Duke Energy®

139 East Fourth Street, R 25 At II
P O Box 960
Cincinnati, Ohio 45201-0960
Tel. 513-419-1837
Fax. 513-419-1846
dianne.kuhnelll@duke-energy.com

Dianne B Kuhnell
Senior Paralegal

VIA OVERNIGHT DELIVERY

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NOV 17 2008

PUBLIC SERVICE COMMISSION

November 14, 2008

2008-00473

Ms. Stephanie Stumbo
Executive Director
Kentucky Public Service Commission
211 Sower Boulevard
Frankfort, Kentucky 40602-0615

Re: *FILING OF THE ANNUAL STATUS REPORT AND ADJUSTMENT OF THE 2008 DSM COST RECOVERY MECHANISM WITH FILING OF THE AMENDED TARIFF SHEETS FOR GAS RIDER DSM (FOURTH REVISED SHEET NO. 62) AND ELECTRIC RIDER DSM (FOURTH REVISED SHEET NO. 78)*

Dear Ms. Stumbo:

Enclosed please find an original and twelve copies of the Annual Status Report and Adjustment of the 2008 DSM Cost Recovery Mechanism, as captioned above.

Please date-stamp the extra two copies of each of the copies of the testimony and return in the enclosed envelope.

Sincerely,

Dianne B Kuhnell

Dianne B. Kuhnell
Senior Paralegal

cc: Parties of Record

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NOV 17 2008

PUBLIC SERVICE COMMISSION

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In The Matter Of:	)	
	)	
THE ANNUAL COST RECOVERY FILING	)	CASE NO. 2008-00473
FOR DEMAND SIDE MANAGEMENT BY	)	
DUKE ENERGY KENTUCKY, INC.	)	

FILING OF THE ANNUAL STATUS REPORT AND ADJUSTMENT OF THE 2008 DSM COST RECOVERY MECHANISM WITH FILING OF THE AMENDED TARIFF SHEETS FOR GAS RIDER DSM (FOURTH REVISED SHEET NO. 62) AND ELECTRIC RIDER DSM (FOURTH REVISED SHEET NO.78)

Now comes Duke Energy Kentucky, Inc. ("Duke Energy Kentucky" or the "Company") with the consensus of the Residential Collaborative and the Commercial & Industrial Collaborative, and pursuant to this Commission's November 4, 2004 Order in Case No. 2003-00367, February 14, 2005 Order in Case No. 2004-00389, April 4, 2006 Order in Case No. 2005-00402, May 15, 2007 Order in Case No. 2006-00426, and May 14, 2008 Order in Case No. 2007-00369, files its annual status report and proposes an adjustment to the 2008 Demand Side Management ("DSM") Cost Recovery Riders ("Application"). The Applicant is Duke Energy Kentucky of 1697 Monmouth St., Newport, Kentucky 41071. The Residential Collaborative members are: Paul Adams (Kentucky Attorney General's Office), Nina Creech (People Working Cooperatively), Joy Herald Rutan (League of Women Voters), Florence Tandy (Northern Kentucky Community Action Commission), Beth Hodge (Brighton Center), Carl Melcher (Northern Kentucky Legal Aid), Karen Reagor (Kentucky NEED Project), Pat Dressman (Campbell County Fiscal Court), Monica Braunwart (Boone County Fiscal Court) and John Davies (Department of Energy Development and Independence). The Commercial & Industrial

Collaborative members are Paul Adams (Kentucky Attorney General's Office), Jock Pitts (People Working Cooperatively), Monica Braunwart (Boone County Fiscal Court), Karen Reagor (Kentucky NEED Project), John Cain (Wiseway Supply), Daniele Longo (Northern Kentucky Chamber of Commerce), Pat Dressman and Russell Guy (Campbell County Fiscal Court), Bob Flick (Flick's Foods), Kris Knochelmann (Knochelmann Heating & Air), Ed Monohan, Sr. (Monohan Development Company), Gary Sinclair (Kenton County Fiscal Court), and John Davies (Department of Energy Development and Independence).

With the exception of the Kentucky Attorney General's office, which will indicate its opinion at a later date, the members of both the Residential Collaborative and the Commercial & Industrial Collaborative agreed with this Application.

In addition to filing the annual status report, Duke Energy Kentucky and the Residential and Commercial & Industrial Collaboratives respectfully request a modification of Duke Energy Kentucky's DSM Riders to reflect the reconciliation of planned and actual expenditures, lost revenues, and shared savings. For this filing, Duke Energy Kentucky will also be providing results of the recently completed impact evaluation studies for some of the programs. This information is used to reconcile past estimates of lost revenues and shared savings. In addition, Duke Energy Kentucky is informing the Commission that it intends to file a separate application for implementation of a set of energy efficiency programs under its save-a-watt program. The Company plans to continue the existing programs under the current DSM model until such time as the Commission approves the new programs under the save-a-watt model. The Company will perform a final true-up and reconciliation of the current DSM Riders before converting to a new energy efficiency and DSM recovery model. Any remaining balances (over or under) can be transferred to the new save-a-watt Rider or used to close out the existing Rider.

I. INTRODUCTION

A. Background

On December 17, 2002, the Commission issued its Order in Case No. 2002-00358 approving Duke Energy Kentucky's plan to continue the following DSM programs Residential Conservation and Energy Education, Residential Home Energy House Call, and Residential Comprehensive Energy Education for a three-year period ending December 31, 2005; to continue to fund the expansion and improvement of existing programs and the development of new programs; and to implement a revised low-income home energy assistance program as a pilot through May 31, 2004. These programs were extended through 2009 by the April 4, 2006 Order in Case No. 2005-00402. The Commission, in its November 30, 2003 Order in Case No. 2003-00367, also approved the implementation of PowerManager, a residential direct load control program, through the year 2007. The Commission's April 4, 2006 Order in Case No. 2005-00402 authorized the Personalized Energy Report ("PER") program as a pilot program. Finally, the Commission's May 14 Order in Case No. 2007-00369 approved the Company's PowerManager program through 2012 and approved the PER program for recovery of lost revenues and shared savings.

This filing specifically addresses the requirements in prior Commission Orders: November 20, 2003 Order in Case No. 2003-00367, February 14, 2005 Order in Case 2004-00389, April 4, 2006 Order in Case No. 2005-00402, May 15, 2007 Order in Case No. 2006-00426, and May 14, 2008 Order in Case No. 2007-00369. In addition, this filing is being made consistent with the Commission's September 18, 2007 Order in Case 2007-00369 granting Duke Energy Kentucky's request to file annual DSM applications no later than November 15, 2007. In the status and reconciliation portion of this report, expenses are reported for the period July 1, 2007 through June 30, 2008.

Duke Energy Kentucky requests an Order in this proceeding that, as long as Duke Energy Kentucky continues to file annual DSM applications by November 15 of each year, the rates approved in such applications shall remain in effect until the effective date of new DSM rates approved by the Commission, or until otherwise ordered by the Commission.

B. Definitions

For the purposes of this Application, the following terms will have the meanings established in the Principles of Agreement, Demand Side Management (Exhibit 1 to the Application in Case No. 95-312, dated July 15, 1995):

1) **"DSM Revenue Requirements"** shall mean the revenue requirements associated with all Program Costs, Administrative Costs, Lost Revenues (less fuel savings), and the Shareholder Incentive.

2) **"Collaborative"** shall mean the Duke Energy Kentucky DSM Collaborative, which was established by the Signatories and other parties separately from this process.

3) **"Program Costs"** shall mean the costs incurred for planning, developing, implementing, monitoring and evaluating the DSM programs described in Section XI of the Principles of Agreement, Demand Side Management (pp. 11-19) and the DSM programs that have been approved by the Collaborative.

4) **"Administrative Costs"** shall mean the costs incurred by or on behalf of the collaborative process and that are approved by the Collaborative, including, but not limited to, costs for consultants, employees and administrative expenses.

5) **"Lost Revenues"** shall have the meaning in Section IV of the Principles of Agreement, Demand Side Management.

6) **"Shareholder Incentive"** shall have the meaning in Section IV of the Principles of Agreement, Demand Side Management.

7) **"DSM Cost Recovery Mechanism"** shall have the meaning in Section IV of the Principles of Agreement, Demand Side Management.

8) **"Voucher"** shall mean the credit receipt the customer receives from a social service agency. The voucher can be used by the customer as a partial payment toward the utility bill.

II. STATUS OF CURRENT DSM PROGRAMS

Duke Energy Kentucky currently offers the following programs, the costs of which were recoverable through the DSM Cost Recovery Rider mechanism approved by the Commission in Case No. 2004-00389 and in subsequent proceedings.

Program 1: Residential Conservation and Energy Education

Program 2: Residential Home Energy House Call

Program 3: Residential Comprehensive Energy Education Program (NEED)

Program 4: Program Administration, Development & Evaluation Funds

Program 5: Payment Plus

Program 6: PowerManager

Program 7: Energy Star Products

Program 8: Energy Efficiency Website

Program 9: Personalized Energy Report (PER)

Program 10: C&I High Efficiency Incentive (for Businesses and Schools)

Program 11: PowerShare

Under the current DSM Agreement and prior Commission Orders, all of these programs except PowerManager and PER, will end December 2009 unless an application is made to continue them. The PER program was implemented as a pilot program.

This section of the Application provides a brief description of each current program, a review of the current status of each program, and information on any changes that may have been made to the programs. The following table provides a brief summary of the load impacts achieved and level of participation obtained during this filing period.

Summary of Load Impacts July 2007 Through June 2008

Residential Programs	Incremental Participation	Load Impacts Net of Free Riders kWh	kW
Home Energy House Call	568	149,952	17.0
Energy Efficient Website	445	100,161	27.5
Energy Star Products	43,123	1,644,079	280.6
Low Income Program	265	165,095	45.4
Refrigerator Replacement	85	92,395	22.3
Personalized Energy Report			
Power Manager	919		946.6
NEED	625	72,681	6.3
Total Residential	46,030	2,224,363	1,345.7

**Energy Star Products is number of bulbs not participants.

Non-Residential Programs	Incremental Participation	Load Impacts Net of Free Riders kWh	kW
C&I Lighting	24,777	16,712,153	2,408.2
C&I HVAC	2,683	7,198,758	2,728.8
C&I Motors	4	1,851	0.6
Power Share	1		629.0
Total Non-Residential	27,465	23,912,762	5,766.6
Total	73,495	26,137,125	7,112.3

Results of the current cost-effectiveness test results for each of the programs are provided in Appendix A.

A. Program 1: Residential Conservation and Energy Education

The Residential Conservation and Energy Education program is designed to help the Company's income-qualified customers reduce their energy consumption and lower their energy cost. This program specifically focuses on LIHEAP customers that meet the income qualification level (*i.e.*, income below 130% of the federal poverty level). This program uses the LIHEAP intake process as well as other community outreach to improve participation. The program provides direct installation of weatherization and energy-efficiency measures and educates Duke Energy Kentucky's income-qualified customers about their energy usage and other opportunities to reduce energy consumption and lower their costs.

The Company estimates that at least 6,000 customers (number of single family owner-occupied households with income below $25,000) within Duke Energy Kentucky's service area may qualify for services under this program. The program has provided weatherization services to 251 homes in 2000; 283 in 2001; 203 in 2002; 252 in 2003; 252 in 2004; 130 in 2005; 232 in 2006; and 252 in 2007. For the fiscal year 2007-2008, 265 homes were weatherized.

The program is structured so that the homes needing the most work and having the highest energy use per square foot receive the most funding. The program does this by placing each home into one of two "Tiers." This allows the implementing agencies to spend the limited budgets where there is the most cost-effective and significant potential for savings. For each home in Tier 2, the field auditor uses the National Energy Audit Tool ("NEAT") to determine which specific measures are cost-effective for that home. The specific services provided within each Tier are described below.

	Therm / square foot	kWh use/ square foot	Investment Allowed
Tier 1	0 < 1 therm / ft2	0 < 7 kWh / ft2	Up to $600
Tier 2	1 + therms / ft2	7 + kWh / ft2	All SIR $\geq$ 1.5 up to $4K

SIR = Savings - Investment Ratio

Tier 1 Services

Tier 1 services are provided to customers by Duke Energy Kentucky through its subcontractors. Customers are considered Tier 1 if they use less than 1 therm per square foot per year or less than 7 kWh per square foot per year based on the last year of usage (weather adjusted) of Company-supplied fuels. Square footage of the dwelling is based on conditioned space only, whether occupied or unoccupied. It does not include unconditioned or semi-conditioned space (non-heated basements). The total program dollars allowed per home for Tier One services is $600.00 per home.

Tier 1 services are as follows:

- Furnace tune-up & cleaning
- Furnace replacement if investment in repair over $500 (through Gas WX program)
- Venting check & repair
- Water heater wrap
- Pipe wrap
- Waterbed mattress covers
- Cleaning of refrigerator coils
- Cleaning of dryer vents

- Compact Fluorescent Light ("CFL") Bulbs
- Low-flow shower heads and aerators
- Weather-stripping doors & windows
- Limited structural corrections that affect health, safety, and energy up to $100
- Energy education

Tier 2 Services

Duke Energy Kentucky will provide Tier 2 services to a customer if they use at least 1 therm or at least 7 kWh per square foot per year based on the last year of usage of Duke Energy Kentucky-supplied fuels.

Tier 2 services are as follows:

- Tier 1 services plus:
- Additional cost-effective measures (with SIR $\geq$ 1.5) based upon the results of the NEAT audit. Through the NEAT audit, the utility can determine if the cost of energy saving measures pay for themselves over the life of the measure as determined by a standard heat loss/economic calculation (NEAT audit) utilizing the cost of gas and electric as provided by Duke Energy Kentucky. Such items can include, but are not limited to, attic insulation, wall insulation, crawl space insulation, floor insulation and sill box insulation. Safety measures applying to the installed technologies can be included within the scope of work considered in the NEAT audit as long as the SIR is greater than 1.5 including the safety changes.

Regardless of placement in a specific tier, Duke Energy Kentucky provides energy education to all customers in the program.

To increase the cost-effectiveness of this program and to provide more savings and bill control for the customer, the Collaborative and Duke Energy Kentucky proposed in the September 27, 2002 filing in Case No. 2002-00358, and subsequently received approval to expand this program, to include refrigerators as a qualified measure in owner-occupied homes. Refrigerators consume a large amount of electricity within the home, and the program impacts have been updated during this year to reflect current energy savings and refrigerator replacements. To determine replacement, the program weatherization provider performs a two-hour meter test of the existing refrigerator unit. If it is a high-energy consumer as determined by this test, the unit is replaced. The program replaces about half of the units tested. Replacing with a new Energy Star qualified refrigerator, which uses approximately 400 kWh, results in an overall savings to the average customer typically in excess of 1,000 kWh per year.

Refrigerators tested and replaced:

- 2003 = 116 tested and 47 replaced
- 2004 = 163 tested and 73 replaced
- 2005 = 115 tested and 39 replaced
- 2006 = 116 tested and 52 replaced
- 2007 = 136 tested and 72 replaced
- 2008 = 173 tested and 85 replaced

The existing refrigerator being replaced is removed from the home and destroyed in an environmentally appropriate manner to assure that the units are not used as a second refrigerator in the home or do not end up in the secondary appliance market.

With respect to the weatherization and auditing portions of this program, there were no additional impact evaluations conducted during this reporting year. However, the refrigerator program impacts have been updated, presented in Appendix B, with an average savings of 1087 kWh in Kentucky. This updated energy savings finding is used in the current cost effectiveness results reported within this filing. Recommendations from this analysis include more aggressive pursuit of the removal of "second units", or a second refrigerator on the premises, as well as enhanced installation review to ensure that installation protocols are being followed by auditors.

B. Program 2: Residential Home Energy House Call

The Home Energy House Call ("HEHC") program, implemented by Duke Energy Kentucky subcontractor Enertouch Inc. (d/b/a GoodCents Solutions), provides a comprehensive walk-through, in-home analysis by a qualified home energy specialist to identify energy savings opportunities in homes. The energy specialist analyzes the total home energy usage, checks the home for air infiltration, examines insulation levels in different areas of the home, and checks appliances and heating/cooling systems. A comprehensive report specific to the customer's home and energy usage is then completed and mailed back to the customer within ten business days. The report focuses on the building envelope improvements as well as low-cost and no-cost improvements to save energy. At the time of the home audit, the customer receives a kit containing several energy saving measures at no cost. The measures include a low-flow showerhead, two aerators, outlet gaskets, two compact fluorescent bulbs, and a motion sensor night-light. The auditors install the measures so customers can begin realizing an immediate savings on their electric bill or the customer may choose to install the measures themselves.

For the period of July 1, 2007 through June 30, 2008, a total of 568 audits were completed in Kentucky, surpassing the annual goal of 500. During this filing period, direct mail brochures were mailed to 19,167 customers and Duke Energy Kentucky received 657 responses – 3.4% response rate. 21% of responses were from the business reply card, 42% were phone responses, and 37% of the responses were through our web enrollment process. To date, customer satisfaction ratings for the program continue to remain high - 4.8 on a five-point scale.

Some changes to the program delivery went into effect August 18, 2008. The auditors now carry laptop computers on-site and can enter the data collected into the software during the audit, eliminating error in third-party interpretation that was possible in the previous process. This new process will allow a quicker turnaround time for customers to receive their reports. They will be available on-line within twenty-four hours of audit completion. The Company has also updated its report software to provide a much more comprehensive and user-friendly customer report.

In the Fall of 2007, Duke Energy Kentucky solicited Requests for Proposals ("RFPs") for the implementation of three of its energy efficiency programs, including this program, and the contract was awarded to Wisconsin Energy Conservation Corporation ("WECC") located in Madison, Wisconsin. WECC has been administering and implementing programs for twenty-five years. It is one of the largest program operators in the region. WECC's knowledge of home energy audits comes from years of experience administering weatherization programs for income eligible customers including the Home Performance Program offered jointly by Duke Energy Indiana Inc. and Vectren Energy Delivery. WECC has contracted with Thermo-Scan Inspections ("TSI") located in Carmel, Indiana to deliver this program. TSI has been in the business of providing a wide array of inspection services for commercial and industrial businesses, municipalities, contractors and homeowners to identify, repair and protect homes, buildings, equipment and structures from moisture, leaks, corrosion and inefficient energy usage since 1979. They received the **Energy Star** for Homes **Outstanding Achievement Award** two years in a row, recognizing the important contribution they make to energy efficient construction and environmental protection. Together, WECC and TSI can provide the administration, marketing, staff, tracking, systems, logistics, training, customer service, scheduling and technical support required to support Duke Energy Kentucky's Home Energy House Call program. The transition to WECC and TSI will take place November 1, 2008. Duke Energy has been working with WECC, TSI and GoodCents to ensure a seamless transition for the customers.

The Residential Home Energy House Call program evaluation was updated for this filing period. The evaluation includes a process and impact evaluation, as well as a statistical billing analysis comparing pre and post energy usage trends. These savings estimates, customer response, and program recommendations are described in the report in Appendix C. Two types of energy savings estimation methodologies were employed and compared. Given the fact that statistical comparisons of pre- and post-energy usage within a home is a more rigorous measure of energy savings, compared to engineering estimation, the cost effectiveness results employ the energy savings derived from the statistical billing analysis findings.

C. Program 3: Residential Comprehensive Energy Education

The Residential Comprehensive Energy Education program is operated under subcontract by Kentucky National Energy Education Development ("NEED"). NEED was launched in 1980 to promote student understanding of the scientific, economic, and environmental impacts of energy. The program is currently available in 46 states, the U.S. Virgin Islands, and Guam. The program has provided unbiased educational information on all energy sources, with an emphasis on the efficient use of energy. Energy education materials, emphasizing cooperative learning, are provided to teachers. Leadership Training Workshops are structured to educate teachers and students to return to their schools, communities, and families to conduct similar training and to implement behavioral changes that reduce energy consumption. Educational materials and Leadership Training workshops are designed to address students of all aptitudes and have been provided for students and teachers in grades K through 12.

The Kentucky NEED program follows national guidelines for materials used in teaching, but also offers additional services such as: hosting teacher/student workshops, sponsoring teacher attendance at summer training conferences, sponsoring attendance at a National Youth Awards Conference for award-winning teachers and students, and providing curricula, free of charge, to teachers.

Overall, the program has reached teachers and students in seventy-five schools in the six counties served by Duke Energy Kentucky. There are currently over 200 teachers enrolled in the program. At a minimum, these teachers have impacted over 11,056 students. In addition, many of the teachers have multiple classes, so the number is potentially higher. Students who attend workshops are encouraged to mentor other students in their schools – further spreading the message of energy conservation. Teams of middle school and high school students serve as facilitators at workshops. Through this approach, all grade levels are either directly or indirectly presented the energy efficiency and conservation message. Several of the student teams have made presentations to community groups, sharing their knowledge of energy, promoting energy conservation and demonstrating that the actions of each person impact energy efficiency. It is intended that these students will also share this information with their families and reduce consumption in their homes.

Due to efforts of the Kentucky NEED program, energy and facility managers with the Kenton County School District implemented a voluntary program that garnered national recognition around their energy management plans; it incorporated student participation and education curriculum. This led to the construction project of an additional efficiency ("LEED") certified school building. These efforts have continued to build upon the Special Projects grant awarded by the Governor's Office of Energy Policy from the U.S. Department of Energy ("DOE"). This Rebuild Kentucky project, which began in January 2002, established a new partnership to implement an Energy Smart Schools program in six Northern Kentucky counties. Kentucky NEED is a cost share partner in this project.

The program addresses: (1) building energy efficiency improvements through retrofits financed by use of energy saving performance contracts ("ESPC") and improved new construction; (2) school transportation practices; (3) educational programs; (4) procurement practices; and (5) linkages between school facilities and activities within the surrounding community. Successful elements of the Energy Smart Schools program will be marketed to other schools statewide. (This program is now called Kentucky High Performance Sustainable Schools Program since Rebuild America is no longer a DOE program). During the 2008-2009 school year, this program will focus more on energy saving operations and maintenance opportunities that will include establishing school energy teams consisting of maintenance/custodial staff, teacher advisor(s) and student energy teams. The student teams will focus their efforts on developing an energy plan for their schools to encourage energy saving behaviors by all members of the school community. While the program will be facilitated by Kentucky NEED, additional program partners include the Kentucky School Plant Management Association ("KSPMA") and the Kentucky Energy Efficiency Program for Schools ("KEEPS").

To improve and better document the energy savings associated with the program, a change was made in 2004 adding a new survey instrument for use in the classroom and an energy savings "kit" as a teaching tool. New curriculum was developed around this kit and survey to allow teachers to have actual in-home measures assessed and implemented. The result of this change has demonstrated that measures are being installed in the home. These kits include CFL bulbs, low-flow shower heads, faucet aerators, water temperature gauge, outlet insulation pads, and a flow meter bag.

The kits were tested in the Spring of 2003 and began full application in the new school year beginning September 2003 when the science curriculum deals with these issues. The number of kits distributed from 2003-2005 totaled 985. During the 2006-2007 school year, 235 kits were distributed to students. During the 2007-2008 school year, 551 kits were distributed. Other activities in the 2007-2008 school year included: six teachers from six schools in the service territory attended a five-day training conference for the NEED summer teacher training workshop, 182 teachers received NEED materials; and two teacher/student training workshops with twenty-two teachers and 110 students. A workshop was held in September, hosted by NEED at the request of Northern Kentucky

University, to provide training and materials for education majors. NEED promotes efficiency and conservation practices using lessons from the "Building Buddies" with kits, Monitoring & Mentoring with kit, Learning & Conserving with kit, Energy House, Today in Energy, and the Energy Conservation Contract. Four schools also received assistance in designing and implementing an energy efficiency program for their schools. During the Summer of 2007, Kentucky NEED staff worked with Kenton County Schools to develop their Energy WISE Manual. Due to the success of the Twenhofel NEED Team, Kenton County implemented a voluntary program, encouraging all schools in the district to form student energy teams. All eighteen schools in the district decided to form energy teams and training sessions for these teams were held in September, with twenty-five teachers and 200 students attending. The teams promoted energy efficiency and conservation measures in the schools and monitored energy consumption. A year-end summary of their efforts showed a substantial reduction in energy consumption. A workshop was also held for teachers in the Covington Diocese to introduce and prepare them to facilitate the Duke Energy Kentucky energy efficiency at home kits along with NEED curriculum. Using the guide developed by Kentucky NEED, efforts are being made to enroll additional districts in the student energy team program.

Kentucky NEED works with the Department for Energy Development and Independence Division of Energy Efficiency and Conservation, formerly known as the Kentucky Office of Renewable Energy and Energy Efficiency to develop and facilitate the Kentucky Energy Smart Schools programs. NEED hosted the sixth annual High Performance Schools Workshop on March 18-19, 2008.

