulbs of 75 watts or less and approximately 37% of the new CFLs replaced incandescent light bulbs of 100 watts or more. Approximately 10% of the new CFLs replaced old CFLs and approximately 10% of the new CFLs were installed in new light fixtures.

The new CFLs were most often installed in living rooms (22.82%), bedrooms (22.21%) and kitchens (16.07%). Table 5-8 shows the location of CFL installations.

Table 5-8. Room Locations of CFL Installations in 2011

<i>Room Location</i>	<i>Percent of CFLs Installed</i>
Living Room	22.82%
Bedroom	22.21%
Kitchen	16.07%
Bathroom	10.03%
Basement	8.90%
Dining Room	6.24%
Den	1.74%
Stairway	1.54%
Office	0.92%
Entry Way	0.51%
Garage	0.20%
Other Location	8.80%
Total	100%

5.2.6 Customer Satisfaction

Customers were asked in the telephone surveys how satisfied they were with their new CFLs and how satisfied they were with the CFL program. Customers were also asked to explain their satisfaction ratings.

5.2.7 Customer Satisfaction with Their New CFLs

Overall, 88% of the program participants indicated they were satisfied with their new CFLs (see Table 5.9). Only 5.5% of the customers registered dissatisfaction with their new CFLs and 85% of these responses came from the retail customers. Reasons for being dissatisfied with the new CFLs centered on the CFLs not being bright enough and not being as bright as the incandescent light bulbs they replaced. The other general complaint was that the CFLs did not come on right away and that they took too long to come on.

Table 5-9. Customer Satisfaction with New CFLs

<i>How satisfied are you with your new CFLs?</i>	<i>Distribution Channel</i>			<i>Total Sample</i>
	<i>Direct Mail</i>	<i>Low Income</i>	<i>Retail</i>	
Very Satisfied	61.0%	83.3%	51.7%	58.0%
Somewhat Satisfied	32.2%	13.3%	32.9%	30.3%
Neutral	3.4%	3.3%	8.1%	6.3%
Somewhat Dissatisfied	1.7%	0%	6.0%	4.2%
Very Dissatisfied	1.7%	0%	1.3%	1.3%
N	59	30	149	238
Percent	100%	100%	100%	100%

5.2.8 Customer Satisfaction with the CFL Program

The customer surveys indicated that 80% of the participants were satisfied with the CFL Program and that only 7.5% were dissatisfied with the program (see Table 5-10). Reasons given by customers for dissatisfaction with the CFL program seem to indicate a general dissatisfaction with the electric company.

Table 5-10. Customer Satisfaction with the CFL Program

<i>Overall, how satisfied are you with CFL Program?</i>	<i>Distribution Channel</i>			<i>Total Sample</i>
	<i>Direct Mail</i>	<i>Low Income</i>	<i>Retail</i>	
Very Satisfied	60.3%	75.9%	45.7%	53.3%
Somewhat Satisfied	22.4%	17.2%	30.4%	26.7%
Neutral	6.9%	3.4%	16.7%	12.4%
Somewhat Dissatisfied	3.4%	3.4%	5.1%	4.4%
Very Dissatisfied	6.9%	0%	2.2%	3.1%
N	58	29	138	225
Percent	100%	100%	100%	100%

6. CONCLUSIONS AND RECOMMENDATIONS

The Ohio CFL program distributed 78% of the warehoused CFLs to customers during the 2011 program year (i.e., 2,887,491 CFLs out of a total of approximately 3.7 million CFLs). The lower than expected ISR was the primary factor that contributed to the variance between *ex post* and *ex ante* estimates of annual savings for the Ohio CFL Program. The observed ISR of 80% is primarily influenced by the initial storage rate of 33% and the longer term storage rate of 20%.

ADM's estimates of the 2011 Ohio CFL program's ISR and CFL storage rate are consistent with the results of the *2006-2008 Upstream Lighting Program* evaluation conducted by KEMA (2010)⁷ for the California Public Utilities Commission, which examined the effectiveness of a statewide CFL distribution program using retail delivery channels for residential customers of three California utility companies (Pacific Gas & Electric; Southern California Edison; and San Diego Gas and Electric). The analysis of CFL installation rates reported in the KEMA study for the three-year program period (2006-2008) assumed that all bulbs acquired were either stored or installed. The same assumption governed ADM's analysis of the 2011 Ohio CFL program.

The question at this point is "*How long will it take for the stored CFLs to be installed?*" Estimates from the KEMA (2010) study suggest that this will probably take about two years. The KEMA study provides data to suggest that approximately 57% of the stored CFLs will be installed within the next year (see Table 77 in the KEMA 2010 report), meaning by the end of 2012 for Ohio, and that almost all (99%) of the CFLs distributed in 2011 should be installed within two years, meaning by the end of 2013 for Ohio (see Table 72 in the KEMA 2010 report).

6.1 CFL DISTRIBUTION IN 2012

The determinants of CFL savings include the per-bulb kWh savings impact rate and the CFL distribution rate. The Companies' have greater control over the latter than the former. In achieving full distribution of the CFLs that remain warehoused, it is important to consider the factors that contributed to CFL distribution in 2011. Retail sales accounted for the majority of CFL distribution in 2011.