Participants in the 2007-2008 NEED Youth Awards for Energy Achievement

Program included these northern Kentucky schools: Beechgrove Elementary – Independence, KY; Caywood Elementary – Edgewood, KY; Fort Wright Elementary – Fort Wright, KY; Piner Elementary – Morning View, KY; River Ridge Elementary – Villa Hills; KY, White's Tower Elementary – Independence, KY; Phillip A. Sharp Middle School – Butler, KY; Twenhofel Middle School – Independence, KY; Campbell County High School Freshman Academy – Alexandria, KY; and Kenton County Energy WISE District-Wide Program. Students and teachers from Twenhofel Middle School, Phillip A. Sharp Middle School and the Kenton County Energy WISE program attended the national conference in Washington, D.C. from June 20 – 23, 2008. During the awards ceremony on June 23, the Kenton County Energy WISE district-wide program was recognized as NEED's National District of the Year

In partnership with the Department for Energy Development & Independence: Division of Energy Efficiency and Conservation-Kentucky, NEED continues to promote student participation in the Change a Light, Change the World campaign. Using NEED's Change a Light ("CAL") Teacher's Guide, students are encouraged to facilitate CAL activities in their schools and communities. The Department for Energy Development & Independence and Kentucky NEED are again offering $350 mini-grants to student groups facilitating Change a Light projects. During the 2006-2007 campaign, Kentucky students ranked twenty-third in overall pledges, in which hundreds of organizations participated. As the 2007-2008 campaign comes to a close, Kentucky NEED is the top pledge driver in both the Education and Non-Profit sectors, collecting over 21,980 pledges; 1463 of those pledges being collected by three northern Kentucky schools.

Kentucky NEED is actively promoting the energy efficiency incentive program for schools, coordinating a presentation at the northern Kentucky Superintendents' monthly meeting and at meetings with additional district facility personnel.

An impact evaluation of the Residential Comprehensive Energy Education (KY NEED) program was conducted and included with this filing as Appendix D. It is recommended that this program strive to increase participation, as well as thoroughly track installation of kit measures in order to fully account for all program savings. Further, consideration should be given to the inclusion of measures likely to achieve more significant energy savings (*e g.*, CFLs). The average savings for this program were found to be lower than expected, 0.0008 kW, 8.304 kWh, and 0.962 Therm. These numbers are used for the cost effectiveness tests included within this filing.

D. Program 4: Program Administration, Development, & Evaluation Funds

This program is responsible for designing, implementing and capturing costs related to the administration, evaluation and support of the Collaborative and Duke Energy Kentucky's overall DSM effort. Program development funds are utilized for the redesign of programs and for the development of new programs, or program enhancements, such as the refrigerator replacement portion of the Residential Conservation and Energy Education program. Evaluation funds are used for cost effectiveness analysis and evaluation, impact evaluation and process evaluation of program activities, such as those included as appendices to this filing. Funds going forward will be used to again monitor, evaluate and analyze these programs to improve cost effectiveness and program design. Therefore, Duke Energy Kentucky expects, and has planned for, the continuation of funding for this program to cover evaluation study costs for the current year's activities as well as future evaluations. Duke Energy

Kentucky strives to optimize and balance the use of these program funds, such that program development and redesign continues, that all programs are analyzed every year for cost effectiveness, and that programs are generally afforded the opportunity for a full scale impact evaluation and energy savings assessment once every two years. Duke Energy Kentucky believes that it is unnecessary to spend significant funds on impact evaluations every year for all programs, but also understands that all programs must undergo impact evaluation scrutiny and review at least once every two to three years.

E. Program 5: Payment Plus

From January 2002 through June 2006, the Residential Collaborative and Duke Energy Kentucky tested an innovative home energy assistance program called Payment Plus. The program was designed to impact participants' behavior (*e.g.*, encourage meeting utility bill payments as well as eliminate arrearages) and to generate energy conservation impacts. That program was extended with the Commission's Order in Case No. 2004-00389 to include both the early participants and new participants each year.

The program has three parts:

1. Energy & Budget Counseling – to help customers understand how to control their energy usage and how to manage their household bills, a combined education/counseling approach is used.
2. Weatherization – participants in this program are required to have their homes weatherized as part of the normal Residential Conservation and Energy Education (low-income weatherization) program unless weatherized in past program years.

3. Bill Assistance – to provide an incentive for these customers to participate in the education and weatherization, and to help them get control of their bills, payment assistance credits are provided to each customer when they complete the other aspects of the program. The credits are: $200 for participating in the energy efficiency counseling, $150 for participating in the budgeting counseling, and $150 to participate in the Residential Conservation and Energy Education program. If all of the requirements are completed, a household could receive up to a total of $500. This allows for approximately 125 homes to participate per year as some customers do not complete all three steps or have already had the weatherization completed prior to the program.

This program is offered over six winter months per year starting in October. Customers are tracked and the program evaluated after two years to see if customer energy consumption dropped and changes in bill paying habits occurred.

Over the last five years, participants have been monitored and compared to a control group of customers with similar arrearages and incomes. This evaluation has looked at not only energy savings, but arrearage and payment practices. It is the only long-term impact and process evaluation in the country looking at both energy savings and arrearages from a single program. As a result, there is long-term evidence that the program is effective at both saving natural gas and having a positive impact on arrearages. The evaluation firm recommended that the program continue. Copies of the evaluation report were included in the 2006 filing.

Given the positive evaluation results, the Collaborative proposed and the Commission approved in May 2007 continuation of the program at a cost of $150,000 per year, through 2009. Follow up educational reinforcement took place for all participants beginning Fall 2007. For the filing period beginning Fall of 2007, 168 participants attended energy education counseling, 140 participants attended budget counseling and 111 participant homes have been weatherized.

Program cost effectiveness results are calculated using the energy savings from the latest impact evaluation submitted in the 2007 filing, applied to current year participants and current year program implementation costs.

F. Program 6: PowerManager

The purpose of the PowerManager program is to reduce demand by controlling residential air conditioning usage during peak demand conditions in the summer months. The program is offered to residential customers with central air conditioning. Duke Energy Kentucky attaches a load control device to the customer's compressor to enable Duke Energy Kentucky to cycle the customer's air conditioner off and on when the load on Duke Energy Kentucky's system reaches peak levels. Customers receive financial incentives for participating in this program based upon the cycling option selected. If a customer selects Option A, their air conditioner is cycled to achieve a 1 kW reduction in load. If a customer selects Option B, the air conditioner is cycled to achieve a 1.5 kW load reduction. Incentives are provided at the time of installation: $25 for Option A and $35 for Option B. In addition, when a cycling event occurs, a Variable Daily Event Incentive based upon marginal costs is also provided.

The cycling of the customer's air-conditioning system has shown that there is minimal impact on the operation of the air-conditioning system or on the customer's comfort level. The load control device has built-in safe guards to prevent the "short cycling" of the air-conditioning system. The air-conditioning system will always run the minimum amount of time required by the manufacturer. The cycling simply causes the air-conditioning system to run less, which is no different than what it does on milder days. Research from other programs, including previous Duke Energy Ohio and Duke Energy Kentucky programs, has shown that the indoor temperature should rise approximately one to two degrees for control Option A and approximately two to three degrees for control Option B. Additionally, the indoor fan will continue to run and circulate air during the cycling event.

Duke Energy Kentucky continues to explore opportunities to cross-market the PowerManager program with Duke Energy Kentucky's other DSM programs thus tying both conservation and peak load management together as one package.

In 2007, Duke Energy Kentucky mailed 125,397 PowerManager marketing pieces and had 989 customers enrolled in the program with 791 switch installations completed from the enrollments. In 2008, Duke Energy Kentucky mailed 89,508 marketing pieces and had 991 customers enrolled in the program with 469 installations completed from enrollments. The cumulative installations as of the end of 2008 total 1,260 switches. The installation rate during 2007-2008 was intentionally less than projected originally, due to a desire to ensure that existing switches, operations and systems were operating as efficiently and effectively as possible. Previous quality control assessments, measurements and verifications suggested that paging, installation, operations and signaling were not being effectively received within some areas. As such, significant effort during 2007 resulted in the successful increase in load reductions realized per household to an average of 1.04 kW per home. Continued efforts in 2008 are hoped to increase the average load reduction per household. Results of the 2008 impact evaluation should be available in late Fall 2008. This quality management effort has provided increased assurance that the program operates as intended, and at a load reduction level that is clearly cost effective and worthy of further pursuit and customer promotion. Termed the "Duke A Quality Control" ("QC") program, the effort was implemented in January of 2007. A total of 1,334 switches were visited in the field. The program consisted of a general inspection of the health of the air conditioner, the switch installation, and retrieval of the event performance data stored inside the switch. QC efforts will continue in 2008.

In 2007, Duke Energy Kentucky performed seven control events during the 2007 summer season. In 2008, Duke Energy Kentucky performed five control events during the 2008 summer season.

During the Summer of 2008, Duke Energy Kentucky continued collecting data for assessment of PowerManager in much the same way as is described in the 2007 PowerManager Impact Evaluation Report. Data loggers were installed on cooling units at forty-two customer sites to measure duty cycles and standard household meters were replaced with interval meters that measure 15-minute kWh usage. There were thirteen holdovers from the 2007 sample and twenty-nine new recruits.

Also during the Summer of 2008, Duke Energy Kentucky conducted a new operability study to measure the performance of PowerManager load control devices. An entirely fresh sample was selected for this study, including 100 PowerManager sites in Kentucky. An initial collection of register data from load control devices at these sites has been completed and there will be a second data collection after the end of the

PowerManager control season. The change in certain key registers between these data collections will be analyzed in much the same way as described in the 2007 PowerManager Impact Evaluation Report to provide a statistically valid assessment of the performance of PowerManager load control devices during the Summer of 2008.

The program was recently approved through 2012 in Case No. 2007-00369. The current year cost effectiveness results use current year participants, current year costs and 2007 impact evaluation findings and load reductions.

G. Program 7: Energy Star Products

As approved in Order 2004-00389, the Energy Star Products program provides market incentives and market support through retailers to build market share and usage of Energy Star products. Special incentives to buyers and in-store support stimulate demand for the products and make it easier for store participation. The programs target residential customers' purchase of specified technologies through retail stores and special sales events. Now in the second year of the program, the focus remains on CFL (bulbs) and torchiere lamps. Technologies may change over the future years of program operation based on new technologies and market responses.

Price continues to be the primary market barrier to CFL adoption. Purchase rewards are provided for customers to lower the cost of the item and stimulate interest. The second barrier is retailer participation. Through retail education, in-field sales support (signs, ads, etc.), and stimulated market demand, retailers stock more product, provide special promotions and plan sales strategies around these Energy Star products. Additional support is provided through manufacturer relationships that often can reduce prices through special large-scale purchases. Coordination occurs with the national Energy Star initiatives such as the Change a Light, Change the World promotion.

To stimulate the market and get customers to buy and install the efficient lighting, the program provides incentives or "customer rewards" through special in-store "Instant Reward" events that occur in stores at the time of purchase or at special promotional events in the community. Technology incentives start at $2 per bulb and $20 per torchiere. The program also provides training to sales staff of the retailers on the sales aids provided.

Duke Energy Kentucky has contracted with the WECC to provide this service. Recognized as the national leader in this program and located in the region, Duke Energy Kentucky is taking advantage of WECC's current activity to control costs and leverage other activity.

In 2007 and 2008, Duke Energy Kentucky used a combination of promotional events and on-going in-store instant rebates to promote the adoption of energy efficient CFL bulbs. Two sales events took place during the Fall of 2007. The first event was held on October 2 in Bellevue at the Callahan Community Center and included a press conference with the support of Bellevue's Mayor John Meyer. On October 3, 2007, the second event was held in Ft. Mitchell at the City Building, supported with a press conference by Mayor Thomas L. Holocher. At each of these events, local customers could purchase CFLs for $0.99 and torchieres for $9.99.

Thirteen retail hardware stores participated in the sales promotion that lasted from October through March of 2008 and resulted in the sale of over 39,000 CFL bulbs and 370 torchieres. In the Spring of 2008 as part of Earth Day activities, Duke Energy Kentucky partnered with the Home Depot in Florence and two Ace Hardware retailers in

Florence and Independence to promote CFL bulbs. At the Home Depot, a markdown promotion sold 2,334 CFL bulbs. At the Ace locations, customers were able to purchase a five pack of 13 watt CFL bulbs for just $5 using an instant in-store rebate. Results from these two stores report that a total of 2,572 bulbs have been sold through June 2008. Total bulbs sold for the 2007-2008 filing period were 42,669 CFL bulbs and 454 torchieres.

An evaluation of the Kentucky Energy Star CFL program was conducted and is included in Appendix E. Recommendations from this filing include expanding the types of CFLs included in the promotions, as well as enhancing the types of CFL promotions offered to include non-price motivators.

H. Program 8: Energy Efficiency Website, On-line Energy Assessment and Free Energy Efficiency Starter kit

As approved in Order 2004-00389, Duke Energy Kentucky's residential website offers opportunities for customers to assess their energy usage and obtain recommendations for more efficient use of energy in their homes. This Kentucky program fits suitably into our new multi-state program design now referred to as our Residential Energy Assessment Program.

As an expansion to our previous energy efficiency website model, new website pages, new content and new on-line tools have been added. These on-line services help accomplish several things by providing energy efficiency information, tips, and bill analysis. However, Duke Energy Kentucky also intends to use these tools to help identify those customers who could benefit most by investing in new energy efficiency measures or practices. Those customers can then be targeted for participation in other

Duke Energy Kentucky programs.

In November 2006, the Company's Quick-e-Audit tool was upgraded to the Home Energy Calculator provided by Apogee. In this new, easy to use energy analysis tool, a customer provides information about their home, number of occupants, and other energy-related home and family characteristics. This tool allows an unlimited number of potentially energy saving scenarios to be run and charts and tables compare the scenarios to show energy savings.

As an incentive to encourage customers to use the website, a free Energy Efficiency Starter Kit is offered. The kit is mailed directly to the customer's service address and provides the customer with the following measures:

- Showerhead, 1.5 GPM
- Kitchen Swivel Aerator, 1.5 GPM
- Bathroom Aerator, 1.0 GPM
- 15 Watt ENERGY STAR® rated CFL
- 20 Watt ENERGY STAR® rated CFL
- Shrink Fit Window Kit
- Closed Cell Foam Weatherstrip, 17' Roll
- Switch and outlet draft stopper gaskets
- Duke Energy labeled DOE "Energy Savers" booklet
- Roll of Teflon tape for showerhead or faucet aerator

For the period July 2007 to June 2008, 445 kits were mailed.

In an effort to increase participation in this program, extensive changes are being made in both the online energy efficiency tools offered to customers and the process in which the free kit program is promoted. Duke Energy Kentucky now offers a full line of new interactive energy efficiency tools offered by Aclara. With this change, all customers who use Duke Energy Kentucky's on-line services to pay bills or view their accounts will be directed through the Aclara menu page that highlights many energy efficiency opportunities, the most important of which is the Home Profile. The Home Profile is a short energy audit that will be promoted heavily and will be used to give the customer an immediate personalized energy report on their energy usage. Duke Energy Kentucky anticipates the number of customers reached by this new process will be significantly larger than past energy efficiency tools. After the initial rollout of the new process, the Company will review the actual and projected participants and plan to add the energy efficiency kit offer to the process accordingly.

No new impact evaluations were conducted for the energy efficiency website program, since an impact evaluation was included with last year's filing. The numbers from the 2007 evaluation of energy savings is applied to current year participants and program costs.

I. Program 9: Personalized Energy Report (PER)

The PER program provides Duke Energy Kentucky customers with a customized energy report aimed at helping them better manage their energy costs. With rising energy costs in all aspects of daily life, the customer is searching for information they can use and ideas they can implement that will impact their monthly energy bill. The PER program also includes the Energy Efficiency Starter Kit containing nine easily installed measures that demonstrate how easy it is to move towards improved home energy efficiency. For purposes of this pilot program, Duke Energy Kentucky has agreed to test the efficacy of the kit by sending it to 25% of the survey respondents. The program targets single family residential customers in the Duke Energy Kentucky market who have not received measures through the Home Energy House Call energy efficiency audit or Residential Conservation & Energy Education programs within the last three years.

The program gives information on the entire home from an energy usage standpoint, providing energy tips and information regarding how they use energy and what simple, low cost/no cost measures can be undertaken to lower their energy bill. This program provides value because customers lack education on how they individually consume energy in their home and the steps that can be taken to lower their energy bills. This program is meant to educate the customer and put at their disposal information, customized tips, and simple to install measures which can all lower their energy costs.

To get this information, a customer completes an energy survey that generates the Personalized Energy Report. Both are excellent educational tools. The survey stimulates the customer to think about how they use energy and then the PER provides them with tools and information to lower their energy costs. Additionally, the PER provides instructions on how to install the energy measures demonstrating how easy it is to improve their efficiency.

To gain customer participation, the PER program commences with a letter to the customer, offering the Personalized Energy Report if they would return a short, fourteen question survey about their home. The survey asks very simple questions such as age of home, number of occupants, types of fuel used to cool, heat, and cook. Once the survey is returned, the information is used to generate a customized energy report. The report contains the following information:

- Month-to Month comparisons of electric and/or gas usage including the amount of the bill;
- Predictions of customer's usage based on 95th percentile weather conditions (extremely hot summer/extremely cold winter) and 5th percentile weather conditions (extremely mild summer/extremely mild winter); also includes bill amounts based on 2006 tariffs;
- Trend chart showing usage of electric and/or gas by kWh/ccf by month and amount of monthly bill;
- Bill comparison of Duke Energy Kentucky versus the average national electric and/or gas rate;
- A disaggregation of how the customer uses electricity and/or gas;
- Description of Budget Bill; and
- Customized energy tips.

Customized tips are based upon the customer's specific answers to questions in the survey. As an example:

- If the age of the home is over thirty years, plastic window kits would be a recommended measure
- If over 50% of the ducts are in the attic, adding duct insulation would also be a measure

As part of quality control and evaluation, Duke Energy Kentucky completes a follow-up survey with a sub-segment of the customers who received the offer and those who also responded to determine what drove their responses. An additional sub-segment of customers who received the Energy Efficiency Starter Kit also receive the survey and include questions regarding installation of the measures found in the kit.

For the 25% of customers who received The Energy Efficiency Starter Kit, the kit contains the following items:

- 2 each 1.5 GPM showerheads
- 1 each Kitchen Swivel Aerator 2.2 GPM
- 1 each Bathroom Aerator 1.0 GPM
- 1 each Bath Aerator 1.5GPM
- 1 each Small Roll Teflon Tape
- 1 each 15-Watt CFL Mini Spiral
- 1 each 20-Watt CFL Mini Spiral
- 2 each 17' Roll Door Weatherstrip
- 1 each Combination Pack Switch/Outlet Gasket Insulators
- Installation instructions for all measures

Duke Energy Kentucky is using a similar kit in the Home Energy House Call and NEED programs with significant success.

The initial pilot campaign that was approved was conducted in 2006. No other PER campaigns were offered in the time period July 2007 to June 2008. Below are the results of the 2006 pilot campaign.

Mailings went out in three waves:

Wave 1 – May 22, 2006 to 6250 customers; 1417 responses = 22.7% (with kits)

Wave 2 – July 5, 2006 to 5489 customers; 1393 responded = 25.4% (with kits)

Wave 3 – August 18, 2006 to 35,336 customer; 6,249 responded = 17.7% (w/o kits)

In total, 47,505 were mailed, with 9,059 responses. 2810 kits were shipped for an overall response rate of 19.0%. Findings of the research from this pilot are described below. For the pilot, the budget totaled was $109,246, however total expenditures were $67,749. The primary reason for the difference of $41,497 was that the number of customers fitting the criteria within the target was only 47,000 versus the 72,000 originally expected. The PER program has recently been approved as an ongoing program in Kentucky in Case 2007-00369. Plans are being made to offer another campaign in the coming year. No new PER campaigns were offered during this filing period, so the impact evaluation from the previous filing is used for the current year's cost effectiveness results.

J. Program 10: C&I High Efficiency Incentive (Including Schools Initiative)

The Commission's Order in Case No. 2004-00389 approved a new program for Duke Energy Kentucky to provide incentives to small commercial and industrial customers to install high efficiency equipment in applications involving new construction, retrofit, and replacement of failed equipment. Given that approval, the program provided expanded technologies in Kentucky and included the following:

High-Efficiency Incentive Lighting

- T-8 with Electric Ballasts replacing T-12
- LED Exit Signs New/Electronic
- CFL Fixture
- CFL Screw in
- T-5 with Elec. Ballast replacing T-12

- T-5 High Output High Bay
- Tubular Skylight
- Hi Bay Fluorescent
- 320 Metal Halide Pulse Start
- LED Traffic Signals
- Controls/Occupancy Sensors

High Efficiency Incentive HVAC

- Packaged Terminal AC
- Unitary AC & Heat Pump
- Rooftop HP & AC
- Ground Source HP – Closed Loop
- Air Cooled Chillers
- Water Cooled Chillers
- Window AC
- HP Water Heater
- Thermostats/Controls

High Efficiency Incentive Pumps, Motors & Drives

- NEMA Premium Motors 1 to 250 HP with greater than 1500 hours per year
- High Efficiency Pumps 1-20 HP
- Variable Frequency Drives 1-50 HP

Refrigeration

- Energy Star Refrigerators & Freezers
- Energy efficiency Ice Machines
- Head Pressure Controls
- Night Covers for displays
- Efficient Refrigeration Condensers
- Anti-sweat Heater Controls
- Vending Machine Controls

Other Misc. Technologies

- Injection Molder Barrel Wraps
- Engineered Air Compressor Nozzles
- Pellet Dryer Duct Insulation
- Energy Star Clothes Washers for Commercial Applications

Incentives are provided through the market providers (contractors and retail stores) based on Duke Energy Kentucky's cost-effectiveness modeling but with a high-end limit of 50% of measure cost. Using the Duke Energy Kentucky cost-effectiveness model assures cost-effectiveness over the life of the measure. Primary delivery of the program is through the existing market channels, equipment providers and contractors. Duke Energy Kentucky is using its current DSM team to manage and support the program. Additional outside technical assistance is being provided by GoodCents to analyze technical applications and provide customer/market provider assistance as necessary. Duke Energy Kentucky also will provide education and training to its market providers to understand the program and the appropriate applications for the technologies. Full program operations began in the last quarter of 2005. Results to date were beyond expectation. In the first nine months of the program, thirty-six applications were processed totaling $313,350 in incentives. Duke Energy Kentucky attributes this to high installation rates of T-8, T-5 High Output, and High Bay Lighting technologies as well as to a pent-up demand in the marketplace. To respond to the market, the following adjustments were made to the program in order to serve more customers and remain cost effective:

- Incentives for T-8, T-5 and High Bay fixtures are no longer eligible in a "new construction" application, only retrofit applications. The new construction market is utilizing these technologies as a normal practice so incentives are now not needed.
- The incentive levels for T-8 High Bay and T-5 High Output High Bay fixtures were adjusted to align with price changes in the market.
- A cap of $50,000 per facility per calendar year was implemented in an effort to serve more customers.
- A reservation system was instituted during the proposal stage, to ensure that customers will receive their incentives once the project is complete.

Despite these changes, the program still ran out of funds in April of 2007. There were seven applications waiting to get paid in the amount totaling $81,248 and Duke Energy Kentucky received four reservation applications totaling $83,279 for projects scheduled to be completed in July – September. In the Fall of 2006, Duke Energy Kentucky filed with the Commission a request for a 100% increase in funding along with an additional $451,885 for a Kentucky Schools program to respond to market demand

and customer opportunities – providing schools funding for facility assessments, custom and prescriptive measures rebates and energy efficiency education from the NEED organization. On May 15, 2007, the Commission approved Duke Energy Kentucky's application to expand the program. In the first quarter of 2008, Duke Energy Kentucky reviewed the program's performance. Based on the current market response and its impact on the current revised budget, Duke Energy Kentucky made the decision to incorporate the new measures mirroring those in the Ohio program that was approved in July 2007. Announcements in the form of e-mails and direct mail letters regarding the program expansion went out to vendors and all eligible customers in May 2008. New vendor brochures were distributed in the direct mail letters. Follow-up telephone calls to the vendors were made to ensure they received the material and offering to help them understand the expanded program and processes. New applications are posted on Duke Energy Kentucky's Business and K-12 websites. Activity in the Kentucky market has slowed somewhat in the last four months, but the addition of new measures should drive participation up.

Due to the timing of the approval to implement the Schools program, there has been modest activity in the schools market. Three schools in Duke Energy Kentucky's service territory submitted seven applications totaling $26,516 in incentives. However, in the Summer of 2008, Kenton County schools took advantage of several prescriptive incentive measures to help motivate efficiency upgrades at seventeen schools. Each facility has had an assessment and will be installing many prescriptive and custom measures.

School Custom Incentives

Duke Energy Kentucky currently offers Custom Incentives only to schools in Kentucky. Custom Incentives are available for energy efficiency measures which are not included in Duke Energy Kentucky's portfolio of Prescriptive Incentives. This program helped motivate additional custom energy efficiency within Kenton County schools and some of the funding allocated for this program has been provided to the school district, but the impacts are not included in the fiscal year tracking from July 2007 to June 2008. These impacts will be recorded during the coming fiscal year of reporting.

Upon receiving a Custom Incentive application, Duke Energy Kentucky reviews the application and performs a technical evaluation as necessary to validate energy savings. Measures submitted by the customer are then modeled in DSMore to determine an acceptable incentive that ensures cost effectiveness to the program overall, given the energy savings, and supports a customer's payback with the incentive of no less than two years. Evaluation follow-up and review includes application review, site visits and/or onsite metering and verification of baseline energy consumption, customer interviews, and/or use of loggers/sub-meters. As use of Custom Incentives increases, Duke Energy Kentucky will evaluate applications and determine if certain measures can be included in the Prescriptive Incentives program. Including measures that repeatedly arise in Custom Incentive applications in the Prescriptive Incentives makes planning and applying for measure incentives easier for customers.

An update of the C&I program evaluation is found in Appendix F.

K. Program 11: PowerShare®

This PowerShare® update will first describe the program and then provide details on participation and curtailments for the Summer of 2008. The Company will then describe significant events occurring at the Midwest ISO that will impact the program starting in March 2009.

Brief Description: PowerShare® is the brand name given to Duke Energy Kentucky's Peak Load Management Program (Rider PLM, Peak Load Management Program KY.P.S.C. Electric No. 2, Sheet No. 77). The PLM Program is voluntary and offers customers the opportunity to reduce their electric costs by managing their electric usage during the Company's peak load periods. Customers and the Company will enter into a service agreement under this Rider, specifying the terms and conditions under which the customer agrees to reduce usage. There are two product options offered for PowerShare® called CallOption® and QuoteOption®:

- CallOption® – A customer served under a CallOption® product agrees, upon notification by the Company, to reduce its demand or provide generation for purchase by the Company. Each time the Company exercises its option under the agreement, the Company will provide the customer a credit for the energy reduced or generation provided. If available, the customer may elect to buy through the reduction at a market-based price. In addition to the energy credit, customers on the CallOption® will receive an option premium credit. Only customers able to provide a minimum of 100 kW load response qualify for CallOption®.
- QuoteOption® – Under the QuoteOption® products, the customer and the

Company agree that when the average wholesale market price for energy during the notification period is greater than a pre-determined strike price, the Company may notify the customer of a QuoteOption® event and provide a Price Quote to the customer for each event hour. The customer will decide whether to reduce demand or provide generation during the event period. If they decide to do so, the customer will notify the Company and provide the Company an estimate of the customer's projected load reduction or generation. Each time the Company exercises the option, the Company will provide the customer an energy credit. There is no option premium for the QuoteOption® product since customer load reductions are voluntary. Only customers able to provide a minimum of 100 kW load response qualify for QuoteOption®.

Rider PLM was approved pursuant as part of the settlement agreement in Case No. 2006-00172. In the Commission's Order in Case No. 2006-00426, approval was given to include the PowerShare® program within the DSM programs.

PowerShare® 2008: Duke Energy Kentucky's customer participation goal for 2008 was to retain all customers who currently participate and to promote customer migration to the CallOption® program. This would provide additional demand response that can reduce the need for a new plant. The table below compares account participation levels for 2007 and 2008 as well as MW's enrolled in the program.

Kentucky PowerShare Participation Update

Enrolled Customers

CallOption			QuoteOption		
2007	2008	Change	2007	2008	Change
2	**8**	**6**	**49**	**32**	**-17**

Enrolled Load Curtailment Potential (MW's)*

CallOption			QuoteOption		
2007	2008	Change	2007	2008	Change
1.8	**3.8**	**2.0**	**9.0**	**5.8**	**-3.2**

*Potential for QuoteOption is 80% of enrolled load curtailment estimate

As presented above, Duke Energy Kentucky continues to make strides to increase participation in CallOption®. QuoteOption® participation declined in 2008 mainly due to a database review. Customers who did not participate actively or who did not intend to participate in the future were removed from the participant list.

During the Summer of 2008, CallOption® events occurred on July 18 and August 5. There were no QuoteOption® events during the Summer of 2008. The average hourly estimated total curtailed load during the two CallOption® events is 4,400 kW. The 4,400 kW value is a result of adding the estimated load reduction during the events (3,266 kW) and the estimated buy-through energy during the events (1,134 kW). These values have not been weather adjusted for peak normal conditions. A special note should be made regarding the MISO market prices for energy on August 5. On this day, the weather projections suggested peak day type conditions. The hot weather did not materialize and therefore the Midwest ISO market prices for energy remained relatively low. This low market price during an event contributes to higher buy-through quantities.

Midwest ISO Developments: Over the past year, Midwest ISO has filed tariff changes with Federal Energy Regulatory Commission ("FERC") regarding the Midwest ISO Module E, Resource Adequacy Requirements, and also changes to the Midwest ISO energy markets tariffs to incorporate a new Ancillary Services Market (ASM). These changes, if final approval is received by FERC as submitted, may have impact on the current PowerShare® program parameters offered to customers. At the current time, Duke Energy Kentucky does not necessarily foresee any changes required to Rider PLM. However, if necessary, Rider PLM will be revised and submitted for Commission approval for the 2009 PowerShare® program. With or without revisions to Rider PLM, it is likely that Duke Energy Kentucky will alter the current PowerShare® program parameters for CallOption® and potentially offer new product options to customers. The load reduction values from the previous 2007 impact evaluation are used for the cost effectiveness tests included with this filing.

III. CALCULATION OF THE 2008 DSM COST RECOVERY MECHANISM

The reconciliation of the DSM rider involves a comparison of projected versus actual program expenses, lost revenues, and shared savings as well as inclusion of the prior year's reconciliation. The actual cost of residential and non-residential program expenditures, lost revenues, and shared savings for this reporting period was $3.9 million. The projected level of expenditures is $6.1 million.

Lost revenues are computed using the applicable marginal block rate, net of fuel costs and other variable costs, times the estimated kWh savings for a three-year period from installation of the DSM measure. The estimate of kWh savings is based upon the results from any recently completed impact evaluation studies and actual customer participation. Lost revenues accumulate over a three-year period from the installation of each measure, unless a general rate case has occurred.

With respect to shared savings, Duke Energy Kentucky utilized the shared incentive of 10% of the total savings net of the costs of measures, incentives to customers, marketing, impact evaluation, and administration. The savings are estimated by multiplying the number of participants for each measure times the UCT value and then subtracting the program costs. Shared savings only are valued for new installation of new DSM measures.

A. Outline of DSM Activity

Duke Energy Kentucky is planning to offer the following DSM programs in Duke Energy Kentucky's service territory in 2009 as part of its current DSM model, until such time as a new portfolio of programs is approved as part of the Company's save-a-watt filing:

Program 1: Residential Conservation and Energy Education

Program 2: Residential Home Energy House Call

Program 3: Residential Comprehensive Energy Education Program (NEED)

Program 4: Program Administration, Development & Evaluation Funds

Program 5: Payment Plus

Program 6: PowerManager

Program 7: Energy Star Products

Program 8: Energy Efficiency Website

Program 9: Personalized Energy Report (PER)

Program 10: C&I High Efficiency Incentive (including School Incentives)

Program 11: PowerShare®

The Company will also be implementing the Home Energy Assistance Program as approved by the Commission in its September 30, 2008 Order in Case No. 2008-00100. There will be no reconciliation of that program in this Application since the program is starting after the reporting period for this Application. The projected costs are identified in Appendix I.

B. 2009 DSM Riders

In accordance with the Commission's Order in Case No. 95-312, the Joint Applicants submit the proposed DSM Riders (Appendices G and H). The Riders are intended to recover projected 2009 program costs, lost revenues and shared savings to reconcile the actual DSM revenue requirement, as previously defined, to the revenue recovered under the DSM Riders for the period July 1, 2007 through June 30, 2008. Appendix I, page 1 of 6, tabulates the reconciliation of the DSM Revenue Requirement associated with the prior reconciliation, Duke Energy Kentucky's program costs, lost revenues, and shared savings between July 1, 2007 and June 30, 2008, and the revenues collected through the DSM Riders over the same period. The calculation of lost revenues and shared savings only covers the period from the date of the Order in Case No. 2004-00389 through June 30, 2008. The true-up adjustment is based upon the difference between the actual DSM revenue requirement and the revenues collected during the period July 1, 2007 through June 30, 2008. This page also incorporates information in Appendix I, page 6 that reconciles past lost revenues and shared savings estimates to the values from the impact evaluation studies for the following programs:

- PowerManager
- Energy Star Products
- Energy Efficiency Website

- C&I High Efficiency Incentive (for Businesses and Schools)
- PowerShare®
- Personalized Energy Report

The actual DSM revenue requirement for the period July 1, 2007 through June 30, 2008 consists of: (1) program expenditures, lost revenues, and shared savings; and (2) amounts approved for recovery in the previous reconciliation filing. The actual program costs incurred are reflected in column (2) labeled "Projected Program Costs 7/2007 to 6/2008."

Appendix I, page 5 contains the calculation of the 2008 Residential DSM Riders. The calculation includes the reconciliation adjustments calculated in Appendix I, page 1 and the DSM revenue requirement for 2009. The residential DSM revenue requirement for 2009 includes the costs associated with the Residential DSM programs, the program development funds, the Energy Education and Bill Assistance Program (Payment Plus), the PowerManager program, the Energy Star Products program, the Energy Efficiency Website program, the PER program, and any applicable net lost revenues and shared savings (Appendix I, pages 2-3). Total revenue requirements are incorporated along with the projected electric and gas volumes (Appendix I, page 4) in the calculation of the Residential DSM Rider.

Appendix I, page 5 also contains the calculation of the 2009 Commercial & Industrial DSM Rider. The calculation includes the reconciliation adjustments calculated in Appendix I, page 1 and the DSM revenue requirement for 2008. The Commercial & Industrial DSM revenue requirement for 2009 includes the costs associated with the commercial and industrial DSM program (C&I High Efficiency Incentive), the

PowerShare® program, the High Efficiency School Incentive program, and the associated net lost revenues and shared savings (Appendix I, pages 2-3). The 2009 Commercial & Industrial DSM Rider is calculated in two parts. One part (Part A) is based upon the revenue requirements for the C&I High Efficiency Incentive Program (Business and Schools). This part is only recovered from all non-residential rate classes except rate TT. The other part (Part B) is based upon the revenue requirements for the PowerShare® program and is recovered from all non-residential rate classes including rate TT.

Total revenue requirements are incorporated along with the projected electric volumes (Appendix I, page 4) in the calculation of the Residential DSM Rider.

The Company's proposed 2009 DSM Riders, shown as Appendices G and H, replace the current DSM Riders, which were implemented in the first available billing cycle of May 2008. The electric DSM rider, proposed to be effective with the first billing cycle in January 2009, is applicable to service provided under Duke Energy Kentucky's electric service tariffs as follows:

Residential Electric Service provided under:

Rate RS, Residential Service, Sheet No. 30

Non-Residential Electric Service provided under:

Rate DS, Service at Secondary Distribution Voltage, Sheet No. 40

Rate DT, Time-of-Day Rate for Service at Distribution Voltage, Sheet No. 41

Rate EH, Optional Rate for Electric Space Heating, Sheet No. 42

Rate SP, Seasonal Sports, Sheet No. 43

Rate GS-FL, Optional Unmetered General Service Rate for Small Fixed Loads, Sheet No. 44

Rate DP, Service at Primary Distribution Voltage, Sheet No. 45

Rate RTP-M, Real Time Pricing – Market-Based Pricing, Sheet No. 59

Rate RTP, Experimental Real Time Pricing Program, Sheet No. 99

Rate TT, Service at Transmission Voltage, Sheet No. 51

The gas DSM rider is applicable to service provided under the following residential gas service tariff:

Rate RS, Residential Service, Sheet No. 30

Calculation of the Residential Charge

The proposed residential charge per kWh for 2009 was calculated by dividing the sum of: (1) the reconciliation amount calculated in Appendix I, page 1; and (2) the DSM Revenue Requirement associated with the DSM programs projected for calendar year 2009, by the projected sales for calendar year 2009. DSM Program Costs for 2009 include the total implementation costs plus program rebates, lost revenues, and shared savings. The calculations in support of the residential recovery mechanism are provided in Appendix I, page 5.

Calculation of the Non-Residential Charge

The proposed non-residential charge per kWh for 2009 was calculated in two parts. The first part (Part A), applicable to all non-residential rate classes except Rate TT, is calculated by dividing the sum of: (1) the reconciliation amount calculated in Appendix I, page 1; and (2) the DSM Revenue Requirement associated with the C&I High Efficiency Incentive Program projected for calendar year 2009, by the respective projected sales for calendar year 2009. The second part (Part B), applicable to all non-residential rate classes including Rate TT, is calculated by dividing the DSM Revenue Requirement associated with the PowerShare® program projected for calendar year 2009, by total non-residential projected sales for calendar year 2009. DSM Program Cost for 2009 includes the total implementation costs plus program rebates, lost revenues and shared savings.

The rider applicable to all non-residential rate classes except Rate TT is the sum of Part A and Part B. The rider applicable to all non-residential rate classes including Rate TT is only Part B.

Allocation of the DSM Revenue Requirement

As required by KRS 278.285(3), the DSM Cost Recovery Mechanism attributes the costs to be recovered to the respective class that benefits from the programs. The amounts associated with the reconciliation of the Rider are similarly allocated as demonstrated in Appendix I, page 2. The costs for the PowerManager program are fully allocated to the residential electric class, since this is the class benefiting from the implementation of the program. As required, qualifying industrial customers are permitted to "opt-out" of participation in, and payment for, the C&I High Efficiency Incentive Program. All of Duke Energy Kentucky's Rate TT customers met the "opt-out" requirements prior to the implementation of the DSM Riders in May 1996, and are not subject to this portion of the DSM Cost Recovery Mechanism. However, all non-residential customers, including Rate TT customers, will be charged for the PowerShare® program.

WHEREFORE, the Joint Applicants respectfully request that the Commission review and approve this Application and Duke Energy Kentucky gives notice that the new rates will take effect thirty days from the date of this Application.

Respectfully submitted,

DUKE ENERGY KENTUCKY, INC.

By: ______________________

Rocco O. D'Ascenzo (92796)
Senior Counsel
Amy B. Spiller (85309)
Associate General Counsel
Duke Energy Business Services, Inc.
Room 25ATII
P. O. Box 960
Cincinnati, Ohio 45201-0960
Telephone: (513) 419-1852
Fax: (513) 419-1846

CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing filing was served on the following via ordinary United States mail, postage prepaid, this 14th day of November, 2008:

Larry Cook, Assistant Attorney General
The Kentucky Office of the Attorney General
1024 Capital Center Drive
Frankfort, Kentucky 40602-2000

Richard Raff
Public Service Commission
730 Schenkel Lane
Frankfort, Kentucky 40602

Florence W. Tandy
Northern Kentucky Community Action Commission
P.O. Box 193
Covington, Kentucky 41012

Carl Melcher
Northern Kentucky Legal Aid, Inc.
302 Greenup
Covington, Kentucky 41011

Rocco O. D'Ascenzo

Appendix A

Cost Effectiveness Test Results

Program	UCT	TRC	RIM	Participant
Residential Conservation and Energy Education	2.13	2.13	1.15	NA
Refrigerator Replacement	0.99	0.99	0.51	NA
Residential Home Energy House Call	1.32	1.32	0.74	NA
Residential Comprehensive Energy Education Program (NEED)	0.49	0.49	0.37	NA
Power Manager	8.67	10.39	8.67	NA
Energy Star Products	2.56	2.56	0.67	7.03
Energy Efficiency Website	6.27	6.27	1.17	NA
Personal Energy Report (PER)	19.38	36.06	1.35	NA
C&I High Efficiency Incentive (for Businesses and Schools)				
Lighting	7.06	3.47	1.11	4.56
HVAC	1.00	2.70	0.69	8.70
Motors	3.88	1.51	1.08	1.79
PowerShare	4.13	394.60	2.66	NA

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APPENDIX B

Low Income Refrigeration Program
Duke Energy Kentucky & Ohio
Savings Analysis
July 1, 2007 – June 30, 2008

September 2008

Submitted by Rick Morgan

6205 Davenport Drive, Madison, WI 53711
608-277-9518

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Morgan Marketing Partners

Refrigerator Analysis July 1, 2007 – June 30, 2008

Duke Energy Kentucky and its Energy Collaborative proposed and subsequently received approval to expand the low income weatherization program to include refrigerators as a qualified measure in owner occupied homes. This program was also approved by the Ohio Collaborative and the Ohio Public Service Commission and is offered in the Duke Energy Ohio territory. This memo is to report the data analysis to determine the average savings for the Low Income Refrigerator replacement program in combined Duke Energy Ohio & Kentucky territories during the report period July 1, 2007 to June 30, 2008.

Field Protocol

To understand the data results, it is important to understand the field protocol to determine the existing refrigerator's efficiency and whether it qualifies for replacement. The refrigerators are tested in homes that are being weatherized through either the Duke Energy Low Income Weatherization program and its delivery contractor, or the State Weatherization program delivery by the state weatherization agency in the area. When a delivery contractor auditor comes to the home to determine weatherization requirements, they install a digital power meter directly to the refrigerator. The refrigerator plugs into the power meter, manufactured by Brand Electronics, which then plugs into the wall. The auditor calibrates the unit and then lets it run for two hours at a minimum. Two hours is required so that the unit can stabilize and cycle. While more time would be optimal for increased accuracy, two hours has been shown to be able to determine poorly operating units that need to be replaced. [1]

The Protocol which follows specifies the steps that are taken by the auditor in the home and the applicable data entered.

Protocol Steps

1. *Clean refrigerator coils and Check seal on door gasket.*

---

[1] *SELECTION OF HIGH USAGE REFRIGERATORS AND FREEZERS* by Jim Mapp April 16, 1998. & *Low-Income Refrigerator Replacement – Selection Criteria for High Usage Refrigerator Replacement* by Jim Mapp Ph. D. Wisconsin Division of Energy, Kathy Schroder, Program Manager Cinergy Corp, and Rick Morgan, President Morgan Marketing Partners, 2001 IEPEC

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2 *Check to see that the refrigerator closes tightly.*

3 *Open door and take data:* *Brand* ____________________

Model Number ____________________ *Size* ____________________

Serial Number ____________________

4. *Close Door when compressor comes on and note wattage. (remember to zero the watt meter before you start)* *Running Wattage:* ____________ *watts*

5 *Let operate normally for two hours or more with door closed and take the total minutes and the kWhY reading (kWh per year estimate)*

Total Minutes: ____________ *kWhY reading:* ____________

6. *Record peak running wattage at end of the test.* *Peak Watts* ____________

7 *If Peak Wattage is less than 325 watts and the refrigerator has an estimated annual energy usage over 1315 kWhY – **Replace the unit***

8 *If Peak Wattage is more than 325 watts and the refrigerator has an estimated annual energy usage over 1565 kWhY – **Replace the unit**.*

Additional Information Collected

- Customer Name
- Address Where Unit Installed
- Customer Duke Energy Electric Account Number
- Number in Family
- Square Feet of dwelling
- Replacement Unit Size in ft3
- Special Conditions in the home
- Date New Unit Ordered
- Date New Unit Delivered
- Old Unit Removed by
- A second refrigerator used by the customer to be removed
- Auditor Name

The meter calculates the annual kWh consumption based on the watts used over the period of the test. If the refrigerator is calculated by the meter to consume over 1315 kWh year (kWhY) it is replaced at no charge to the customer. However, defrost cycles sometimes initiate over the two hour test period which would skew consumption estimates due to the defrost coils heating the unit. When a defrost cycle occurs the meter measures a higher peak watt consumption during the test which is seen in the data. If the unit shows higher than 325 peak watts during the test, it is assumed that the unit has gone into defrost mode. The 325 was chosen as most compressors use 250 watts or less to operate and then with the lights included, would equal 300 peak watts or less. When the unit shows this high wattage demonstrating defrost mode, the kWh per year must equal 1565 kWh or more to be replaced. Units that have bad seals as determined by the auditor can be replaced in special cases even if the meter wattage is below the requirement which happens approximately 5% of the time.

If a unit is found to need replacement, the auditor orders a unit from the specified vendor providing the Energy Star unit. Three sizes are available, 21 cubic feet, 18 cubic feet and 15 cubic feet. The auditor determines the size for the replacement. The auditor is allowed to go to larger sizes under special circumstances. Of the total units replaced during this period, 34% were 21 ft3, 58% were 18 ft3 and 8% were 15 ft3.

Old units are required to be removed by the refrigerator supplier at the time of the delivery of the new unit and the old unit is environmentally recycled. This assures that the old refrigerator does not continue to be used by the customer or get resold in the secondary market thus taking it permanently off the grid. If there is a second refrigerator on the premise that is working and the customer does not want it anymore, the program will remove and recycle the unit for free. The program has not been successful in getting second units removed as no second units were picked up during the reporting period. This may be an area that the program wants to pursue more aggressively in future years.

Field data is then entered into a database and was reviewed for this analysis. Savings are determined by taking the metered consumption estimate for the year (kWhY) minus the energy consumption rating for the specific Energy Star refrigerator replacing the original unit. These Energy Star consumption estimates are determined by the standardized manufacturer testing in accordance with Energy Star guidelines. Those consumption estimates are:

- 443 kWh/yr for 21 cubic foot
- 434 kWh/yr for 18 ft3
- 372 kWh/yr for 15 ft3

Results

The program data show that there were 764 units tested in Ohio and Kentucky programs and 334 replaced. That is 44% replacement rate (the same replacement rate as last year).

Based on the July 1, 2007 to June 30, 2008 data from the field protocol outlined above, savings is on average 1154 kWh for all the units replaced. Last periods savings were 1089 showing consistency in application of the protocol and continued savings for the program. The highest savings was over 2800 kWh per year and the lowest 14 kWh. There were 33 units with less than the minimum savings (1315 kWhY minus 443 kWh of the 21 ft3 unit = 872 kWh). A majority had broken seals or other problems, however, these installations should be reviewed by Duke Energy to assure that the protocols are being followed by all auditors.

Savings broken down by state are as follows:

State	kWh Savings	Participants
Ohio	1176	249
Kentucky	1087	85

Note that these savings do not include any spillover or market effects from taking the old refrigerator off the secondary market.

The data used for analysis is within the attached spreadsheet. Due to privacy concerns, customer names have been removed.

DSMore Analysis

To complete the DSMore analysis of cost effectiveness, savings should be applied across all hours with an annual savings of 1154 kWh. By using the two hour meter test, natural diversity of load is automatically included, thus using Mode 2 standard testing will work. Life of the measure is related to how early the unit is being replaced. Effective useful life of the new unit is 8 years based on research completed in California on a long term recycling program.[2] This reflects the time the unit would be normally replaced with a new unit and the time that the replaced unit might be used as a secondary refrigerator before ultimate operations failure.

The refrigerator that is recycled earns some non-energy environmental benefits by ensuring that the collected refrigerators are processed and recycled in a manner that meets and exceeds both federal and state environmental laws and regulations. However, these benefits are not quantified here. Ozone-depleting chlorofluorocarbon refrigerants and foam insulation blowing agents (CFCs/HCFCs/HFCs), mercury, used oils, plastics, metals, and glass are recovered and recycled. Polychlorinated biphenyls (PCBs) are also recovered for disposal.

Cost for the program is approximately $1000 per replaced refrigerator which includes the refrigerator delivery cost, recycling, testing and administration. These costs vary slightly by size, but for modeling the $1000 average cost is appropriate.