⁷ KEMA, Inc. (February 8, 2010). *Final Evaluation Report: Upstream Lighting Program*. Prepared for the California Public Utilities Commission, Energy Division. CALMAC Study ID: CPU0015.01.

Within the retail channel, the least effective retail chain for distributing CFLs was Discount Drugs, which was able to sell only about half of the CFLs it received in 2011. At the beginning of 2012, Discount Drugs had almost 350,000 unsold CFLs remaining in its program inventory. Thus, Discount Drugs had approximately half of the program's unsold inventory at the end of 2011. In the process evaluation component of the study, Discount Drugs admitted that sales had been slow and volunteered to return part of its unsold inventory back to the program for redistribution. ADM would encourage the Companies' to pursue this strategy by shifting a major portion of the unsold CFL inventory in the possession of Discount Drugs and redistribute that inventory to one or more of the other retailers.

7. APPENDIX A: PARTICIPATION SUMMARY

Table A-1. 2011 kWh Summary Table

<i>Utility</i>	<i>Participation</i>	<i>Ex Ante kWh per Unit Impact</i>	<i>Ex Ante kWh Impact, Total</i>	<i>Ex Post kWh per Unit Impact</i>	<i>Ex Post kWh Impact, Total</i>
OE	1,209,158	71.536	86,498,327	65.108	78,725,859
CEI	1,231,561	71.536	88,100,948	65.108	80,184,474
TE	447,222	71.536	31,992,473	65.108	29,117,730
Total	2,887,941	71.536	206,591,747	65.108	188,028,063

Table A-2. 2011 kW Summary Table

<i>Utility</i>	<i>Participation</i>	<i>Ex Ante kW per Unit Impact</i>	<i>Ex Ante kW Impact, Total</i>	<i>Ex Post kW per Unit Impact</i>	<i>Ex Post kW Impact, Total</i>
OE	1,209,158	0.012	14,510	0.01	12,092
CEI	1,231,561	0.012	14,779	0.01	12,316
TE	447,222	0.012	5,367	0.01	4,472
Total	2,887,941	0.012	34,655	0.01	28,879

8. APPENDIX B: SURVEY INSTRUMENT

**Ohio Edison
Direct Mail Channel
2011 CFL Program
Participant Telephone Survey**

Customer Name: _____ Phone _____ Number: _____
 _____ / _____ / _____

Customer Zip Code: _____ Date of Interview: _____ / _____ / _____

Distribution Channel	Code	EDC	Code
Retail	1	The Illuminating Company	1
Direct Mail	2	Ohio Edison	2
Low Income	3	Toledo Edison	3

Hello. I am calling on behalf of Ohio Edison, your electric utility company. You may recall receiving six compact fluorescent light bulbs (CFLs) from the Ohio Edison CFL Program. You have been randomly selected to participate in a follow-up telephone survey about these energy efficient light bulbs. You will receive a \$10 gift card for participating in this survey. May I to talk with you now about the CFLs you received? This will only take a few minutes.

Yes	01	PROCEED WITH INTERVIEW
No	02	THANK RESPONDENT AND TERMINATE
Refused	99	THANK RESPONDENT AND TERMINATE

1. *Our records indicate that you received six CFL bulbs from the Ohio Edison CFL Program back in ___ [INSERT MONTH FROM RECEIPTDATE FIELD]. Of the six CFL bulbs you received, how many have you have installed so far?*

Number of CFLs installed to date: _____	
Don't know	98
Refused	99

2. In which rooms have you installed the CFLs? How many were installed in each room? What month?

Room Location	Code	# CFLs Installed	Month Installed
Bedrooms	1		
Bathrooms	2		
Living Room	3		
Kitchen	4		
Entry Way	5		
Dining Room	6		
Garage	7		
Basement	8		
Den	9		
Stairway	10		
Office	11		
Other Room/Location	12		
Store for Later Installation	13		
Don't Know	98		
Refused	99		

ASK Q3 IF CUSTOMER STORED CFLS FOR LATER INSTALLATION; OTHERWISE SKIP TO Q4

3. How many of the CFLs that have not yet been installed do you think will be installed by the end of the 2011 calendar year?

Number of CFLs planned to install by end of year: _____
 Don't know 98
 Refused 99

4. Now I would like you to think about the kinds of lamps the installed CFLs replaced.

(a) How many of the ___ [NUMBER FROM Q1] installed CFLs replaced incandescent light bulbs?

Number of installed CFLs that replaced incandescent light bulbs: _____ [ENTER 0 TO 6]
 Don't Know98
 Refused99

IF ZERO, SKIP TO Q4D

(b) How many of the replaced incandescent light bulbs were 100 Watts or more?

Number of replaced incandescent bulbs that were 100 Watts or more: _____ [ENTER 0 TO 6]
 Don't Know98
 Refused99

(c) How many of the replaced incandescent light bulbs were 75 Watts or less?