[2] *Residential Refrigerator Recycling Ninth Year Retention Study* Study ID Nos. 546B, 563 prepared for Southern California Edison Company by KEMA July 22, 2004

Appendix C

Process and Energy Impact Evaluation of the Home Energy House Call Program in Kentucky

Final Report

Prepared for
Duke Energy
139 East Fourth Street
Cincinnati, OH 45201

September 15, 2008

Submitted by:

Johna Roth and Nick Hall
TecMarket Works
165 West Netherwood Road
Oregon, Wisconsin 53575
(608) 835-8855

Pete Jacobs
BuildingMetrics
2540 Frontier Avenue, Suite 201
Boulder, Colorado 80301
(303) 444-4149

TECMARKET Works

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Summary of Findings

Energy Savings

The measures provided in the Energy Efficiency Starter Kits are installed and used by program participants in a way that provides significant energy savings to the participants and to Duke Energy. For the Kentucky participants, the installation of the measures provided in the kit to the 1,181 participants provides an estimated net annual energy savings of 5,016 therms, 179,962 kWh and reduced peak load by 17.379 kilowatts. These savings can be expected over the effective useful life of the installed measures.

	Gross Savings	Net Savings
Annual Savings for Kit Measure Installations		
kW	32.235	17.379
kWh	330,503.4	179,961.70
Therms	10,079.8	5,016.30
Annual Savings HEHC Recommendations Installs		
kW	29.9	6.013
kWh	81,859	16,454
Therms	4,117	828
Total Annual Savings for Kit Measures and Recommendations		
kW	62.135	23.392
kWh	412,362.4	196,415.7
Therms	14,196.8	5,844.3
Life Cycle Kit Measure Installs		
kWh		1,334,714
Therms		50,511
Life Cycle HEHC Recommendation Installs		
kWh		220,192
Therms		10,243
Total Life Cycle Kit and HEHC Recommendations Installs		
kWh		1,554,906
Therms		60,754

On a per-participant basis, this equals first year annual gross energy savings of 280 kWhs and .027 kW per person, with a net savings of 152 kWhs and .015 kWs for the energy efficiency kit. The home energy audit report provides gross first-year annual savings of 69 kWhs and .025 kW per person. The total first year net energy savings for the kit and the audit recommendations are 23.392 kWs, 196,416 kWhs and 5,844 therms.

The total net lifetime savings for the Home Energy House Call Program is 1,316 kWhs and 51 therms per participant.

The impact estimates are based on survey responses of what actions were taken and the use conditions associated with these actions for the weather zone in which the participants reside. The energy savings estimates are based on DOE-2 simulations of measure impact in residential buildings. This type of modeling and assessment approach is an industry standard and can be expected to provide accurate estimates of program impact that are consistent with the accuracy of the survey information provided by the program participants.

Energy Savings Distributions

The tables below present a summary of the total savings from the program participants. Table 1 presents the gross energy savings for each of the kit measures based on the randomly sampled participant survey responses extrapolated to the program population of 1,181. Table 2 presents the expected savings after the false-response and self-selection biases are factored into the calculations. These biases are described in Section 1, Savings Distributions. Table 3 presents the net savings, which factors in the estimated program freeridership.

Table 1. First Year Gross Energy Savings of Kit Measures, All Program Participants (n=1,181)

Kit Measures	kW	kWh	Therms
15-watt CFL	6.397	77,426	-115.2
20-watt CFL	6.153	71,044	-105.7
Weather stripping	0.127	433	8.5
Outlet gaskets	0.53	1,812	35.6
Window shrink kit	0 144	7,020	92.9
Showerhead	18.879	172,267	8,399.2
Bathroom aerator	0.003	229	803.8
Kitchen aerator	0.003	274	960.6

Table 2. First Year Energy Savings of Kit Measures, Net of False-Response and Self-Reporting Bias, All Program Participants (n=1,181)

Kit Measures	kW	kWh	Therms
15-watt CFL	3.845	46,533	-69.2
20-watt CFL	3.698	42,697	-63.5
Weather stripping	0.076	260	5.1
Outlet gaskets	0.319	1,089	21.4
Window shrink kit	0.087	4,219	55.8
Showerhead	9.458	86,306	4,208.0
Bathroom aerator	0.002	115	402.7
Kitchen aerator	0.002	137	481.3

Table 3. First Year Net Energy Savings of Kit Measures, Net of False-Response, Self-Reporting Bias and Freeridership, All Program Participants (n=1,181)

Kit Measures	kW	kWh	Therms
15-watt CFL	3.768	45,602	-67.8
20-watt CFL	3.624	41,843	-62.3
Weather stripping	0.065	223	4.4
Outlet gaskets	0.328	1,121	22

Window shrink kit	0.086	4,198	55.6
Showerhead	9.506	86,737	4,229.0
Bathroom aerator	0.001	109	380.6
Kitchen aerator	0.001	130	454.8

Program Operations

Third-party implementer changes have taken place since this program began operation, and the program is currently switching to a new implementation provider. With this change, program operations should improve with the use of program auditors who are expected to be better trained.

The program managers have obtained expert assistance to help improve the operations of the program, particularly in the areas of improved program design, marketing and quality control procedures. The program is currently meeting its objectives within budget.

Customer Satisfaction

Based on 100 surveys of a random sample of the 1,181 participants in Kentucky, the customer's satisfaction with the program is very high with an overall satisfaction score of 9.06 on a 10-point scale. They were satisfied with the audit (9.65 out of 10) and with the energy efficiency starter kit.

Recommendations

1. The installation rate of the window shrink kit is very low (5%). This is expected because this measure is not one that everyone wants or needs and it requires installation expertise. Once installed, it renders the window non-functioning as a ventilation tool. The cost-effectiveness of this measure should be examined to determine the installation rate needed to reach the cost-effectiveness threshold. If this installation rate cannot be met, the item should be removed from the kit. In order to obtain the cost effectiveness threshold it may be necessary for the kit to be modified in a way that increases the installation rates. For example Duke should consider the following:
    a. Include clear customer-focused, easily accessible information on the effectiveness of installing the window shrink kit so that customers see the benefit information as soon as they open the kit and look at that measure.
    b. Make sure the kit includes clear, easy-to-follow instructions on how to install the kit.

    These messages need to be easy to find and easy to understand. The amount of time a customer will be exposed to this information might be only a few seconds. The message needs to be clear and be transmitted in a few seconds. If this does not increase installation rates above the cost effectiveness threshold, the measure should be discontinued as an item in the kit.

2. Duke should determine if the level of detail provided by the auditor can be cost-effectively enhanced. During the onsite visit, the auditors may be able to increase installation rates for needed changes by interacting with the customer about the "areas of concern" in their home. We realize that this is not always possible because of the need to rapidly move in and out of the home for what is essentially a free service to the participant. However, the time interacting with the customer may well be the most valuable part of the audit in terms of getting customers to take needed actions. An increase in auditor training to include customer interaction and approaches should be considered. This effort must balance the cost of the service and the expected increase in savings.

3. The contract calls for the implementers to train their auditors. This requirement needs to be enforced. The auditors receive one week of classroom training before they accompany a fully trained and experienced auditor for 2-3 weeks. However, in some cases auditors have gone to the field before they were fully trained. The new contract with WECC may solve this issue by using only HERS certified raters to conduct the audits. However, this should be confirmed shortly after WECC assumes the role of implementer to ensure that the auditors are fully trained.

4. The incorporation of more testing technologies, such as the use of a blower door or infrared imaging would help some customers understand the energy saving opportunities better than a simple visual examination. However, this service is costly and could harm the participation rate and interest in the program if it's done by charging the customer. Within the current program, participants can request a blower door assessment for a cost of $125. To date, only one home has requested that test since the program started in 2003. However, as energy costs and environmental issues gain in importance; more customers may be interested in this service, so it is worth promoting this aspect of the program to identify the cost and benefits associated with increase testing promotion.

5. Having personal computers in the field with the auditors will allow them to upload and process the audit information in a more efficient manner, which will allow the reports to be delivered to the participant in a timelier manner. However, that approach should not distract from a well designed report. The report should be such that it is designed using state-of-the art behavior change theories that focus on presentation and education leading to an install decision. Duke should consider having color laser printers with the auditor so that the report can be delivered and reviewed with the customer while on site.

Introduction

This document presents the evaluation report for Duke Energy's Home Energy House Call (HEHC) Program as it was administered in Kentucky. An impact analysis was performed for each of the measures in the Energy Efficiency Starter Kit and for the measures that were installed as a result of the HEHC audit. The impacts are based on engineering analysis of the impacts associated with the self-reported measure installs identified through a participant survey. Additional analysis was performed using a billing analysis comparing the pre and post program energy consumption levels of program participants.

This report is structured to provide program energy savings impact estimations per measure via the engineering analysis, and program savings based on the billing analysis results. The impact tables reporting total savings are based on the savings identified from 100 surveyed participants extrapolated to the program's total participants. The study includes participants from January 2006 through September of 2007 (n=1,181). After each of the measures are discussed individually, the report presents the estimated energy savings achieved per distributed Energy Efficiency Starter Kit through the audit.

This impact evaluation of the measures with the kits is based on surveys conducted with customers who participated in the HEHC program and who have received the kits mailed by the program. The impact of the HEHC recommendations that were implemented is based on survey responses of the actions they have taken that were at least in part caused by the audit report. The study did not use on-site verification efforts to confirm if the survey information provided by the customer is accurate or if the measures taken were correctly installed or used. The impact analysis conducted for this study was systematically adjusted downward to account for self-selection bias and potential false response bias sometimes associated with survey research of socially acceptable behaviors documented via telephone surveys. As a result, the evaluation consultants consider this study a reasonable estimate of program-induced savings.

The evaluation was conducted by TecMarket Works and BuildingMetrics with assistance from Integral Analytics. The survey instruments were developed by TecMarket Works and BuildingMetrics. The survey was administered by TecMarket Works. Integral Analytics performed the billing analysis. BuildingMetrics developed the engineering algorithms to estimate energy impacts based on the survey responses.

Methodology

This section presents the approach for conducting this assessment.

Development of the Surveys

TecMarket Works and Building Metrics developed a customer survey for the Home Energy House Call (HEHC) Program participants to be implemented after they have had time to install at least some if not many of the actions in the kit and the recommendations offered during the home energy audit. The survey asked the customer for information specific to each of the measures included in the Energy Efficiency Starter Kit. In addition the participant was asked to report the actions that they had taken that were caused in whole or in part by the recommendations provided in the HEHC audit report. For each measure that was installed and for each recommendation taken, the participant was asked questions pertaining to their intentions to take that action without the intervention of the program. This information was used to estimate freeridership and to calculate net energy savings.

Because of evaluation budget limitations, the survey was restricted to 100 completed surveys with program participants, however the sample size obtained appears to be reasonable. These participants were surveyed by TecMarket Works. During the survey development process it was necessary to restrict questions so that the survey did not last longer than about 10 minutes. This approach helped control the evaluation cost, but also reduced the number of questions that could be asked in order to calculate energy savings. However, this procedure did not result in overly restrictive questions. To help focus the survey, the questions asked were based on key results of an earlier study employing an identical approach for similar measures. The experience from the previous study (PER Program) allowed this study to use those questions that were most informative to the energy impact estimation process and eliminate those questions that were found to have little impact on the results of the energy savings calculations. This allowed the HEHC survey to be shorter and more focused, yet still provide the information needed to estimate savings. The surveys can be found in Appendix C: Participant Survey Protocol.

Program Impact Estimation

Impact Estimates for Kit Measures

Using the measure-specific data collected from the customer surveys, we were able to extrapolate energy savings to the HEHC Program as a whole, and for each of the kit's eight measures individually. The energy savings for each of the measures was determined through a method in which TecMarket Works and BuildingMetrics assigned the estimates of energy savings for each of the measures included in the HEHC Energy Efficiency Starter Kit. The estimates were formed via engineering estimates of savings based on survey information and on modeling results in which the calculations for the actions taken follow DOE-II residential software modeling algorithms for the expected weather in which the actions are taken. Historical weather average daily conditions were used as the predictive weather. This approach allows for reliable energy savings estimates consistent with accepted modeling approaches based on customer-provided installation and use conditions.

The items distributed in the kit include the following measures.

1. 15-watt CFL
2. 20-watt CFL
3. Weather stripping
4. Outlet gaskets
5. Window shrink kit
6. Showerhead
7. Bathroom aerator
8. Kitchen aerator

The algorithms used to calculate the impact estimates can be found in Appendix A: Impact Algorithms Used.

Freeridership and Spillover

Freeridership and spillover were calculated for each measure in the Energy Efficiency Starter Kit. The level of freeridership was determined by using the responses to three questions in the survey (found in Appendix C). The three questions and the level of freeridership and/or spillover that was applied to the energy savings are presented in the table below, using the CFL as an example measure. All other possible combinations of answers to the series of questions resulted in 0% freeridership and 0% spillover.

Table 4. Freeridership and Spillover Factors for Energy Efficiency Kit Measures

6a: Did you have any CFLs installed before you got the kit?	6b:Were you planning on buying <additional> CFLs before you got the kit?	6c: Have you purchased any CFLs since you got the kit?	% Freeridership	% Spillover
Yes	yes	yes	100	
Yes	yes	no	100	
Yes	no	yes		75
No	no	yes		100
No	yes	no	50	
No	yes	yes	50	50
Don't Know	yes	yes	75	25
Don't Know	yes	no	50	
Don't Know	no	yes		100
Yes	already installed in every place	yes	100	
Yes	already installed in every place	no	100	
Don't Know	maybe	yes	25	50
Yes	maybe	yes		25
Yes	maybe	no	25	
No	maybe	yes		50
Yes	don't know	yes		75
No	don't know	yes		100
Yes	yes	don't know	100	

Yes	already installed in every place	don't know	100	
don't know	yes	don't know	50	
No	yes	don't know	50	

Freeridership was also calculated for the home energy audit as an independent analysis to determine the level of participants that would have had their homes audited if the HEHC were not made available. All other possible responses to these questions were counted as 0% freeridership.

Table 5. Questions to Estimate Freeridership Factors for the Home Energy Audit

Considering an audit before the program?	if not available through the program, would you still have purchased an audit?	If yes, would you have purchased it within a year?	% Freeridership
Yes	yes	yes	100
Yes	yes	no	50
Yes	Yes	don't know	25

None of the participants responded in a manner that labeled them as a freerider. The freeridership level for the HEHC audit is 0%.

Impact Estimates for HEHC Audit and Recommendations

The participants of the Home Energy House Call Program each received an audit of their home followed up by a customized audit report with specific recommendations for improvements to their home that would increase their home's energy efficiency. In this report, we present the recommendations as they were reported to us by the random sample of 100 participants contacted during the telephone survey. We first asked them what, if any, improvements they had made to their home. We then ask if this was a recommendation that was in the audit report. If they said that yes, (it was in the audit report) we ask how influential the recommendation in the audit report was to their decision to install the item on a scale of 1 to 10.

Savings were calculated using engineering algorithms that can be found in Appendix A: Impact Algorithms Used. The gross savings are adjusted for the influence factor. For example, if they said that the influence of the audit report was a 10 on the scale, full energy impacts are presented. If they reported that the audit report had an influence factor of 8, then 80% of the energy impacts are counted as program-induced and contribute to the program energy savings estimates. Self-selection bias and false response bias are then factored in to calculate the final estimated net impact.

Billing Analysis

This analysis presents the results of the billing analysis of the Ohio Home Energy House Call (HEHC) Program. This analysis relies upon a statistical analysis of actual customer billed energy (both electricity and natural gas) consumption before and after participation in the PER program to estimate the impact of the program. Table 1 presents the results of this billing analysis.

Table 1: Ohio HEHC Average Annual Savings: Billing Analysis versus Engineering Analysis

	Billing Analysis	Engineering Analysis
kWh	343	349
Therm	25	12

For this analysis, data are available both across households (i.e., cross-sectional) and over time (i.e., time-series). With this type of data, known as "panel" data, it becomes possible to control, simultaneously, for differences across households as well as differences across periods in time through the use of a "fixed-effects" panel model specification. The fixed-effect refers to the model specification aspect that differences across homes that do not vary over the estimation period (such as square footage, heating system, etc.) can be explained, in large part, by customer-specific intercept terms that capture the net change in consumption due to the program, controlling for other factors that do change with time (e.g., the weather).

Because the consumption data in the panel model includes months before and after the installation of measures through the program, the period of program participation (or the participation window) may be defined specifically for each customer. This feature of the panel model allows for the pre-installation months of consumption to effectively act as controls for post-participation months. In addition, this model specification, unlike annual pre/post-participation models such as annual change models, does not require a full year of post-participation data. Effectively, the participant becomes their own control group, thus eliminating the need for a non-participant group. We know the exact month of participation in the program for each participant, and are able to construct customer specific models that measure the change in usage consumption immediately before and after the date of program participation, controlling for weather and customer characteristics.

The fixed effects model can be viewed as a type of differencing model in which all characteristics of the home, which (1) are independent of time and (2) determine the level of energy consumption, are captured within the customer-specific constant terms. In other words, differences in customer characteristics that cause variation in the level of energy consumption, such as building size and structure, are captured by constant terms representing each unique household.

Algebraically, the fixed-effect panel data model is described as follows:

$$y_{it} = \alpha_i + \beta x_{it} + \varepsilon_{it},$$

where:

y_{it} = energy consumption for home i during month t
α_i = constant term for site i
β = vector of coefficients
x = vector of variables that represent factors causing changes in energy consumption for home i during month t (i.e., weather and participation)
ε = error term for home i during month t.

With this specification, the only information necessary for estimation is those factors that vary month to month for each customer, and that will affect energy use, which effectively are weather conditions and program participation. Other non-measurable factors can be captured through the use of monthly indicator variables (e.g., to capture the effect of potentially seasonal energy loads).

The effect of the program, in the case the Personal Energy Report kit as well as recommended measures, is done by including a variable which is equal to one for all months after the customer received the kit and the report. The coefficient on this variable is the savings associated with the kit. In order to account for differences in billing days, the usage was normalized by days in the billing cycle. The estimated electric model is presented in Table 2.[1]

[1] The model includes weather terms and monthly indicator terms as well as the terms presented in the variables presented in Table 1. These terms were not included in order make interpretation clearer.

Table 2: Estimated Electricity Model – dependent variable is daily kWh usage, January 2005 through April 2008.

Independent Variable	Coefficient	t-value
Indicator variable for months after participation in program	-0.938	-3.19
Sample Size	39,834 obs (1,006 homes)	
R-Squared	64%	

This estimated model shows that the HEHC program (both kits and recommended measures) results in an annual savings of 343 kWh. This estimate is fairly well estimated, with the 90% confidence interval extending from savings of 166 kWh to 519 kWh per year.

The natural gas model is presented in Table 3 below.

Table 3: Estimated Natural Gas Model – dependent variable is daily Therm usage, January 2005 through April 2008.

Independent Variable	Coefficient	t-value
Indicator variable for months after participation in program	-0.069	-2.20
Sample Size	37,281obs (975 homes)	
R-Squared	32%	

This estimated model shows that the HEHC program results in an annual savings of 25 Therms. This estimate has a 90% confidence interval extending from a savings of 6 Therms to 44 Therms.

Section 1: Use of the Kit

This section presents the energy impact approach and calculations for installation and use of the measures in the Energy Savings Kit that was distributed to all HEHC participants. Findings are estimated using the 100 survey responses extrapolated to the 1,181 participants of the Home Energy House Call Program.

Use of the Kit's Measures and Their Impacts

CFLs

The CFLs included in the HEHC kit were installed by more recipients than any other measure in the Energy Efficiency Starter Kit. 95% of the recipients installed the 15-watt CFL, and 91% of them installed the 20-watt CFL. Table 6 below shows a summary of the responses to the questions about the 15-watt CFL. The same information can be found in Table 7 for the 20-watt CFL.

Table 6. Frequency of Installation: 15-watt CFL

Installed 15w bulb	**Surveyed participants** (n=100)
Yes	95%
No	5%
Don't Know	0%
Plan to Install 15w bulb	
Yes	1%
No	3%
Don't Know	1%

Table 7. Frequency of Installation: 20-watt CFL

Installed 20w bulb	**HEHC participants surveyed** (n=100)
Yes	91%
No	7%
Don't Know	2%
Plan to Install 20w bulb	
Yes	0%
No	3%
Don't Know	2%

Using the information above and the algorithm for lighting impacts (which can be found in Appendix A), the estimate of savings for these 1,181 customers totals 12.55 kw and 148,470 kilowatt hours per year. However, the reduction in heat output from switching the incandescent to the CFL results in an increase in therm consumption of 220.9 therms per year total. Savings can be found in Table 8.

The savings per customer (as extrapolated from the surveyed participants) for either of the CFLs can also be found Table 8 below. For instance, each customer that installed the 15-watt CFL will save 69 kWhs per year (77,426.3 / 1,122 = 69.01). This is the average per customer savings. The real savings will of course depend on the other factors involved (the wattage of the bulb removed and hours of use). These hours of use data have been measured as part of the overall CFL analysis, and are reasonable to use and apply in this analysis.

Table 9 presents the impact estimates from the planned installations of the CFLs included in the kit. These savings may or not be realized, depending on whether the customers install the items.

Table 8. Impact Estimates from the Installation of the CFL Bulbs

	Estimated Number Installed	Total kW Savings	Total kWh Savings	Total Therm Savings
15-watt CFL	1122	6.397	77,426.3	-115.2
20-watt CFL	1075	6.153	71,043.8	-105.7
	Per Install →	Mean kW Savings	Mean kWh Savings	Mean Therm Savings
15-watt CFL		0.006	69.01	-0.1
20-watt CFL		0.006	66.09	-0.1

Table 9. Potential Impact Estimates from the Planned Installation of the CFL Bulbs

	Estimated Number Planning to Install	Total Potential kW Savings	Total Potential kWh Savings	Total Potential Therm Savings
15-watt CFL	12	0.101	1,222.5	-1.8
20-watt CFL	0	0.067	772.2	-1.1
Per Install (when done) →		Mean kW Savings	Mean kWh Savings	Mean Therm Savings
15-watt CFL		0.008	101.88	-0.15
20-watt CFL		!Zero Divide	!Zero Divide	!Zero Divide

Weather Stripping

Just over a third of the kit recipients (36%) installed the weather stripping. Given this level of installations, the savings for this measure are somewhat modest, Table 11 below shows the energy savings from these estimated 425 installations, with only 433 kilowatt hours and 8.5 therms saved per year.

Table 10. Frequency of Installation: Weather Stripping

Installed weather stripping	HEHC participants surveyed (n=100)
Yes	36%
No	39%

Don't Know	24%
Plan to install	
Yes	2%
No	35%
Don't Know	2%

Table 11. Impact Estimates from the Installation of the Weather Stripping

	Estimated Number Installed	Total kW Savings	Total kWh Savings	Total Therm Savings
Weather stripping	425	0.127	432.8	8.5
	Per Install →	**Mean kW Savings**	**Mean kWh Savings**	**Mean Therm Savings**
Weather stripping		0.0	1.02	0.02

Table 12. Potential Impact Estimates from the Planned Installation of the Weather Stripping

	Estimated Number Planning to Install	Total Potential kW Savings	Total Potential kWh Savings	Total Potential Therm Savings
Weather stripping	24	0.008	27.0	0.5
Per Install (when done) →		**Mean kW Savings**	**Mean kWh Savings**	**Mean Therm Savings**
Weather stripping		0.0	1.13	0.02

Outlet Gaskets

About half of the recipients installed the outlet gaskets. The kilowatt hour savings from this measure are 1,812 kWh annually.

Table 13. Frequency of Installation: Outlet Gaskets

Installed the gaskets on outlets	HEHC participants surveyed (n=100)
Yes	45%
No	46%
Don't Know	9%
Plan to install	
Yes	11%
No	28%
Don't Know	7%

Table 14. Impact Estimates from the Installation of the Outlet Gaskets

	Estimated Number Installed	Total kW Savings	Total kWh Savings	Total Therm Savings
Outlet gaskets	531	0.530	1,811.5	35.6
	Per Install →	Mean kW Savings	Mean kWh Savings	Mean Therm Savings
		0.001	3.41	0.07

Table 15. Potential Impact Estimates from the Planned Installation of the Outlet Gaskets

	Estimated Number Planning to Install	Total Potential kW Savings	Total Potential kWh Savings	Total Potential Therm Savings
Outlet gaskets	130	0.155	530.7	10.4
	Per Install →	Mean kW Savings	Mean kWh Savings	Mean Therm Savings
		0.001	4.08	0.08

Window Shrink Kit

Most of the kit recipients did not install the window film shrink kit. Only 5% of the population installed this measure.

Table 16. Frequency of Installation: Window Film Shrink Kit

Installed window shrink kit	HEHC participants surveyed (n=100)
Yes	5%
No	66%
Don't Know	29%
Plan to install	
Yes	2%
No	57%
Don't Know	7%

With the low numbers of installations combined with the fact that the PER study (conducted on the same set of measures) found that 38% of the kits were installed on double-pane windows, the savings for this measure are also quite low.

Table 17. Impact Estimates from the Installation of the Window Film Shrink Kit

	Estimated Number Installed	Total kW Savings	Total kWh Savings	Total Therm Savings
Window shrink kit	59	0 144	7,019 6	92 9
	Per Install →	Mean kW Savings	Mean kWh Savings	Mean Therm Savings
		0.002	118.98	1.57

Table 18. Potential Impact Estimates from the Planned Installation of the Window Shrink Kit

	Estimated Number Planning to Install	Total Potential kW Savings	Total Potential kWh Savings	Total Potential Therm Savings
Window shrink kit	24	058	1,979.9	26.2
	Per Install →	Mean kW Savings	Mean kWh Savings	Mean Therm Savings
		0.002	82.5	1.09

Low-Flow Showerhead

A high percentage (41%) of the kit recipients installed the low-flow showerhead, with the resulting gross energy savings being high as well. Total energy savings are over 172,000 kilowatt-hours and over 8,000 therms annually.

Table 19. Frequency of Installation: Low-Flow Showerhead

Installed the showerhead	HEHC participants surveyed (n=100)
Yes	41%
No	54%
Don't Know	4%
Plan to install	
Yes	6%
No	42%
Don't Know	6%

Table 20. Impact Estimates from the Installation of the Low-Flow Showerhead

	Number Installed	Total kW Savings	Total kWh Savings	Total Therm Savings
Showerhead	579	18.879	172,266.5	8,399.2
	Per Install →	Mean kW Savings	Mean kWh Savings	Mean Therm Savings
		0.033	297.52	14.51

Table 21. Potential Impact Estimates from the Planned Installation of the Low-Flow Showerhead

	Estimated Number Planning to Install	Total Potential kW Savings	Total Potential kWh Savings	Total Potential Therm Savings

Showerhead	71	3.951	36,055.8	1,758.0
	Per Install →	**Mean kW Savings**	**Mean kWh Savings**	**Mean Therm Savings**
		0.056	507.83	24.76

Faucet Aerators

The customers are somewhat likely to install the faucet aerators included in the Energy Efficiency Starter Kit. Less than half of the kit recipients installed both of the aerators.

Table 22. Frequency of Installation: Bathroom Faucet Aerator

Installed the bathroom aerator	**HEHC participants surveyed** (n=100)
Yes	36%
No	54%
Don't Know	10%
Plan to install	
Yes	2%
No	45%
Don't Know	6%

Table 23. Frequency of Installation: Kitchen Faucet Aerator

Installed the kitchen aerator	**HEHC participants surveyed** (n=100)
Yes	46%
No	47%
Don't Know	6%
Plan to install	
Yes	3%
No	40%
Don't Know	4%

The energy impacts for this measure are in the table below, and indicate overall savings of over 500 kilowatt hours per year and 1,700 therms per year.

Table 24. Impact Estimates from the Installation of the Bathroom and Kitchen Faucet Aerators

	Number Installed	**Total kW Savings**	**Total kWh Savings**	**Total Therm Savings**
Bathroom aerator	425	0.003	229.1	803.8
Kitchen aerator	543	0.003	273.8	960.6
	Per Install →	**Mean kW Savings**	**Mean kWh Savings**	**Mean Therm Savings**
Bathroom aerator		0.0	0.54	1.89
Kitchen aerator		0.0	0.5	1.77

Table 25. Potential Impact Estimates from the Planned Installation of the Faucet Aerators

	Estimated Number Planning to Install	Total Potential kW Savings	Total Potential kWh Savings	Total Potential Therm Savings
Bathroom aerator	24	0.000	27.9	98.0
Kitchen aerator	35	0.000	27.9	98.0
	Per Install →	Mean kW Savings	Mean kWh Savings	Mean Therm Savings
Bathroom aerator		0.0	1.16	4.08
Kitchen aerator		0.0	0.8	2.8

All Kit Measures

The Energy Efficiency Starter Kit is a kit of 8 energy efficient measures. The tables below show the relative "popularity" of each of the items for the recipients of the kits and the total savings for each of the measures based on those surveyed customers that indicated they installed the measure or plan to install the measure.

The CFLs are the most likely measure to be installed, with the kitchen aerator and outlet gaskets coming in second. Given the past responses from the PER evaluation in 2007, the customer-indicated behaviors and changes (such as number of showers, wattage of bulb replaced, etc.) means that the showerhead provides a greater amount of savings than the CFLs.

Table 26 below presents the estimated savings when the percent installation is applied to the total program population of 1,181. The total savings from those that received the kits and were randomly selected for the survey is estimated to be 330,503 kilowatt-hours and 10,080 therms annually. The kilowatt impact of the kits is estimated to be 32.235.

Table 26. Summary of Total Savings for All Installed Measures

Kentucky Kits	Installed	Plan to Install	Total kW savings	Total kWh savings	Therm savings
15-watt CFL	1122	12	6.397	77,426.3	-115.2
20-watt CFL	1075	59	6.153	71,043.8	-105.7
Weather stripping	425	24	0.127	432.8	8.5
Outlet gaskets	531	130	0.530	1,811.5	35.6
Window shrink kit	59	24	0.144	7,019.6	92.9
Showerhead	484	71	18.879	172,266.5	8,399.2
Bathroom aerator	425	24	0.003	229.1	803.8
Kitchen aerator	543	35	0.003	273.8	960.6
Total Savings			**32.235**	**330,503.4**	**10,079.8**

Table 27 below shows the mean savings per measure installed. To obtain these values, the total savings for each measure was divided by the total installations, resulting in a "per install" savings value. If a customer were to install each of the measures in the kit, the "Mean Total" amount at the bottom of each table would be the average energy savings based on the responses of that group.

Table 27. Summary of Mean Savings for All Measures

Kit Measures	Mean kW per install	Mean kWh per install	Mean Therms per install
15-watt CFL	0.006	69.01	-0.1
20-watt CFL	0.006	66.09	-0.1
Weather stripping	0.0	1.02	0.02
Outlet gaskets	0.001	3.41	0.07
Window shrink kit	0.002	118.98	1.57
Showerhead	0.033	297.52	14.51
Bathroom aerator	0.0	0.54	1.89
Kitchen aerator	0.0	0.5	1.77
Mean Total Savings, if all measures installed	**0.048**	**557.07**	**19.63**

Savings Distributions

There are some risks associated with relying on self-reported behavioral changes, because the foundation of the savings estimates are based solely on the participant's responses, with no means to verify that the respondent has installed the kit's measures and is using them effectively. There are two main sources of bias with these types of surveys that directly impact the conclusions drawn from the responses. These sources of bias are Self-Selection Bias and False Response Bias. There is also an issue regarding the accuracy of the baseline energy use conditions used by the evaluation contractor to estimate savings in that many of these conditions need to be based on assumptions about the participant population, rather than on measurements. These three conditions impact the evaluation contractor's ability to provide accurate estimates of energy impact. These issues are discussed in more detail in the following paragraphs.

Self-Selection Bias

For this evaluation, we are using the self selection bias value of 29.9%. This value was estimated during the previous PER evaluation and is likely applicable for the HEHC study as well. The self-selection bias applied in this study is described below and is taken from the text of the PER evaluation report.

PER Self-Selection Bias

The survey was sent to 5,401 PER Program participants – 3,562 customers that did not receive the kit, and 1,839 customers that did receive the Energy Efficiency Starter Kit. The data collection efforts resulted in 1,879 responses from PER participants who only received the PER (response rate = 52.8%), and 741 responses (response rate = 40.3%) from Kentucky PER participants who received the Energy Efficiency Kit. The people that filled out and returned the survey are the participants that are more likely to install measures from the Energy Efficiency Kit and consider taking actions based on the recommendations from the Personalized Energy Report. That is, they self-selected themselves to return the survey because they have a higher interest in the subject matter than the people who did not. These individuals also will often respond to a survey in order to let it be known that they did the right thing, and that they are taking steps to be more energy efficient. The customers that did not return the survey are more likely to have a lower interest in the subject matter, and are less likely to take actions. Thus, the people who returned the survey are not the typical participant, but rather are the participant that is more likely to take actions. With 47.2% of the PER group and 59.7% of the Kit group not responding, we are setting the self-selection bias used to estimate the potential range of impacts at half of the non-response rate. As a result, all estimated energy impact estimates will be discounted 29.9%[2] for customers that received the Energy Efficiency Kit and the Personalized Energy Report, and 23.6% for those that only received the Personalized Energy Report. All impact estimates will be discounted by this percentage in order to calculate the low end of the range of savings estimates for each measure and recommendation to adjust for self-selection bias. The adjustment approach is an estimate because there is no way to assign an adjustment factor for the survey without on-site verification efforts to establish a reliable bias factor. We set the factor at

[2] (59.7% response rate / 2 = 29.9% self-selection rate)

half of the non-response rate based on professional judgment from conducting surveys and metering studies of energy efficiency programs for over 28 years and interacting with the evaluation community regarding reasonable expectations and experience.

False Response Bias

False Response Bias is a problem with many self-reporting surveys. The participants respond not with the truth, but with the socially acceptable answer. In short, they lie about what measures they installed or what actions they have taken as a result of the Home Energy House Call program. False response bias is typically not a high number, but ranges from a low of two or three percent to a high of 15 percent in our experience, depending on the topic and the population being tested. The False Response Bias is set at 10% for this survey, unless otherwise indicated. A 10% discount will be applied to all impact-related measure estimates to calculate the low end of the range of savings estimates for each measure and recommendation.

Baseline Energy Use Assumptions

When a mail survey is used to conduct an evaluation, the evaluation contractors are unsure of the actual conditions in the home that have experienced a change. For example, while a new showerhead may have been installed, it is impossible to estimate precise savings unless the flow rates and use conditions associated with the previous showerhead are well understood. For this study we established our baseline assumptions based on the survey results and our past research and experience with programs and program evaluations that have taken measurements of baseline conditions. We have also used housing-type computer models to estimate baseline conditions and behaviors. As a result, we are not adjusting the baseline conditions applied in this study based on on-site pre-program inspections, but rather we are using the survey results, the literature, our past research and field experience to set what we think are typical baseline conditions. However, because these are not program-participant measured baseline conditions, it is important to let the reader know that the baselines used in this study are estimated.

Level of Discounting for False Response Bias

The level of discounting used to determine the ranges for each of the measures and recommendations can be found in the table below. The self-selection bias discount factor for all measures for HEHC is 29.9%.

Measure	False Response Bias
CFLs	10%
Weatherstripping	10%
Outlet gaskets	10%
Window shrink kit	10%
Showerhead	20%
Aerators	20%

Section 2: Savings Estimates

Each of the Kit measures' savings are recalculated here in order to provide probable ranges of energy savings associated with each item. The tables below provide the gross energy savings (as extrapolated to the whole population and reported above), the savings after the self-selection bias and false reporting bias are factored in, and then the net savings which factors in freeridership using the estimates adjusted for the biases.

Table 28. Kentucky Participants' Range of Kilowatt Savings – Installed Items

Measure	Total kW Savings		
	Self-Selection and False Response	Unadjusted Gross Savings	Net Savings
15-watt CFL	3.845	6.397	3.768
20-watt CFL	3.698	6.153	3.624
Weatherstripping	0.076	0.127	0.065
Outlet gaskets	0.319	0.530	0.328
Window shrink kit	0.087	0.144	0.086
Showerhead	9.458	18.879	9.506
Bathroom aerator	0.002	0.003	0.001
Kitchen aerator	0.002	0.003	0.001

Table 29. Kentucky Participants' Range of Kilowatt-Hour Savings – Installed Items

Measure	Total kWh Savings		
	Self-Selection and False Response	Unadjusted Gross Savings	Net Savings
15-watt CFL	46,533.2	77,426.3	45,601.8
20-watt CFL	42,697.3	71,043.8	41,842.7
Weatherstripping	260.1	432.8	223.0
Outlet gaskets	1,088.7	1,811.5	1,121.4
Window shrink kit	4,218.8	7,019.6	4,197.7
Showerhead	86,305.5	172,266.5	86,737.0
Bathroom aerator	114.8	229.1	108.5
Kitchen aerator	137.2	273.8	129.6

Table 30. Kentucky Participants' Range of Therm Savings – Installed Items

Measure	Total Therm Savings		
	Self-Selection and False Response	Unadjusted Gross Savings	Net Savings
15-watt CFL	-69.2	-115.2	-67.8
20-watt CFL	-63.5	-105.7	-62.3
Weatherstripping	5.1	8.5	4.4
Outlet gaskets	21.4	35.6	22.0
Window shrink kit	55.8	92.9	55.6
Showerhead	4,208.0	8,399.20	4,229.0
Bathroom aerator	402 7	803.8	380.6

Kitchen aerator	481.3	960.6	454.8

Table 31, Table 32, and Table 33 below present the potential gross and net savings from the program if those that indicated they planned to install the item do indeed install the item.

Table 31. Kentucky Participants' Range of Kilowatt Savings – Planned Items

Measure	Total kW Savings		
	Self-Selection and False Response	Unadjusted Gross Savings	Net Savings
15-watt CFL	0.061	0.101	0.059
20-watt CFL	0.040	0.067	0.039
Weatherstripping	0.005	0.008	0.004
Outlet gaskets	0.093	0.155	0.096
Window shrink kit	0.703	1.170	0.699
Showerhead	1.980	3.951	1.990
Bathroom aerator	0.000	0.000	0.000
Kitchen aerator	0.000	0.000	0.000

Table 32. Kentucky Participants' Range of Kilowatt-Hour Savings – Planned Items

Measure	Total kW Savings		
	Self-Selection and False Response	Unadjusted Gross Savings	Net Savings
15-watt CFL	734.7	1,222.5	720.0
20-watt CFL	464.1	772.2	454.8
Weatherstripping	16.3	27.0	13.9
Outlet gaskets	318.9	530.7	328.5
Window shrink kit	1,189.9	1,979.9	1,184.0
Showerhead	18,063.9	36,055.8	18,154.3
Bathroom aerator	14.0	27.9	13.2
Kitchen aerator	14.0	27.9	13.2

Table 33. Kentucky Participants' Range of Therm Savings – Planned Items

Measure	Total kW Savings		
	Self-Selection and False Response	Unadjusted Gross Savings	Net Savings
15-watt CFL	-1.1	-1.8	-1.1
20-watt CFL	-0.7	-1.1	-0.7
Weatherstripping	0.3	0.5	0.3
Outlet gaskets	6.3	10.4	6.5
Window shrink kit	15.7	26.2	15.7
Showerhead	880.7	1,758.0	885.2
Bathroom aerator	49.1	98.0	46.4
Kitchen aerator	49.1	98.0	46.4

Effective Useful Lifetime Impact Estimates

In order to calculate the estimated energy impacts over the lifetime of the measures of the kit, we used the following life-spans for each of the measures.

Kit Measures	Effective Useful Life
15-watt CFL	5
20-watt CFL	5
Weather stripping	5
Outlet gaskets	20
Window shrink kit	1
Showerhead	10
Bathroom aerator	10
Kitchen aerator	10

The peak program kilowatt impact of the installed measures in the kit remains high for the first five years at 17 kW, then, in year 6 the savings drop to about 10 kW. Then in year 11, kW savings drop to less than 0.5 kW for the remainder of the 20 year period.

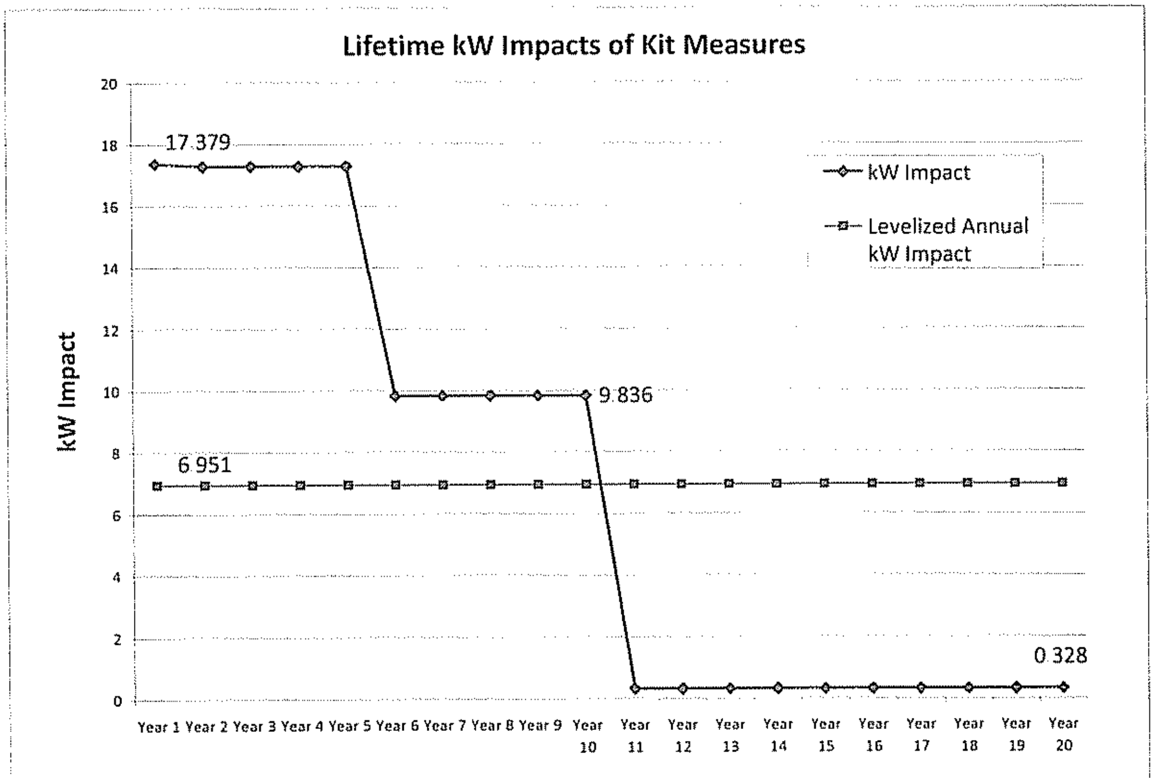

Figure 1. Lifetime kW Impacts of Kit Measures

The figure below presents the kilowatt hour savings that can be expected over the next 20 years based on the effective useful life of the installed measures. For the first five years, annual savings are close to 180,000 kilowatt hours for the 1,181 participants of the HEHC program. By year six, the savings drop to 88,000 kWhs, and in years eleven through twenty, annual kWh savings from the kit are just over 1,000 kWhs per year. The total kWh savings over the next twenty years for these 1,181 participants is 1,334,714 kWhs, a mean of 1,130 kWhs per participant.

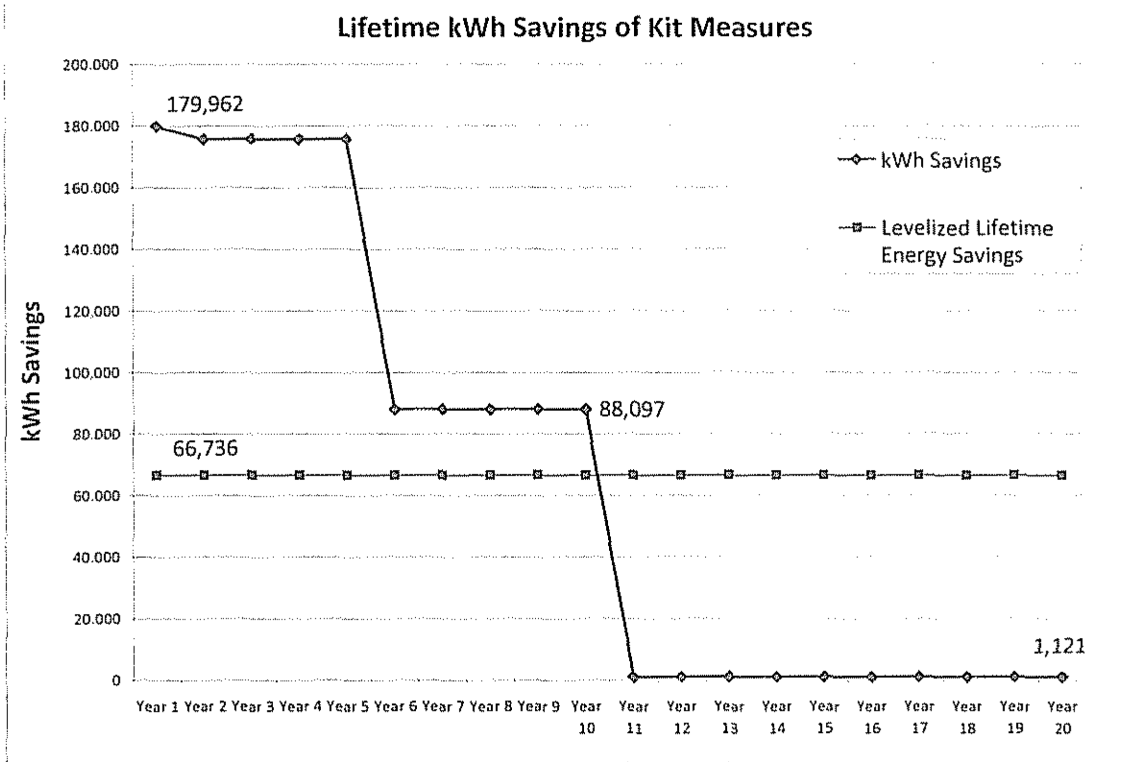

Figure 2. Lifetime kWh Savings of Kit Measures

The figure below presents the therm savings that can be expected over the next 20 years based on the effective useful life of the installed measures. For the first five years, annual savings are just over 5,000 therms for the 1,181 participants of the HEHC program. By year six, the savings increase slightly because the negative effect on natural gas usage caused as the gas impacts from CFLs use drops out of the equation (this assumes that the program is not the cause of continued CFL use), and in years eleven through twenty, annual therms drop drastically down to 22 therms per year. The total therm savings over the next twenty years for these 1,181 participants is 50,511 kWhs, a mean of 43 therms per participant. If the program causes the participant to permanently move to CFL use, the savings will continue. This savings would be market transformation savings and are not counted in this evaluation. As a result, these savings are less than what can actually be expected.

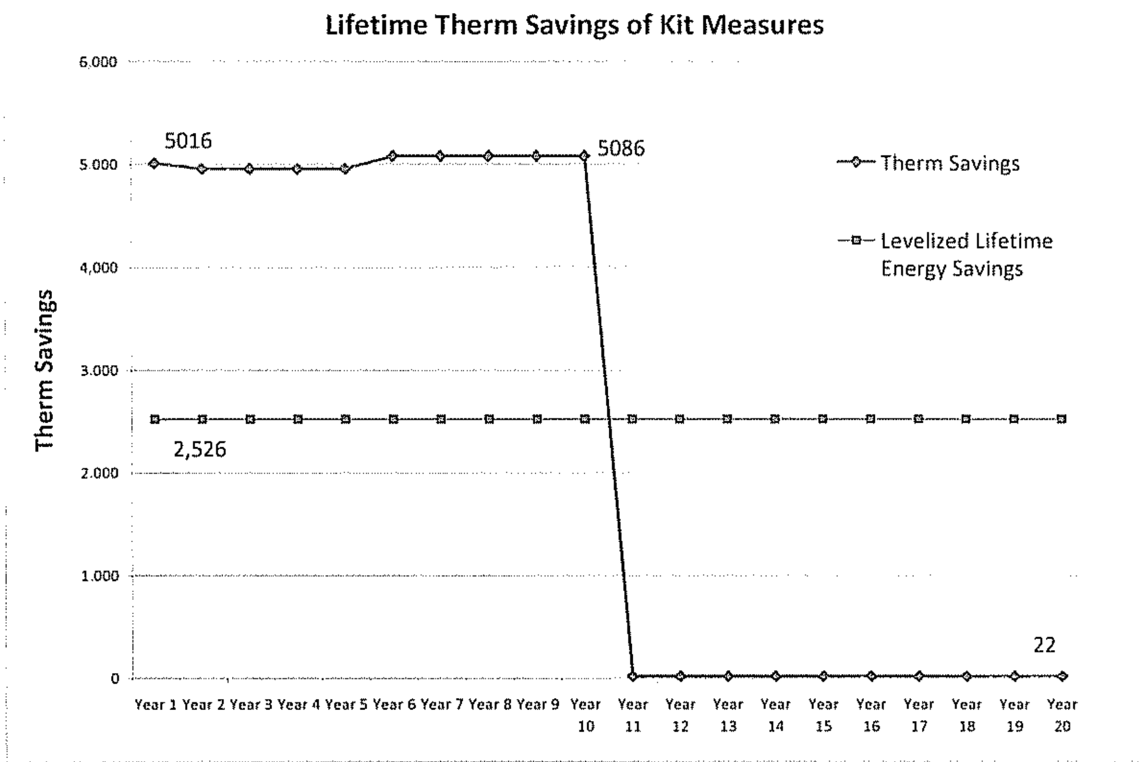

Figure 3. Lifetime Therm Savings of Kit Measures

Audit Freeridership

The Home Energy House Call audit did not have any freeridership. To calculate freeridership, we used the following table:

Considering an audit before the program?	if not available through the program, would you still have purchased an audit?	If yes, would you have purchased it within a year?	% Freeridership
yes	yes	yes	100
yes	yes	no	50
yes	yes	don't know	25

None of the 100 participants surveyed answered the above questions with a series of responses that resulted in a value other than zero.