Number of replaced incandescent bulbs that were 75 Watts or less: _____ [ENTER 0 TO 6]
 Don't Know98
 Refused99

(d) How many of the new CFLs replaced other CFLs?

Number of old CFLs replaced by new CFLs: _____ [ENTER 0 TO 6]	
Don't Know	98
Refused	99

(e) How many of the new CFLs were installed in a new light fixture?

Number of CFLs installed in new light fixture: _____ [ENTER 0 TO 6]	
Don't Know	98
Refused	99

ASK Q5 IF CFLS REPLACED INCANDESCENT LIGHT BULBS; OTHERWISE SKIP TO Q6

5. Were the incandescent bulbs that you replaced with CFLs still operating when you removed them or were they burned out?

Still Operating	01
Burned Out	02
Both: Some were Still Operating and some were Burned Out	03
Don't Know	98
Refused	99

6. Before you received the 6 CFLs from Ohio Edison, about how many CFLs did you have installed in your home? Would you say:

None	01
1-5	02
6-10	03
More than 10	04
Don't Know	98
Refused	99

7. Does your home presently contain more CFLs or more incandescent light bulbs?

More CFLs	01
More Incandescent	02
About the same	03
Don't Know	98
Refused	99

I would now like to ask you some questions about your experience with the Ohio Edison CFL Program.

8. How did you hear about the Ohio Edison CFL Program?

Newspaper ad	01
Radio ad.....	02
TV ad.....	03
Retail store ad.....	04
First Energy Call Center	05
When I signed up for electricity service.....	06
Word of mouth.....	07
Other.....	08
Don't Know	98
Refused	99

Specify Other: _____

9. Would you purchase CFLs in the future?

Yes	01
No	02
Don't Know	98
Refused	99

10. How satisfied are you with your new CFLs?

Very satisfied	01
Somewhat satisfied	02
Neither satisfied nor dissatisfied.....	03
Somewhat dissatisfied	04
Very dissatisfied	05
Don't know.....	98
Refused	99

ASK Q11 IF DISSATISFIED WITH CFLS

11. Why aren't you satisfied with your new CFLs?

RECORD VERBATIM

Don't know.....	98
Refused	99

12. Have you noticed any savings on your electric bill since you installed the CFLs?

Yes, my electric bill has decreased .....	.01
No, there does not seem to be a change in my electric bill .....	.02
Not sure or too soon to tell .....	.03
Don't know .....	.98
Refused .....	.99

13. Overall, how satisfied are you with the Ohio Edison CFL Program?

Very satisfied .....	.01
Somewhat satisfied .....	.02
Neither satisfied nor dissatisfied .....	.03
Somewhat dissatisfied .....	.04
Very dissatisfied .....	.05
Don't Know .....	.98
Refused .....	.99

14. Why do you give it that rating?(RECORD VERBATIM RESPONSE)

15. Do you have any suggestions to improve the CFL Program?

Yes .....	.01
No.....	.02
Don't Know .....	.98
Refused .....	.99

IF YES, RECORD VERBATIM RESPONSE:

I'd like to finish up by asking you some questions about your home.

16. Which of the following best describes your home? (READ LIST: OPTIONS 01-07)

Single-family home, detached construction.....	01
Single-family home, factory manufactured/modular.....	02
Mobile home.....	03
Row house.....	04
Two or Three family attached residence.....	05
Apartment with 4+ families.....	06
Condominium.....	07
Other.....	08
Don't Know.....	98
Refused.....	99

Specify Other: _____

17. Do you own or rent this residence?

Own.....	01
Rent.....	02
Don't Know.....	98
Refused.....	99

18. Approximately when was your home built? [DO NOT READ RESPONSE OPTIONS]

Before 1960.....	01
1960-1969.....	02
1970-1979.....	03
1980-1989.....	04
1990-1999.....	05
2000-2005.....	06
2006 or Later.....	07
Don't know.....	98
Refused.....	99

19. How many square feet is the above-ground living space?

Square Feet: _____	
Don't know.....	98
Refused.....	99

ASK Q20 IF Q19 = DON'T KNOW OR REFUSED

20. *Would you estimate the above-ground living space is about:*

Less than 1,000 square feet.....	.01
1000-2000 square feet.....	.02
2000-3000 square feet.....	.03
3000-4000 square feet.....	.04
4000-5000 square feet.....	.05
Greater than 5000 square feet.....	.06
Don't know.....	.98
Refused.....	.99

21. *How many square feet of below-ground living space is heated or air conditioned?*

Square Feet: _____	
Does not apply.....	.88
Don't know.....	.98
Refused.....	.99

ASK IF Q22 IF Q21 = DON'T KNOW OR REFUSED

22. *Would you estimate the below-ground living space is about:*

Less than 1,000 square feet.....	.01
1000-2000 square feet.....	.02
2000-3000 square feet.....	.03
3000-4000 square feet.....	.04
4000-5000 square feet.....	.05
Greater than 5000 square feet.....	.06
Don't know.....	.98
Refused.....	.99

That's all the questions I have. Thank you for your time. Good bye.