Savings from Audit Recommendations

The participants of the Home Energy House Call Program each received an audit of their home followed up by a customized audit report with specific recommendations for improvements to their home that would increase their home's energy efficiency. In this section, we present the recommendations as they were reported to us by the random sample of 100 participants contacted during the telephone survey. As noted in the Methodology section above, we first asked them what, if any, improvements they made to their home. We then ask if this was a recommendation that was in the audit report. If they said that yes, it was in the audit report, we ask how influential the recommendation in the audit report was to their decision to install the item on a scale of 1 to 10.

Savings were calculated using engineering algorithms that can be found in Appendix A: Impact Algorithms Used. The gross savings are adjusted for the influence factor. For example, if they said that the influence of the audit report was a 10 on the scale, full energy impacts are presented. If they reported that the audit report had an influence factor of 8, then 80% of the energy impacts are presented and used to estimate energy savings resulting from the program. .

Table 34 below describes the actions taken by each of the respondents who indicated they took an action because of the recommendation in the audit report, the impact metrics used in calculated estimated savings, the influence factor as reported by the participant, and the program's adjusted net energy impacts without survey bias and false response adjustments.

Table 34. Actions Taken Because of the Audit Report and Net of Influence Energy Impacts

Respondent	Action Taken	Location	Algorithm Used	Influence	kW	kWh	Therms
1	Triple pane windows	home	High performance window	8	0.165	181.2	-5.5
	Insulated door	home	Weather Stripping, 24ft^2	8	0.006	22.9	0.5
4	Hot water pipe insulation	basement	Pipe Wrap	10	0.191	868.1	100.0
5	Wrapped water heater	basement	Insulated water heater	9	0.142	478.2	23.3
6	New doors	home	Weather Stripping, 24ft^2	5	0.011	18.4	0.2
11	Washer	laundry	washer	7	0.080	191.7	2.7
13	New door	home	Weather Stripping, 24ft^2	9	0.020	33.1	0.4
13	Air conditioner	outside	New AC	9	0.820	1237.6	0
17	Insulation	garage	Side wall insulation, 120ft^2	5	0.019	48.1	9
17	Insulation	attic	Attic insulation	5	0.098	172.8	2.7
20	Caulking	windows	Window shrink kit	8	0.130	220.5	2.9
21	Hot water pipe insulation	basement	Pipe Wrap	10	0.191	868.1	100.0
22	Refrigerator	kitchen	New refrigerator	6	0.126	905.0	-1.2
25	Hot water heater blanket	basement	Insulated water heater	10	0.158	531.3	25.9
26	Hot water pipe insulation	basement	Pipe Wrap	9	0.172	781.3	90.0
27	Garage Seal	garage	Weather Stripping, 36ft	10	0.008	27.5	5
29	Insulation	attic	Attic insulation	10	0.196	345.5	5.3
Total for Sample of 100 Participants					2.533	6,931.3	348.6
Mean per Participant					0.025	69.3	3.5

Total if Extrapolated to Population of 1,181 Participants	29.9	81,859	4,117

The audit recommendations resulted in an estimated net of influence savings (adjusted for influence of the audit report) of 81,859 kWhs and over 4,000 therms when the results are extrapolated to the HEHC population.

The following presents the effective useful life and false response bias that need to be applied to these estimates.

Table 35. Effective Useful Life and False Response Bias for Audit Recommendations

	Effective Useful Life (Years)	False Response Bias
Attic insulation	20	50%
basement wall insulation	20	50%
Dishwasher	9	50%
Dryer	11	50%
Duct insulation	20	50%
Duct repair	18	50%
Fireplace closure	5	50%
High performance window	20	50%
Insulated water heater	15	50%
New AC	15	50%
New furnace	20	50%
New heat pump	15	50%
New refrigerator	12	50%
Pipe Wrap	12	10%
setback thermostat	11	50%
Side wall insulation	20	50%
Washer (clothes)	12	50%
Weather Stripping	5	50%
Window shrink kit	1	50%

After the self-response bias (discussed in Self-Selection Bias section on page 23) and the above factors are applied, the total net energy impacts can be estimated.

The kilowatt impacts of the audit recommendations over their effective useful lives are presented in Figure 4 below. The impact of the installed audit recommendations drop to about half of the first year impact after 13 years.

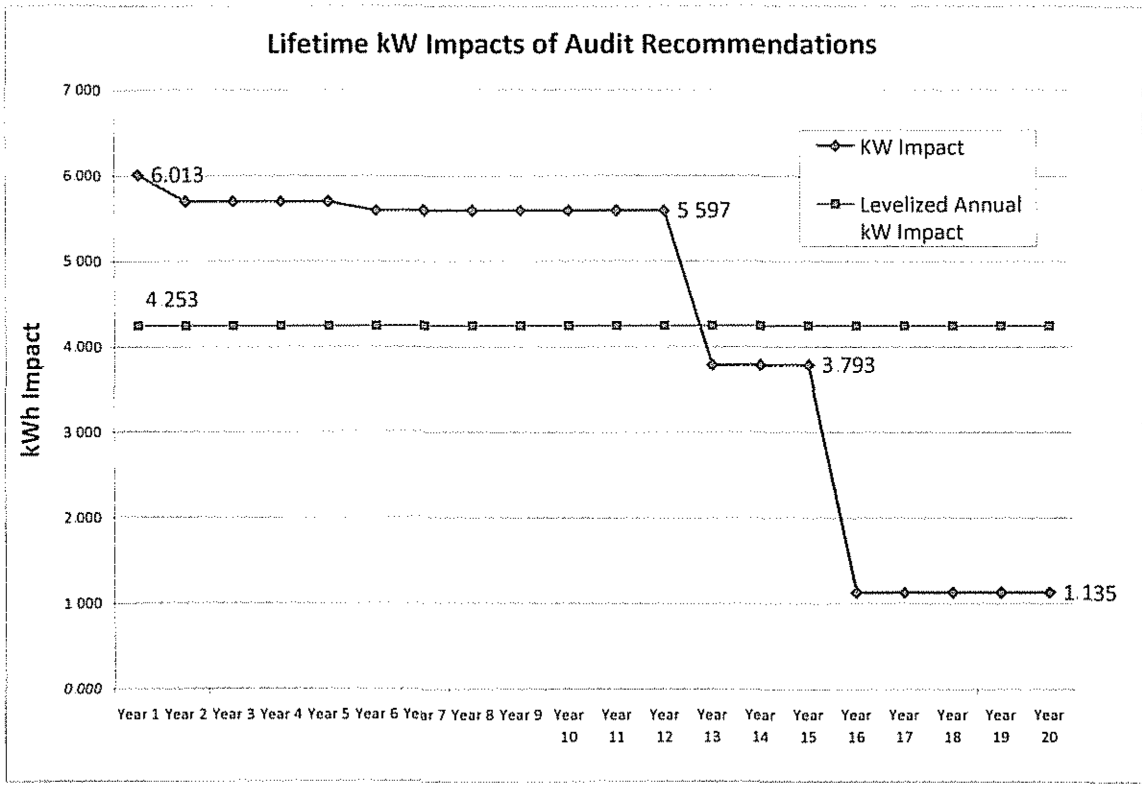

Figure 4. Lifetime kW Impacts of Audit Recommendations

The lifetime kilowatt-hour impacts are presented in Figure 5 below. The total and final net savings (net of influence, self-selection, and false-response) over the next 20 years for these installed audit recommendation is 220,192 kWhs.

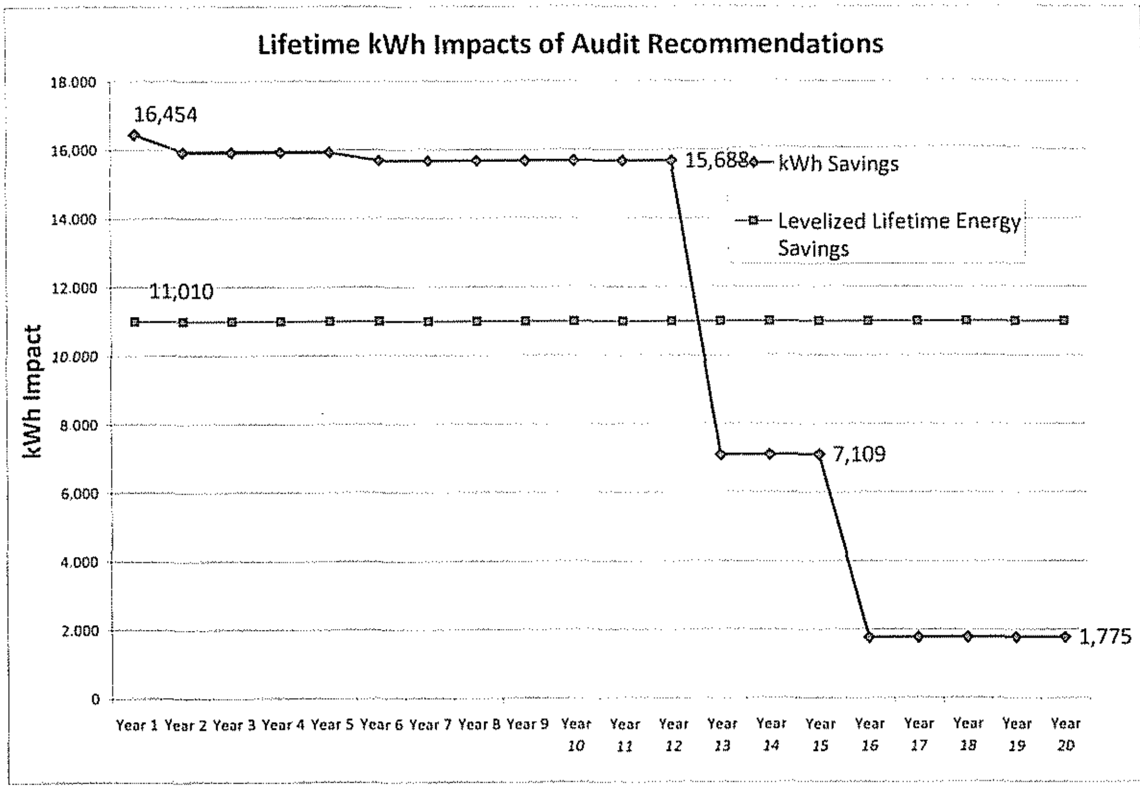

Figure 5. Lifetime kWh Savings of Audit Recommendations

Annual therm savings take a steep drop from 817 to 125 annual therms after twelve years, as presented below in Figure 6 below. However, the total net savings over the next twenty years for the installed measures recommended by the HEHC audit is 10,243 therms.

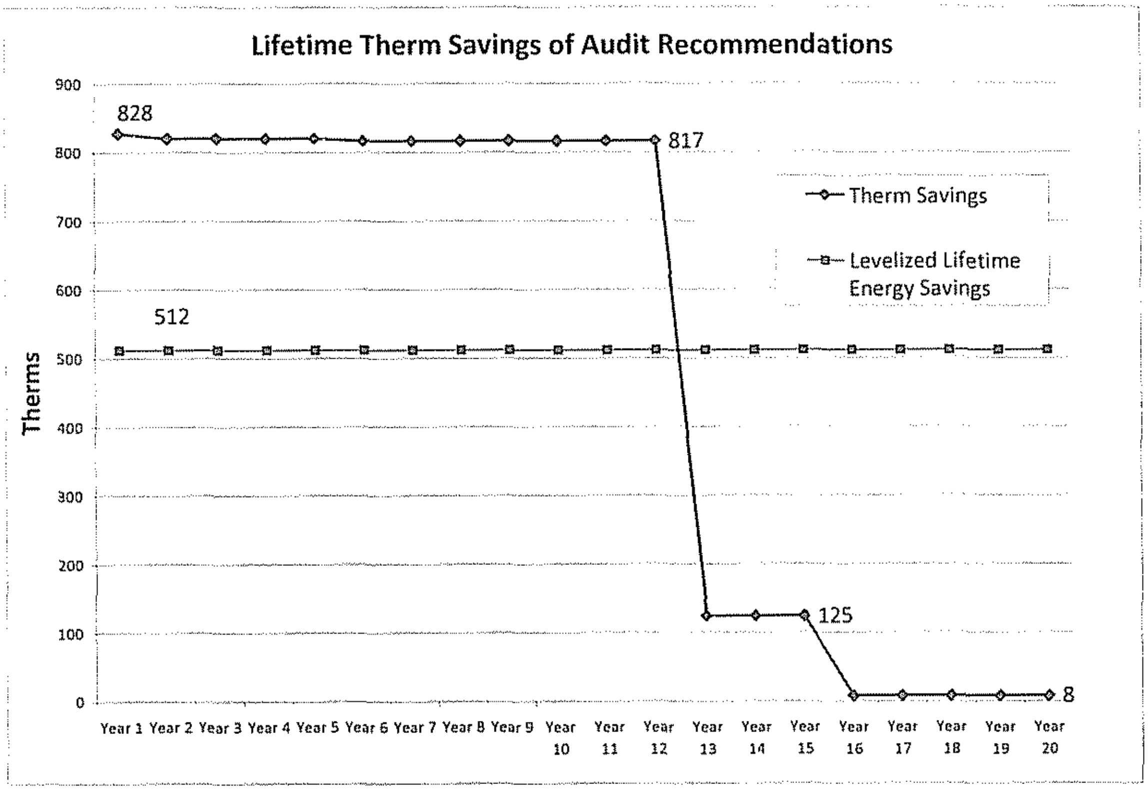

Figure 6. Lifetime Therm Savings of Audit Recommendations

Section 3: Program Operations and Customer Satisfaction

The program manager of Home Energy House Call was interviewed in July of 2008. The 100 customer surveys were performed in June-August of 2008. The interview protocol used during these interviews can be found in Appendices B and C. The results of the process interviews are report by the response categories presented below.

Program Objectives

One of the objectives of the HEHC Program is to raise customer awareness about how they use energy and to help them understand how they can affect their own bill with low cost or no cost actions, and that they can influence the environment with their activities.

This objective is being met, as customers are aware and they realize that taking the actions recommended by the audit and using the items in the kit do work to lower their energy consumption. However, according to a program manager, the level of detail provided by the auditors could be enhanced. Some auditors are better than others in the level of detail provided. In the interviews they are supposed to ask customers about "areas of concern" in their home, but sometimes they do not ask about it, or follow up on it because they forget, don't have time, or don't have the necessary knowledge to help address the issue.

A third-party contractor performs the audits. In order to minimize costs they allow 1 hour per audit and schedule 6 audits in a day. This schedule allows little time to move beyond a set of highly regimented activities, with little time for effectively communicating a complex message to customers. However, the program provides this service at no cost to the participant. As a result, the program does provide value to the participants and this value is recognized by a very high level of participant satisfaction with the program and the services provided.

From a cost effectiveness perspective, in which the program is to acquire energy savings below the avoided cost-of-supply option, the program is limited in the amount of service it can provide. Electricity (non-gas) customers have a small savings potential, providing little room for expanded services. As a result, the primary focus is on Duke's electric heat customers, or ones that use a significant amount of air conditioning (>12,000 kWh in the summer).

Program Operations

A third party contractor (GoodCents) implements the program currently. This includes operating the call center, hiring and training the auditors. The contractor has all the necessary software to collect and process the on-site audit information and translate the data into a custom report for the customers.

The program manager makes sure that the team is meeting expectations, conducts mock trainings, and sets up the on-sites visits for the auditors.

In conjunction with the contractor, the Duke program manager develops an annual marketing strategy. The marketing approach is organized by zip code targeting customers that have both electric and gas service from Duke or, in electric only territories, have high AC use in the summer.

The program enjoys a lot of media attention, especially in the fall and spring. The program manager assures that the information released about the program is accurate, coordinating messages with the contactors ability to serve.

The program has introduced the energy efficiency starter kits as a give-a-way item with the receipt of the audit. If requested, the auditor will install the items in the kit, but focuses on installing the CFL bulbs to make sure the savings are achieved.

Once the audit is completed, the report is developed and reviewed by the contractor and then mailed to the participant. The implementer reports program accomplishments and counts to Duke on a weekly basis.

Duke Energy performs periodic follow-ups and site verifications with the auditors, with assistance by Morgan Marketing Partners. There have been some adjustments to the program implementation approach as the program moved from the past contractor to a new provider (WECC).

Auditor Training

The contract calls for the implementers to train their auditors. The auditors receive one week of classroom training before they accompany a fully trained and experienced auditor for 2-3 weeks. The implementer wants to get their newly training auditing staff into the field as quickly as possible. However, in some cases auditors have gone to the field before they are fully trained. These auditors have needed additional training or coaching to develop the skills necessary to address the issues that will come up in any given house. The new contact with WECC may solve this issue by using only HERS certified raters to conduct the audits.

Implementation Changes

With the new implementation contactor moving to WECC, changes to the program are being planned. One of these changes is to make the HEHC report more user friendly and better able to convey the energy savings opportunity message to the participants. An additional change being planned is a shorter turn-around time between the audit and the delivery of the report.

Program Design

The current Home Energy House Call program was designed with input from Niagara Consulting (who helped design of the energy efficiency starter kit). Mr. Rick Morgan of Morgan Marketing Partners assists with quality review and auditor training planning. Internal Duke staff helps with the development of the marketing information and manage the impact evaluation efforts.

Possible Program Improvements

The incorporation of more technologies like blower door testing or infrared imaging would help customers 'see' the energy saving opportunities; however this service is costly and could harm the participation rate and interest in the program by making it overly costly. Within the current program participants can request a blower door assessment for a cost of $125. To date, only one home has requested that test since the program started in 2003. However, as energy, energy costs and environmental issues gain in importance; more customers may be interested in this service.

Having PCs in the field with the auditors will allow them to upload and process the audit information in a more efficient manner, which will allow the reports to be delivered to the participant in a timelier manner. However, this may also be cost-prohibitive.

Participant Satisfaction Survey

One hundred of the 1,181 participants were selected at random for a telephone survey about the Home Energy House Call Program. The survey can be found in Appendix C: Participant Survey Protocol and the results of the survey are presented below.

Motivating Factors

The primary factor for participation is the customer's desire to reduce energy costs. Seventy-four percent provided this response as their primary motivating factor. The second most popular response (34% responding) was that they wanted to receive an energy audit of their home.

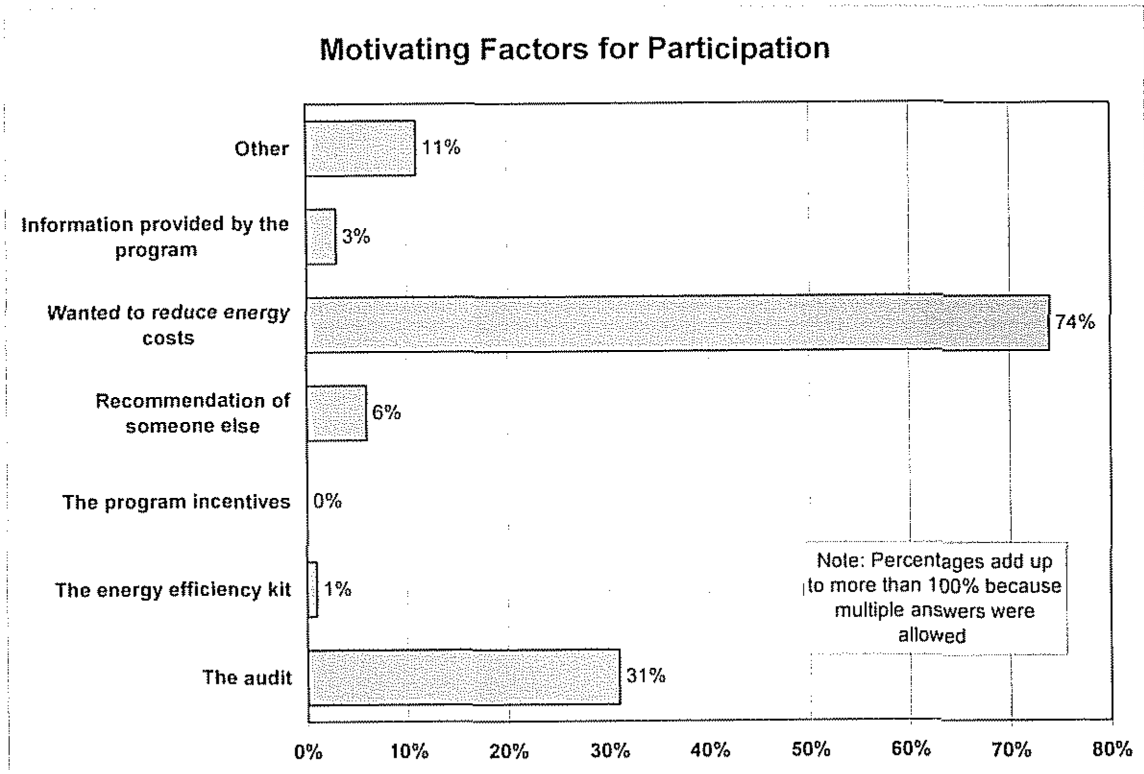

Figure 7. Motivating Factors for HEHC Participants

Audit Consideration

Only 19% of the surveyed participants were considering an audit of their home before enrolling in the program, but only 9% would have purchased one if they wouldn't have received one from through the program.

	Yes	No	DK/NS
Considered before HEHC	19	77	4
Purchased without HEHC	9	69	22
Purchased within a year without HEHC	3	1	5

However, as noted in Audit Freeridership on page 29, there is no freeridership associated with the home energy audit. The reason for this is that none of the 100 participants surveyed answered the series of questions with responses that resulted in a value other than zero.

Energy Efficiency Purchases Since Enrollment in HEHC

Of the 100 participant surveyed, 29 indicated that they have made additional energy efficient upgrades since their enrollment in the HEHC program. These purchases are summarized in the table below.

The table shows that of the 44 improvements made by these 29 participants, 17 of them were suggested in the home audit report, and 19 were not suggested by the audit report. While the audit helps them make energy efficiency decisions, it is not the source of all of their energy efficiency actions. In order to gauge the influence of the audit in the actions taken by each home, we asked participants to rate the importance of the audit in their decision to take an action. The influence column presents the value associated with HEHC's influence on the decision to install the measure indicated. On a scale of 1 to 10, with 10 indicating that the decision was made with a very strong influence by their participation in the program, the mean response was 6.7, indicating that in many cases the program had an influence on the participant's decision to move forward and install energy efficient measures.

Respondent	Action Taken	Location	Suggested In Audit?			How do you know it's efficient?	Influence
			Yes	No	DK/NS		
1	Triple pane windows	home	X			Energy star rated	8
	Insulated door	home	X			Energy star rated	8
2	Furnace	basement		X			1
3	Smart strips	home		X		Turns off equipment when not used	6
4	Hot water pipe insulation	basement	X			Made for that purpose	10
5	Wrapped water heater	basement	X			Energy star rated	9
6	New doors	home	X			Energy star rated	5
7	Insulation	home			X	Energy star rated	6
	Refrigerator	kitchen		X		Energy star rated	6
	Stove	kitchen		X		Energy star rated	6
	Dishwasher	kitchen		X		Energy star rated	6
8	New window	home			X	Energy star rated	6
9	Insulation	home			X		5
10	Insulation	attic		X		Energy star rated	
11	Washer	laundry	X			Energy star rated	7
12	Washer	laundry		X		Energy star rated	4
	Dryer	laundry		X		Energy star rated	4
13	New door	home	X			Energy star rated	9
	Air conditioner	outside	X			Energy star rated	9
14	Washer	laundry		X		Energy star rated	5
	Water heater	basement		X		Energy star rated	5

	Refrigerator	kitchen		X		Energy star rated	5
15	Water heater	basement		X		Energy star rated	1
16	Insulation	attic			X	Energy star rated	10
	Pipe insulation	basement			X	Energy star rated	10
17	Insulation	garage	X			Energy star rated	5
	Insulation	attic	X			Energy star rated	5
18	Furnace	basement		X		Energy star rated	8
19	Caulking	foundation			X		1
20	Caulking	windows	X			Recommendation of auditor	8
21	Hot water pipe insulation	basement	X			Recommendation of auditor	10
22	Refrigerator	kitchen	X			Energy star rated	6
	Washer	laundry		X		Energy star rated	6
	Dryer	laundry		X		Energy star rated	6
23	Air conditioner	outside		X		15 years newer than old one	1
24	Ventilation	attic			X		7
25	Hot water heater blanket	basement	X			Energy star rated	10
26	Hot water pipe insulation	basement	X			Energy star rated	9
27	Garage Seal	garage	X			Recommendation of auditor	10
	Pipe flashing	roof		X		Said energy saving on packaging	10
28	Furnace	basement		X		Energy star rated	7
	Air conditioner	outside		X		Energy star rated	7
29	Insulation	attic	X			Energy star rated	10
	Dishwasher	kitchen			X	Energy star rated	10
		Totals →	**17**	**19**	**8**	**Mean →**	**6.7**

Program Satisfaction

The surveyed participants were very satisfied with the Home Energy House Call program. Figure 8 below shows the respondents' mean satisfaction scores with various aspects of the program.

Overall program satisfaction is very high at 9.06. Surveyed participants rated their satisfaction with the auditors who came to their homes and performed the audit. On a 1 to 10 scale, the auditors' friendliness, help and knowledge were rated a 9.65. The lowest satisfaction (7.81) was with the audit report providing new ideas for improving efficiency. These scores can be expected to improve with the new, more user friendly audit report currently being planned.

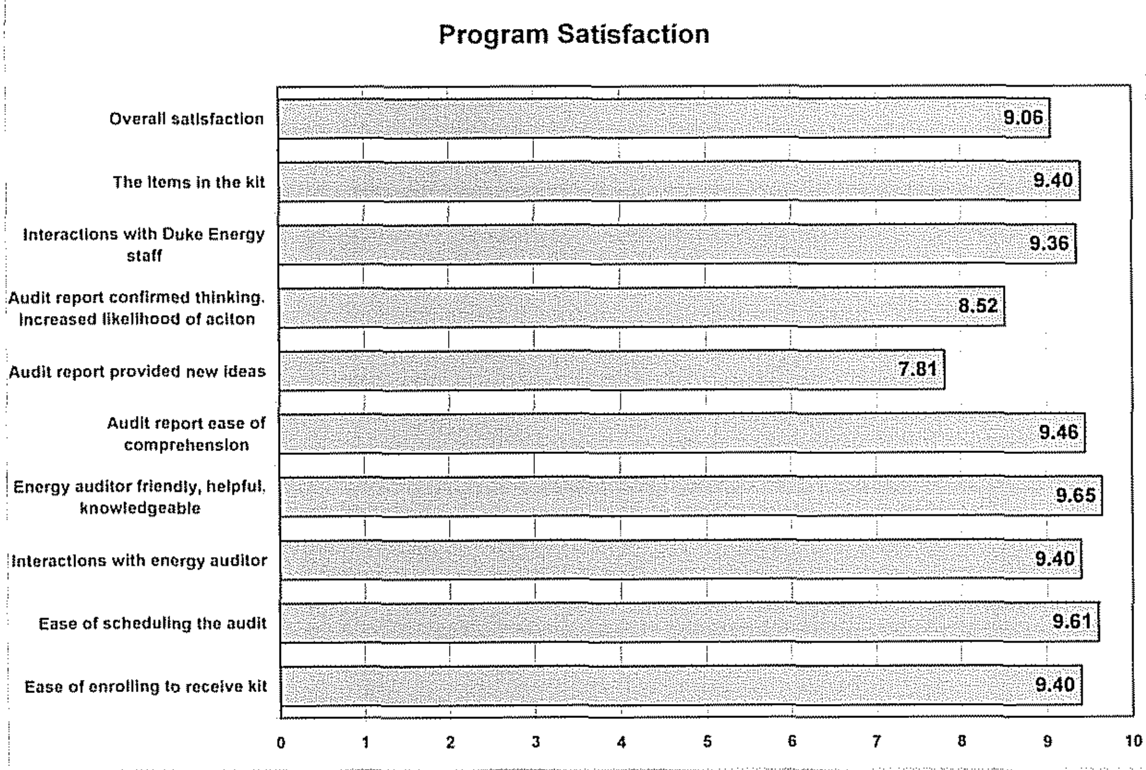

Figure 8. Program Satisfaction

Services and Program Changes Participants Would Like

We asked the 100 surveyed participants what other services they would see be a part of the HEHC program. Their responses are bulleted below:

- include a cover for the hot water heater
- do more for broken down houses
- information on different sources for cheap energy solutions

- wind energy or solar energy sources available for purchase
- rewards program for people who make the effort to conserve energy
- some kind of network where they could put you in contact with suppliers of energy efficient stuff
- some type of follow up to make sure the customer understands the audit report's recommendations within a week or so
- use a piece of equipment to go around and see where air leaks are
- multiple audits for people with multiple homes
- offer to do the fixing up at a reasonable price, do the recommendations for or with the homeowner
- provide additional insulation in the ceiling
- more information on power strips/surge protectors
- move gas and electric meters outside
- consultation service about other energy options
- give more recommendations and some number to go with them about savings
- thermal imaging of the house
- answer all of the questions that you have
- give monetary incentives to make your home more energy efficient
- infrared audit of outside of house
- thermal imaging audit to see if everything is working correctly
- new ideas news letter for updates

We also asked them if there were any changes they would like to see made to the program. Their responses are below:

- have the auditor install the items in the kit
- advertise it more
- a little more timely coming out to your house
- put smart strips in the kit and timers for sprinklers, give more tips for energy saving (wash clothes in cold, turn of water while shaving, etc...)
- use more sophisticated equipment
- didn't get enough info about weather stripping around doors and windows, and window shrink
- do the survey sooner
- focus more on renewable energy, give tax credits for using it
- tell about how beneficial ceiling fans are in conserving energy
- do more advertising
- wish they would have mentioned weather stripping in the garage
- more opportunities for making more changes
- don't give out cfl bulbs, ask people what they need before you waste money on the whole kit
- email updates telling you what is going on
- give away more light bulbs
- give more useful items in the kit

- CFLs are an environmental hazard because of mercury; LED bulbs would be better

We asked the surveyed participants what could be done to increase interest and participation in the program. Their suggestions are below:

- more and/or better advertising (n=29)
  - newspapers, online, tv, radio
- putting flyers in the bills (n=7)
- emphasize that it's free (n=4)
- encourage word of mouth advertising (n=4)
- make people aware of the program's benefits
- going into local areas and get on their mailing flyers
- tell people about the energy savings
- making sure people know there are no strings attached
- commercials showing how much people save on monthly bills
- put energy saving tips in bills in the mail
- make it a more in depth audit
- money or gas incentives, or credits on bills
- offer free time to come make improvements with the homeowner
- give people discounts or tax credits for going green
- telling them they can get their cost down
- stress the fact that it will reduce their payments more
- offered monitors that detect carbon monoxide as incentives
- show them how much money they can save by making small adjustments
- make it easier to know if you are qualified for the program
- cost saving incentives
- tell people how much money they could save on energy
- give discounts off of bills
- incentives to fix up your house
- offer solutions that aren't so obvious
- provide numbers for how much people can save
- referral program
- make people realize the benefit personally
- get children involved, kids get jazzed up about things they learn in school
- give deals on your bills based on your house's efficiency
- homeowners that rent their homes out have no options, give them some
- easy way to sign up and schedule
- make sure people know it will save you money
- annual picnic/fair/get together with free energy efficiency giveaways

What Participants Liked Most

We asked the participants what they liked most about the program. Their responses are bulleted below.

- the free gifts (n=25)
    - especially faucets aerators and light bulbs
    - free faucet aerators
    - CFLs and outlet gaskets
    - especially lights
    - the showerhead and faucet aerators
    - light bulbs
    - especially CFLs and showerhead
    - kitchen faucet aerators
    - outlet gaskets and CFLs
    - the light bulbs
- it was free (n=16)
- information provided (n=2)
- thoroughness and support with the kit to get started with energy saving
- learning that house was satisfactory
- overall report and the little things, auditor took a lot of time to make sure everything was understood
- it was easy and gave helpful information
- save money because of the program
- gave some things that they didn't know about and how to use them
- details of it
- brought a kit with stuff in it to try out
- coming out to the house
- the report
- thorough audit, auditor went over findings and made sure he understood
- someone came in to go over things
- idea that it gave you something else to think about and good ideas about saving money
- enjoyed doing it, liked the light bulbs the most
- showed how much energy running a fan saves, and if you put the thermostat down or up accordingly. Got to appear on the oprah show through the program, all expenses paid
- easy to do
- easy to schedule, auditor was nice and knowledgeable
- person representing it did a very nice job, provided with free kit
- one on one inspection where you can talk to the auditor and he can answer questions
- knowledge of the auditor was very helpful
- made you realize what you spend and what each appliance uses and how you can improve that
- for someone who has no knowledge it would be helpful, the fact that it is even offered is good
- the guy was prompt and nice and friendly
- very thorough and knowledgeable auditor

- everything was excellent, no complaints at all. Learned a lot from the auditor
- opportunity to learn about where you can save energy
- the idea of what the program wanted to do
- having the personal interactions and being able to ask questions
- gave ideas that didn't know existed, showed where the energy was being lost
- good ideas
- encouragement of using energy efficient ways
- communication and energy savings
- nice that they came out with a starter kit with useful stuff
- liked all of it
- someone came out for a one-on-one
- the way they came to the house
- the purpose of it
- acquiring information
- getting the evaluation of what you already have and how efficient it is. See where you can improve and where you're doing okay
- the whole program was great, the guy did a good job presenting it
- the audit report saying where you could improve
- had samples of what to do and what they did
- came out to the house and went through everything with us
- reassurance that what we were currently doing was good and suggestions for improvement
- they gave ideas that you didn't have before
- helpful because it gives you ideas you can choose to do or not
- thorough
- the kit was pretty awesome
- learned about the light bulbs
- not only did they tell you what to do, they gave some things to do right away
- insulators for the wall plugs in the showerhead
- got light bulbs and showerhead
- available and gave some ideas and were proactive at doing it
- ability to reduce energy costs
- very informative
- seeing some savings as a result
- the fact that it exists
- new knowledge
- covers everything
- honest auditor, did a really good job
- very thorough
- easy
- helped save money
- finding ways to save money
- saving money and learning about efficiency.

What Participants Liked Least

We also asked the surveyed participants what they liked least about the program. Their responses are below.

- light bulbs weren't bright enough and disposing of them is hard
- didn't get the stuff from the kit, still want it
- had to install the items themselves
- inconvenient to have to be home
- took too long to schedule the in home visit and too much delay on the survey
- some of the things in the kit weren't useful. Light bulbs are bigger than needed
- only had materials from kit, didn't know what to do next if wanted to do more
- tacky window shrink kit
- left on your own to interpret the results from the report in the mail
- the audit was pretty basic, couldn't test anything and tell exactly what the problems were
- wanted to be surprised with something unknown but it didn't happen
- needs to be more thorough
- the quality of the auditor was poor
- can't do the things herself because of immobility
- nobody is into geothermal or solar. No tax benefits or anything. Should concentrate on using renewable energy sources for your home.
- don't think the recommendations seem like they would do much to improve efficiency
- inconvenience of having to be at home for the audit
- the showerhead wasn't compatible with their house
- taking an hour to do the audit
- some of the ideas were dumb, like the CFLs
- auditor didn't do a very good job
- called back for 10 minute survey
- weather stripping
- didn't see any value added other than the free items, all common sense stuff
- didn't help as much as he had hoped
- didn't do enough, wanted thermal image
- hasn't resolved the energy bill problems
- the cfls
- the auditor didn't answer the question that was asked
- already knew about most of the recommendations
- didn't really need any of the stuff
- pushing CFL technology is bad
- the audit was canceled and had to be rescheduled

Appendix A: Impact Algorithms Used

The impact algorithms contained in this appendix are from the evaluation of the Personalized Energy Report done in 2007. This study included a mail-in survey with over 1,000 returned surveys. This evaluation of the Home Energy House Call Program included phone surveys of 100 participants and did not ask questions about heating and cooling fuels and systems in the home, size of windows, etc. Therefore, the values for these items are taken from the mean of the results of the PER results from 2007. These values are highlighted in these appendices whenever they were used.

CFLs

General Algorithm

Gross Summer Coincident Demand Savings

$$\Delta kW_S = \text{units} \times \left[\frac{(Watts \times DF_s)_{base} - (Watts \times DF_s)_{ee}}{1000}\right] \times CF_S \times (1 + HVAC_{d,\,s})$$

Gross Annual Energy Savings

$$\Delta kWh = \text{units} \times \left[\frac{(Watts \times DF)_{base} - (Watts \times DF)_{ee}}{1000}\right] \times FLH \times (1 + HVAC_c)$$

$$\Delta therm = \Delta kWh \times HVAC_g$$

where:

ΔkW	= gross coincident demand savings
ΔkWh	= gross annual energy savings
$\Delta therm$	= gross annual therm interaction
units	= number of units installed under the program
$Watts_{ee}$	= connected (nameplate) load of energy-efficient unit
$Watts_{base}$	= connected (nameplate) load of baseline unit(s) displaced
FLH	= full-load operating hours (based on connected load)
DF	= demand diversity factor
CF	= coincidence factor
$HVAC_c$	= HVAC system interaction factor for annual electricity consumption = 0.005443995
$HVAC_d$	= HVAC system interaction factor for demand =0.167018
$HVAC_g$	= HVAC system interaction factor for annual gas consumption = -0.00149

15 W CFL Measure

$Watts_{ee}$ = 15, which is the input power of program supplied CFL
$Watts_{base}$ - calculated from survey responses as shown below = 63.85514

Wattage of bulb removed	$Watts_{base}$	Notes
<= 44	40	Most popular size < 44 W
45 - 70	60	Lumen equivalent of 15 W CFL
71 - 99	75	Most popular size in range
> = 100	100	Most popular size in range

FLH - calculated from survey responses as shown below: = 1404.905 for 15-watt, 1340.106 For the 20-watt bulb.

Hours of use per day	FLH	Notes
<1	183	Average value over range
1-2	548	Average value over range
3-4	1278	Average value over range
5-10	2738	Average value over range
11-12	4198	Average value over range
13-24	6753	Average value over range

DF = 1.0 and CF = 0.10

The coincidence factor for this analysis was taken as the average of the coincidence factors estimated by PG&E and SCE for residential CFL program peak demand savings. The PG&E and SCE coincidence factors are combined factors that consider both coincidence and diversity, thus the diversity factor for this analysis was set to 1.0

$HVAC_c$ - the HVAC interaction factor for annual energy consumption depends on the HVAC system, heating fuel type, and location. The HVAC interaction factors for annual energy consumption were taken from DOE-2 simulations of the residential prototype building described at the end of this Appendix.

Covington, KY

Heating Fuel	Heating System	Cooling System	HVACc	HVACg
Other	Any except Heat Pump	Any except Heat Pump	0	0
Any	Heat Pump	Heat Pump	-0.16	0
Gas Propane Oil	Central Furnace	None	0	-0.0021
		Room/Window	0.079	-0.0021
		Central AC	0.079	-0.0021
	Other	None	0	-0.0021
		Room/Window	0.079	-0.0021

		Central AC	0.079	-0.0021
Electricity	Central furnace	None	-0.45	0
		Room/Window	-0.36	0
		Central AC	-0.36	0
	Electric baseboard	None	-0.45	0
		Room/Window	-0.36	0
		Central AC	-0.36	0
	Other	None	-0.45	0
		Room/Window	-0.36	0
		Central AC	-0.36	0

$HVAC_d$ - the HVAC interaction factor for demand depends on the cooling system type. The HVAC interaction factors for summer peak demand were taken from DOE-2 simulations of the residential prototype building described at the end of this Appendix.

Covington, KY

Cooling System	HVACd
None	0
Room/Window	.17
Central AC	.17
Heat Pump	.17

20W CFL Measure

$Watts_{ee}$ = 20, which is the input power of program supplied CFL

$Watts_{base}$ - calculated from survey responses as shown below: = 68.52787

Wattage of bulb removed	$Watts_{base}$	Notes
<= 44	40	Most popular size < 44 W
45 - 70	60	Most popular size in range
71 - 99	75	Lumen equivalent of 20 W CFL
> = 100	100	Most popular size in range

Weatherstripping, Outlet Gaskets, and Fireplace Closure

Gross Summer Coincident Demand Savings

$\Delta kW_S = \text{units} \times (\Delta cfm/unit) \times (kW / cfm) \times DF_S \times CF_S$

Gross Annual Energy Savings

$\Delta kWh = \text{units} \times (\Delta cfm/unit) \times (kWh / cfm)$

$\Delta therm = units \times (\Delta cfm / unit) \times (therm / cfm)$

where:

ΔkW	= gross coincident demand savings
ΔkWh	= gross annual energy savings
units	= number of buildings sealed under the program
$\Delta cfm/unit$	= unit infiltration airflow rate (ft^3/min) reduction for each measure
DF	= demand diversity factor = 0.8
CF	= coincidence factor = 1.0
kW/cfm	= demand savings per unit cfm reduction = 0.00164264
kWh/cfm	= electricity savings per unit cfm reduction = 4.490984952
therm/cfm	= gas savings per unit cfm reduction = 0.088377565

Unit cfm savings per measure

The cfm reductions for each measure were estimated from equivalent leakage area (ELA) change data taken from the ASHRAE Handbook of Fundamentals (ASHRAE, 2001). The equivalent leakage area changes were converted to infiltration rate changes using the Sherman-Grimsrud equation:

$$Q = ELA \times \sqrt{A \times \Delta T + B \times v^2}$$

where:

A	= stack coefficient ($ft^3/min\text{-}in^4\text{-}°F$)
	= 0.015 for one-story house
ΔT	= average indoor/outdoor temperature difference over the time interval of interest (°F)
B	= wind coefficient ($ft^3/min\text{-}in^4\text{-}mph^2$)
	= 0.0065 (moderate shielding)
v	= average wind speed over the time interval of interest measured at a local weather station at a height of 20 ft (mph)

The location specific data are shown below:

Location	Average outdoor temp	Average indoor/outdoor temp difference	Average wind speed (mph)	Specific infiltration rate (cfm/in^2)

Covington	33	35	22	1.92

Measure ELA impact and cfm reductions are as follows:

Measure	Unit	ELA change (in^2/unit)	ΔCfm/unit (KY)
Outlet gaskets	Each	0.357	0.69
Weather strip	Foot	0.089	0.17
Fireplace	Each	1.86	3.57

Unit energy and demand savings

The energy and peak demand impacts of reducing infiltration rates were calculated from infiltration rate parametric studies conducted using the DOE-2 residential building prototype models, as described at the end of this Appendix. The savings per cfm reduction by heating and cooling system type are shown below:

Heating Fuel	Heating System	Cooling System	kWh/cfm	kW/cfm	therm/cfm
Other	Any except Heat Pump	Any except Heat Pump	1.14	0.00000	0.000
Any	Heat Pump	Heat Pump	12.85	0.00248	0.000
Gas Propane Oil	Central Furnace	None	0	0	0.124
		Room/Window	1.14	0.00000	0.124
		Central AC	1.14	0.00000	0.124
	Other	None	0	0	0.124
		Room/Window	1.14	0.00000	0.124
		Central AC	1.14	0.00000	0.124
Electricity	Central furnace	None	23.27	0.01238	0.000
		Room/Window	23.84	0.01485	0.000
		Central AC	23.84	0.01485	0.000
	Electric baseboard	None	23.27	0.01238	0.000
		Room/Window	23.84	0.01485	0.000
		Central AC	23.84	0.01485	0.000
	Other	None	23.27	0.01238	0.000
		Room/Window	23.84	0.01485	0.000
		Central AC	23.84	0.01485	0.000

Window Shrink Kit

Gross Summer Coincident Demand Savings

ΔkW_S = no. windows ×SF/window × (ΔkW/SF) × $DF_S \times CF_S$

Gross Annual Energy Savings
ΔkWh = no. windows ×SF/window × ($\Delta kWh/SF$)

$\Delta therm$ = no. windows ×SF/window × ($\Delta therm/SF$)

where:

ΔkW	= gross coincident demand savings
ΔkWh	= gross annual energy savings
No windows	= quantity of windows treated with window film from survey
SF/window	= window square feet based on window size = 19.90221
DF	= demand diversity factor
CF	= coincidence factor
$\Delta kW/SF$	`= electricity demand savings per square foot of window treated =0.001131
$\Delta kWh/SF$	`= electricity consumption savings per square foot of window treated = 1.531539
$\Delta therm/SF$	`= gas consumption savings per square foot of window treated=0.020262

Coincidence and Diversity Factors:

DF = 0.8
CF = 1.0

The diversity and coincidence factors were taken from *Engineering Methods for Estimating the Impacts of DSM Programs, Volume 2* (EPRI, 1993). These values are typical for residential cooling loads in summer peaking utilities.

Window area assumptions (per window):

Window Type	Size (SF)
Small	9
Average	18
Large	30

Unit energy and demand savings data

The unit energy savings were taken from DOE-2 simulations of the residential prototype building described at the end of this Appendix. The basic simulation assumptions for window U-value and solar heat gain coefficient (SHGC) were taken from the ASHRAE Handbook of Fundamentals (ASHRAE, 2001), and are described below:

	Without window film		**With window film**	
Window type	**U-value (Btu/hr-SF-°F)**	**SHGC**	**U-value (Btu/hr-SF-°F)**	**SHGC**
Single	1.27	0.86	0.81	0.76

Single with storm	0.81	0.76	0.67	0.68
Double	0.81	0.76	0.67	0.68

The unit energy savings depend on the heating fuel, heating system, cooling system and window type:

Heating Fuel	Other
Heating System	Any except Heat Pump
Cooling System	None

Window type	ΔkWh/SF	ΔkW/SF	Δtherm/SF
All	0	0	0

Heating Fuel	Other
Heating System	Any except Heat Pump
Cooling System	Room/Window or Central AC

Window type	ΔkWh/SF	ΔkW/SF	Δtherm/SF
Single	0.795	0.000853	0
Single with storm	0.566	0.000498	0
Double	0.566	0.000498	0

Heating Fuel	Any
Heating System	Heat Pump
Cooling System	Heat Pump

Window type	ΔkWh/SF	ΔkW/SF	Δtherm/SF
Single	4.757	0.001280	0.000
Single with storm	1.621	0.000711	0.000
Double	1.621	0.000711	0.000

Heating Fuel	Gas, propane or oil
Heating System	Any except Heat Pump
Cooling System	None

Window type	ΔkWh/SF	ΔkW/SF	Δtherm/SF
Single	0	0	0.039
Single with storm	0	0	0.011
Double	0	0	0.011

Heating Fuel	Gas, propane or oil

Heating System	Any except Heat Pump
Cooling System	Room/Window or Central AC

Window type	ΔkWh/SF	ΔkW/SF	Δtherm/SF
Single	0.795	0.000853	0.039
Single with storm	0.566	0.000498	0.011
Double	0.566	0.000498	0.011

Heating Fuel	Electricity
Heating System	Any except Heat Pump
Cooling System	None

Window type	ΔkWh/SF	ΔkW/SF	Δtherm/SF
Single	8.748	0.004979	0.000
Single with storm	2.431	0.001351	0.000
Double	2.431	0.001351	0.000

Heating Fuel	Electricity
Heating System	Any except Heat Pump
Cooling System	Room/Window or Central AC

Window type	ΔkWh/SF	ΔkW/SF	Δtherm/SF
Single	9.335	0.005690	0.000
Single with storm	2.940	0.001849	0.000
Double	2.940	0.001849	0.000

Low-Flow Showerhead

Gross Summer Coincident Demand Savings

$$\Delta kW_S = units \times \frac{(GPD_{base} - GPD_{ee}) \times 8.33 \times \overline{\Delta T}}{3413_s} \times DF_x \times CF_s$$

Gross Annual Energy Savings

$$\Delta kWh = \text{units} \times \frac{(\text{GPD}_{\text{base}} - \text{GPD}_{\text{ee}}) \times 8.33 \times \overline{\Delta T}}{3413} \times 365$$

$$\Delta\text{therm} = units \times \frac{(GPD_{base} - GPD_{ee}) \times 8.33 \times \overline{\Delta T}}{\eta_{waterheater}} \times \frac{365}{100000}$$

where:

ΔkW	= gross coincident demand savings
ΔkWh	= gross annual energy savings
units	= number of units installed under the program
GPD_{base}	= daily hot water consumption before installation
GPD_{ee}	= daily hot water consumption after flow reducing measure installation
ΔT	= average difference between entering cold water temperature and the shower use temperature
DF	= demand diversity factor for electric water heating
CF	= coincidence factor
8.33	= conversion factor (Btu/gal-°F)
3413	= conversion factor (Btu/kWh)
24	= conversion factor (hr/day)
365	= conversion factor (days/yr)
100000	= conversion factor (Btu/therm)

Showerhead

GPD_{base} = showers/week / 7 x 3.1 gpm x 5 minutes/shower

GPD_{ee} = showers/week / 7 x 1.5 gpm x 5 minutes/shower

ΔT

City	Average cold water temperature	Shower use temperature	Average ΔT
Covington	53.9°F	100°F	46.1°F

Water heater efficiency

Combustion efficiency for residential gas water heater = 0.70

Demand diversity factor = 0.1

Coincidence factor = 0.4

Showers/week = 8.23

The diversity and coincidence factors were taken from *Engineering Methods for Estimating the Impacts of DSM Programs, Volume 2* (EPRI, 1993). These values are typical for the residential water heating end-use in a summer peaking utility.

Faucet Aerators

This measure used the Efficiency Vermont deemed savings (Efficiency Vermont, 2003) adjusted for entering water temperature:

Demand Savings
$\Delta kW = 0.0171\ kW \times \Delta T / \Delta T_{VT} \times DF \times CF$

Energy Savings
$\Delta kWh_i = 57\ kWh \times \Delta T / \Delta T_{VT}$
$\Delta therms = 2.0 \times \Delta T / \Delta T_{VT\ i}$

City	Average cold water temperature	Hot water use temperature	Average ΔT
Covington	53.9°F	100°F	46.1°F
Burlington VT	44.5	100°F	55.5

Demand diversity factor = 0.1

Coincidence factor = 0.4

The diversity and coincidence factors were taken from *Engineering Methods for Estimating the Impacts of DSM Programs, Volume 2* (EPRI, 1993). These values are typical for the residential water heating end-use in a summer peaking utility.

Insulated Water Heater

Gross Summer Coincident Demand Savings

$$\Delta kW_S = units \times \frac{(UA_{base} - UA_{ee}) \times \Delta T_s}{3413} \times DF_s \times CF_s$$

Gross Annual Energy Savings

$$\Delta kWh = units \times \frac{(UA_{base} - UA_{ee}) \times \overline{\Delta T}}{3413} \times 8760$$

$$\Delta therm = units \times \frac{(UA_{base} - UA_{ee}) \times \overline{\Delta T}}{\eta_{waterheater}} \times \frac{8760}{100000}$$

where:

ΔkW = gross coincident demand savings
ΔkWh = gross annual energy savings
units = number of water heaters installed under the program
UA_{base} = overall heat transfer coefficient of base water heater (Btu/hr-°F) =4.6817
UA_{ee} = overall heat transfer coefficient of improved water heater (Btu/hr-°F)
=1.9217
ΔT = temperature difference between the tank and the ambient air (°F)
DF = demand diversity factor
CF = coincidence factor.
3413 = conversion factor (Btu/kWh)
8760 = conversion factor (hr/yr)
100000 = conversion factor (Btu/therm)
$\eta_{waterheater}$ = water heater efficiency

Water heater tank UA

Water heater size (gal)	Electric		Gas	
	UAbase	UAee	UAbase	UAee
30	3.84	1.69	4.21	1.76
50	4.67	1.83	5.13	1.91
60	4.13	2.06	4.54	2.14
75	5.00	2.42	5.50	2.52
80+	5.72	2.53	6.28	2.64

ΔT = 140°F water setpoint temp – 65°F room temp = 75°F

DF = 1.0
CF= 1.0
$\eta_{waterheater} = 0.7$

The diversity and coincidence factors were taken from *Engineering Methods for Estimating the Impacts of DSM Programs, Volume 2* (EPRI, 1993). These values are typical for residential water heaters meeting standby losses.

Attic Insulation

Gross Summer Coincident Demand Savings
$\Delta kW_S = SF \times (kW/SF_{base} - kW/SF_{ee}) \times DF_S \times CF_S$
$kW/SF_{base} = 0.002142316076294$
$kW/SF_{ee} = 0.002005940054496$

Gross Annual Energy Savings

$\Delta kWh = SF \times (kWh/SF_{base} - kWh/SF_{ee})$

$kWh/SF_{base} = 2.506253405995$

$kWh/SF_{ee} = 2.313866485014$

$\Delta therm = SF \times (therm/SF_{base} - therm/SF_{ee})$

$therm/SF_{base} = 0.03055422343324$

$therm/SF_{ee} = 0.02760245231608$

where:

ΔkW = gross coincident demand savings
ΔkWh = gross annual energy savings
SF = insulation square feet installed = 1796.49
DF = demand diversity factor
CF = coincidence factor
kW/SF `= electricity demand per square foot of insulation installed
kWh/SF `= electricity consumption per square foot of insulation installed
therm/SF `= gas consumption per square foot of insulation installed

Coincidence and Diversity Factors:

DF = 0.8
CF = 1.0

The diversity and coincidence factors were taken from *Engineering Methods for Estimating the Impacts of DSM Programs, Volume 2* (EPRI, 1993). These values are typical for residential cooling loads in summer peaking utilities.

Insulation square foot assumptions:

Average house size from site data (Carolinas), or estimated from number of rooms (Kentucky)

Size of house = number of rooms * 330 SF/room

Average ceiling area = house size / 1.2

If partial insulation, then reduce ceiling area by 50%

R value assumptions

Rbase: = 12.19

Base thickness	R_{base}
2	7

4	14
6	21
8	28
10	35

Assumes existing insulation is fiberglass or cellulose, at R-3.5 per inch. This assumption addresses insulation R-value only. The R-value assumptions for other materials within the ceiling construction are embedded in the simulation model.

Ree =31.6011

The R-value of the wall with added insulation depends on base thickness, added insulation thickness and insulation type: Fiberglass, cellulose and "other" insulation is assumed to have an R-value of 3.5 per inch. Foam insulation is assumed to have an R-value of 5.6 per inch.

Base thickness	Added thickness	Ree	
		fiberglass, cellulose or other	Foam
2	2	14.00	18.20
	4	21.00	29.40
	6	28.00	40.60
	8	35.00	51.80
	10	42.00	63.00
	12	49.00	74.20
4	2	21.00	25.20
	4	28.00	36.40
	6	35.00	47.60
	8	42.00	58.80
	10	49.00	70.00
	12	56.00	81.20
6	2	28.00	32.20
	4	35.00	43.40
	6	42.00	54.60
	8	49.00	65.80
	10	56.00	77.00
	12	63.00	88.20
8	2	35.00	39.20
	4	42.00	50.40
	6	49.00	61.60
	8	56.00	72.80
	10	63.00	84.00
	12	70.00	95.20
10	2	42.00	46.20

	4	49.00	57.40
	6	56.00	68.60
	8	63.00	79.80
	10	70.00	91.00
	12	77.00	102.20
	2	49.00	53.20
	4	56.00	64.40
	6	63.00	75.60
	8	70.00	86.80
	10	77.00	98.00
12	12	84.00	109.20

Unit energy and demand data

The unit energy savings were taken from DOE-2 simulations of the residential prototype building described at the end of this Appendix. The unit energy and demand savings depend on the heating fuel, heating system, cooling system type and Rvalue

Heating Fuel	Other
Heating System	Any except Heat Pump
Cooling System	None

R-value	kWh/SF	kW/SF	therm/SF
All	0	0	0

Heating Fuel	Other
Heating System	Any except Heat Pump
Cooling System	Room/Window or Central AC

R-value	kWh/SF	kW/SF	therm/SF
7	1.339	0.00157	0
14	1.272	0.00149	0
21	1.245	0.00145	0
28	1.231	0.00143	0
35	1.220	0.00142	0
42	1.214	0.00141	0
49	1.210	0.00141	0
56	1.206	0.00140	0
63	1.203	0.00140	0
70	1.201	0.00140	0

77	1.200	0.00140	0
84	1.196	0.00139	0
109	1.194	0.00139	0

Heating Fuel Any
Heating System Heat Pump
Cooling System Heat Pump

R-value	kWh/SF	kW/SF	therm/SF
7	6.550	0.00387	0.00000
14	6.121	0.00378	0.00000
21	5.937	0.00374	0.00000
28	5.833	0.00371	0.00000
35	5.768	0.00370	0.00000
42	5.724	0.00368	0.00000
49	5.689	0.00368	0.00000
56	5.665	0.00367	0.00000
63	5.644	0.00366	0.00000
70	5.628	0.00366	0.00000
77	5.616	0.00366	0.00000
84	5.605	0.00366	0.00000
109	5.576	0.00365	0.00000

Heating Fuel Gas, propane or oil
Heating System Any except Heat Pump
Cooling System None

R-value	kWh/SF	kW/SF	therm/SF
7	0	0	0.04418
14	0	0	0.04058
21	0	0	0.03908
28	0	0	0.03828
35	0	0	0.03768
42	0	0	0.03738
49	0	0	0.03708
56	0	0	0.03688
63	0	0	0.03668
70	0	0	0.03658
77	0	0	0.03648
84	0	0	0.03638
109	0	0	0.03618

Heating Fuel Gas, propane or oil

Heating System	Any except Heat Pump
Cooling System	Room/Window or Central AC

R-value	kWh/SF	kW/SF	therm/SF
7	1.339	0.00157	0.04418
14	1.272	0.00149	0.04058
21	1.245	0.00145	0.03908
28	1.231	0.00143	0.03828
35	1.220	0.00142	0.03768
42	1.214	0.00141	0.03738
49	1.210	0.00141	0.03708
56	1.206	0.00140	0.03688
63	1.203	0.00140	0.03668
70	1.201	0.00140	0.03658
77	1.200	0.00140	0.03648
84	1.196	0.00139	0.03638
109	1.194	0.00139	0.03618

Heating Fuel	Electricity
Heating System	Any except Heat Pump
Cooling System	None

R-value	kWh/SF	kW/SF	therm/SF
7	9.063	0.00501	0.00000
14	8.254	0.00463	0.00000
21	7.915	0.00447	0.00000
28	7.728	0.00439	0.00000
35	7.610	0.00432	0.00000
42	7.528	0.00429	0.00000
49	7.468	0.00426	0.00000
56	7.423	0.00424	0.00000
63	7.387	0.00422	0.00000
70	7.358	0.00421	0.00000
77	7.334	0.00420	0.00000
84	7.313	0.00419	0.00000
109	7.262	0.00417	0.00000

Heating Fuel	Electricity

Heating System	Any except Heat Pump
Cooling System	Room/Window or Central AC

R-value	kWh/SF	kW/SF	therm/SF
7	10.184	0.00646	0.00000
14	9.327	0.00601	0.00000
21	8.969	0.00581	0.00000
28	8.773	0.00571	0.00000
35	8.645	0.00564	0.00000
42	8.560	0.00560	0.00000
49	8.497	0.00557	0.00000
56	8.448	0.00554	0.00000
63	8.410	0.00552	0.00000
70	8.380	0.00551	0.00000
77	8.356	0.00550	0.00000
84	8.331	0.00548	0.00000
109	8.279	0.00546	0.00000

Sidewall Insulation

Gross Summer Coincident Demand Savings

$\Delta kW_S = SF \times (kW/SF_{base} - kW/SF_{ee}) \times DF_S \times CF_S$

$kW/SF_{base} = 0.003607765957447$

$kW/SF_{ee} = 0.003208978723404$

Gross Annual Energy Savings

$\Delta kWh = SF \times (kWh/SF_{base} - kWh/SF_{ee})$

$kWh/SF_{base} = 4.66205106383$

$kWh/SF_{ee} = 3.860968085106$

$\Delta therm = SF \times (therm/SF_{base} - therm/SF_{ee})$

$therm/SF_{base} = 0.05971$

$therm/SF_{ee} = 0.04533334042553$

where:

ΔkW = gross coincident demand savings
ΔkWh = gross annual energy savings
SF = insulation square feet installed = 1960.03
DF = demand diversity factor
CF = coincidence factor
kW/SF '= electricity demand per square foot of insulation installed
kWh/SF '= electricity consumption per square foot of insulation installed

therm/SF = gas consumption per square foot of insulation installed

Coincidence and Diversity Factors:

DF = 0.8
CF = 1.0

The diversity and coincidence factors were taken from *Engineering Methods for Estimating the Impacts of DSM Programs, Volume 2* (EPRI, 1993). These values are typical for residential cooling loads in summer peaking utilities.

Insulation square foot assumptions:

Average house size from site data (Carolinas), or estimated from number of rooms (KY)

Size of house = number of rooms * 330 SF/room

Number of walls	Wall area as a fraction of floor area
1	0.26
2	0.52
3	0.72
4+	0.92

R value assumptions

Rbase:

Base thickness	R_{base}
0	0.91

The base case assumes an uninsulated wall with 3.5 inch air gap. This assumption addresses "insulation" R-value only. The R-value assumptions for other materials within the wall construction are embedded in the simulation model.

Ree

The insulated wall R-value depends on added insulation thickness and insulation type. Fiberglass, cellulose and "other" insulation is assumed to have an R-value of 3.5 per inch. Foam insulation is assumed to have an R-value of 5.6 per inch.

Added thickness	Ree	
	fiberglass, cellulose or other	Foam
1-3	7.9	12.1
4-6	18.4	28.9
7-12	30.7	48.5

13+	46.4	73.7

Unit energy and demand data

The unit energy and demand savings were taken from DOE-2 simulations of the residential prototype building described at the end of this Appendix. The unit energy and demand savings depend on the heating fuel, heating system, cooling system type and wall Rvalue:

Heating Fuel	Other
Heating System	Any except Heat Pump
Cooling System	None

R-value	kWh/SF	kW/SF	therm/SF
All	0	0	0

Heating Fuel	Other
Heating System	Any except Heat Pump
Cooling System	Room/Window or Central AC

R-value	kWh/SF	kW/SF	therm/SF
0.91	2.361	0.00273	0
7.9	2.046	0.00238	0
18.4	1.950	0.00227	0
30.7	1.908	0.00224	0
46.4	1.887	0.00220	0
12.1	1.988	0.00230	0
28.9	1.917	0.00224	0
48.5	1.886	0.00220	0
73.7	1.874	0.00220	0

Heating Fuel	Any
Heating System	Heat Pump
Cooling System	Heat Pump

R-value	kWh/SF	kW/SF	therm/SF
0.91	12.078	0.00655	0.00000
7.9	9.865	0.00605	0.00000
18.4	9.160	0.00588	0.00000
30.7	8.892	0.00581	0.00000
46.4	8.734	0.00578	0.00000

12.1	9.477	0.00597	0.00000
28.9	8.918	0.00583	0.00000
48.5	8.721	0.00578	0.00000
73.7	8.620	0.00575	0.00000

Heating Fuel	Gas, propane or oil
Heating System	Any except Heat Pump
Cooling System	None

R-value	kWh/SF	kW/SF	therm/SF
0.91	0	0	0.08530
7.9	0	0	0.06565
18.4	0	0	0.05974
30.7	0	0	0.05751
46.4	0	0	0.05623
12.1	0	0	0.06230
28.9	0	0	0.05767
48.5	0	0	0.05623
73.7	0	0	0.05543

Heating Fuel	Gas, propane or oil
Heating System	Any except Heat Pump
Cooling System	Room/Window or Central AC

R-value	kWh/SF	kW/SF	therm/SF
0.91	2.361	0.00273	0.08530
7.9	2.046	0.00238	0.06565
18.4	1.950	0.00227	0.05974
30.7	1.908	0.00224	0.05751
46.4	1.887	0.00220	0.05623
12.1	1.988	0.00230	0.06230
28.9	1.917	0.00224	0.05767
48.5	1.886	0.00220	0.05623
73.7	1.874	0.00220	0.05543

Heating Fuel	Electricity
Heating System	Any except Heat Pump
Cooling System	None

R-value	kWh/SF	kW/SF	therm/SF
0.91	17.807	0.00963	0
7.9	13.354	0.00749	0
18.4	12.045	0.00685	0
30.7	11.552	0.00663	0
46.4	11.277	0.00650	0
12.1	12.616	0.00712	0
28.9	11.599	0.00665	0
48.5	11.254	0.00649	0
73.7	11.075	0.00641	0

Heating Fuel	Electricity
Heating System	Any except Heat Pump
Cooling System	Room/Window or Central AC

R-value	kWh/SF	kW/SF	therm/SF
0.91	12.078	0.00655	0.00000
7.9	9.865	0.00605	0.00000
18.4	9.160	0.00588	0.00000
30.7	8.892	0.00581	0.00000
46.4	8.734	0.00578	0.00000
12.1	9.477	0.00597	0.00000
28.9	8.918	0.00583	0.00000
48.5	8.721	0.00578	0.00000
73.7	8.620	0.00575	0.00000

Duct Insulation and Repair

Gross Summer Coincident Demand Savings
$\Delta kW_S = (\Delta kW/unit) \times DF_S \times CF_S \times LF$

Gross Annual Energy Savings
$\Delta kWh = (\Delta kWh/unit) \times LF$

$\Delta therm = (\Delta therm/unit) \times LF$

where:

ΔkW = gross coincident demand savings
ΔkWh = gross annual energy savings
DF = demand diversity factor

CF = coincidence factor
LF = location factor = 0.43
ΔkWunit `= electricity demand savings per dwelling
Insulate = 0.4898181818182
Repair = 0.6379347826087

ΔkWh/SF `= electricity consumption savings per dwelling
Insulate = 928.438961039
Repair = 1057.532608696

Δtherm/SF `= gas consumption savings dwelling
Insulate = 11.83695652174
Repair = 12.58181818182

Coincidence and Diversity Factors:

DF = 0.8
CF = 1.0

The diversity and coincidence factors were taken from *Engineering Methods for Estimating the Impacts of DSM Programs, Volume 2* (EPRI, 1993). These values are typical for residential air conditioners and heat pumps in summer peaking utilities.

The location factors used are as follows:

Heated Area	**Unheated Area**	**DK/No Response**
0	1	.43

Unit energy and demand savings data

The unit energy and demand savings were taken from DOE-2 simulations of the residential prototype building described at the end of this Appendix. The basic assumptions are listed below:

Assumption	Pre treatment	Post treatment	Notes
Duct insulation	Uninsulated	R-19	Consistent with Smart Saver program requirements
Duct sealing	26% leakage	8% leakage	Duct leakage assumptions used in CA for Title 24 and utility program design. Evenly distributed between

			supply and return

The unit energy and demand savings depend on the heating fuel, heating system, cooling system and duct treatment as follows:

Heating Fuel Other
Heating System Any except Heat Pump
Cooling System None

Duct treatment	ΔkWh/unit	ΔkW/unit	Δtherm/unit
All	0	0	0

Heating Fuel Other
Heating System Any except Heat Pump
Cooling System Central AC

Duct treatment	ΔkWh/unit	ΔkW/unit	Δtherm/unit
Insulate	384	0.10	0
Seal	466	0.25	0

Heating Fuel Any
Heating System Heat Pump
Cooling System Heat Pump

Duct treatment	ΔkWh/unit	ΔkW/unit	Δtherm/unit
Insulate	1,520	0.48	0.0
Seal	2,422	0.78	0.0

Heating Fuel Gas, propane or oil
Heating System Furnace
Cooling System None

Duct treatment	ΔkWh/unit	ΔkW/unit	Δtherm/unit
Insulate	0.0	0.0	17.3
Seal	0.0	0.0	16.5

Heating Fuel Gas, propane or oil
Heating System Furnace
Cooling System Central AC

Duct treatment	ΔkWh/unit	ΔkW/unit	Δtherm/unit
Insulate	384	0.10	17.3
Seal	466	0.25	16.5

Heating Fuel	Electricity
Heating System	Furnace
Cooling System	None

Duct treatment	ΔkWh/unit	ΔkW/unit	Δtherm/unit
Insulate	3,917	3.13	0.0
Seal	3,798	2.98	0.0

Heating Fuel	Electricity
Heating System	Furnace
Cooling System	Central AC

Duct treatment	ΔkWh/unit	ΔkW/unit	Δtherm/unit
Insulate	4,285	3.18	0.0
Seal	4,211	3.18	0.0

Installed a New AC or Heat Pump

Gross Summer Coincident Demand Savings

$\Delta kW_S = (\Delta kW/unit) \times DF_S \times CF_S$

AC = 1.138835274542

Heatpump = 1.552048338369

Gross Annual Energy Savings

$\Delta kWh = (\Delta kWh/unit)$

AC = 1375.059900166

Heatpump = 2568.123867069

$\Delta therm = (\Delta therm/unit$

AC = 0

Heatpump = 0

where:

ΔkW	= gross coincident demand savings
ΔkWh	= gross annual energy savings
DF	= demand diversity factor
CF	= coincidence factor
ΔkWunit	`= electricity demand savings per dwelling
ΔkWh/SF	`= electricity consumption savings per dwelling
Δtherm/SF	`= gas consumption savings dwelling

Coincidence and Diversity Factors:

DF = 0.8
CF = 1.0

The diversity and coincidence factors were taken from *Engineering Methods for Estimating the Impacts of DSM Programs, Volume 2* (EPRI, 1993). These values are typical for residential air conditioners and heat pumps in summer peaking utilities.

Unit energy and demand savings data

The unit energy and demand savings were taken from DOE-2 simulations of the residential prototype building described at the end of this Appendix. Unit energy savings are based on replacement of an existing SEER 8.5 air conditioner or heat pump. The unit energy and demand savings depend on the heating fuel, heating system, cooling system and replacement efficiency.

Heating Fuel	Other
Heating System	Any except Heat Pump
Cooling System	None

Replacement efficiency	ΔkWh/unit	ΔkW/unit	Δtherm/unit
All	0	0	0

Heating Fuel	Other
Heating System	Any except Heat Pump
Cooling System	Central AC

Replacement efficiency	ΔkWh/unit	ΔkW/unit	Δtherm/unit
<11	674	0.92	0
12	944	1.28	0
13	1,213	1.65	0
14+	1,346	1.80	0

Heating Fuel	Any
Heating System	Heat Pump
Cooling System	Heat Pump

Replacement efficiency	ΔkWh/unit	ΔkW/unit	Δtherm/unit
<11	2,941	1.36	0
12	2,941	1.36	0
13	5,294	2.45	0
14+	6,496	2.98	0

Heating Fuel	Gas, propane or oil
Heating System	Any except Heat Pump
Cooling System	None

Replacement efficiency	ΔkWh/unit	ΔkW/unit	Δtherm/unit
All	0.0	0.0	0

Heating Fuel	Gas, propane or oil
Heating System	Any except Heat Pump
Cooling System	Central AC

Replacement efficiency	ΔkWh/unit	ΔkW/unit	Δtherm/unit
<11	674	0.92	0
12	944	1.28	0
13	1,213	1.65	0
14+	1,346	1.80	0

0

Heating Fuel	Electricity
Heating System	Any except Heat Pump
Cooling System	None

Replacement efficiency	ΔkWh/unit	ΔkW/unit	Δtherm/unit
All	0.0	0.0	0

Heating Fuel	Electricity
Heating System	Any except Heat Pump

Cooling System Central AC

Replacement efficiency	ΔkWh/unit	ΔkW/unit	Δtherm/unit
<11	674	0.92	0
12	944	1.28	0
13	1,213	1.65	0
14+	1,346	1.80	0

Installed a New Furnace

Gross Annual Energy Savings
Δtherm = (Δtherm/unit)
=16.34529540481

where:

Δtherm/SF = gas consumption savings dwelling

Unit energy and demand savings data

The unit energy and demand savings were taken from DOE-2 simulations of the residential prototype building described at the end of this Appendix. The basic assumptions are listed below:

Furnace Type	AFUE
Baseline	0.78
Standard efficiency (metal flue pipe) replacement	0.80
Condensing furnace (plastic flue pipe) replacement	0.90

The unit energy and demand savings depend on the heating fuel, heating system type, and replacement furnace type:

Heating Fuel Gas, propane or oil
Heating System Furnace

Replacement efficiency	Δtherm/unit
Standard (metal pipe)	3.0
Condensing (plastic pipe)	18.8

Otherwise 0

Prototypical Building Model Description

The impact analysis for many of the HVAC related measures are based on DOE-2.2 simulations of a set of prototypical residential buildings. The prototypical simulation models were derived from the residential building prototypes used in the California Database for Energy Efficiency Resources (DEER) study (Itron, 2005), with adjustments make for local building practices and climate. The prototype "model" in fact contains 4 separate residential buildings; 2 one-story and 2 two-story buildings. The each version of the 1 story and 2 story buildings are identical except for the orientation, which is shifted by 90 degrees. The selection of these 4 buildings is designed to give a reasonable average response of buildings of different design and orientation to the impact of energy efficiency measures. A sketch of the residential prototype buildings is shown in Figure 9.

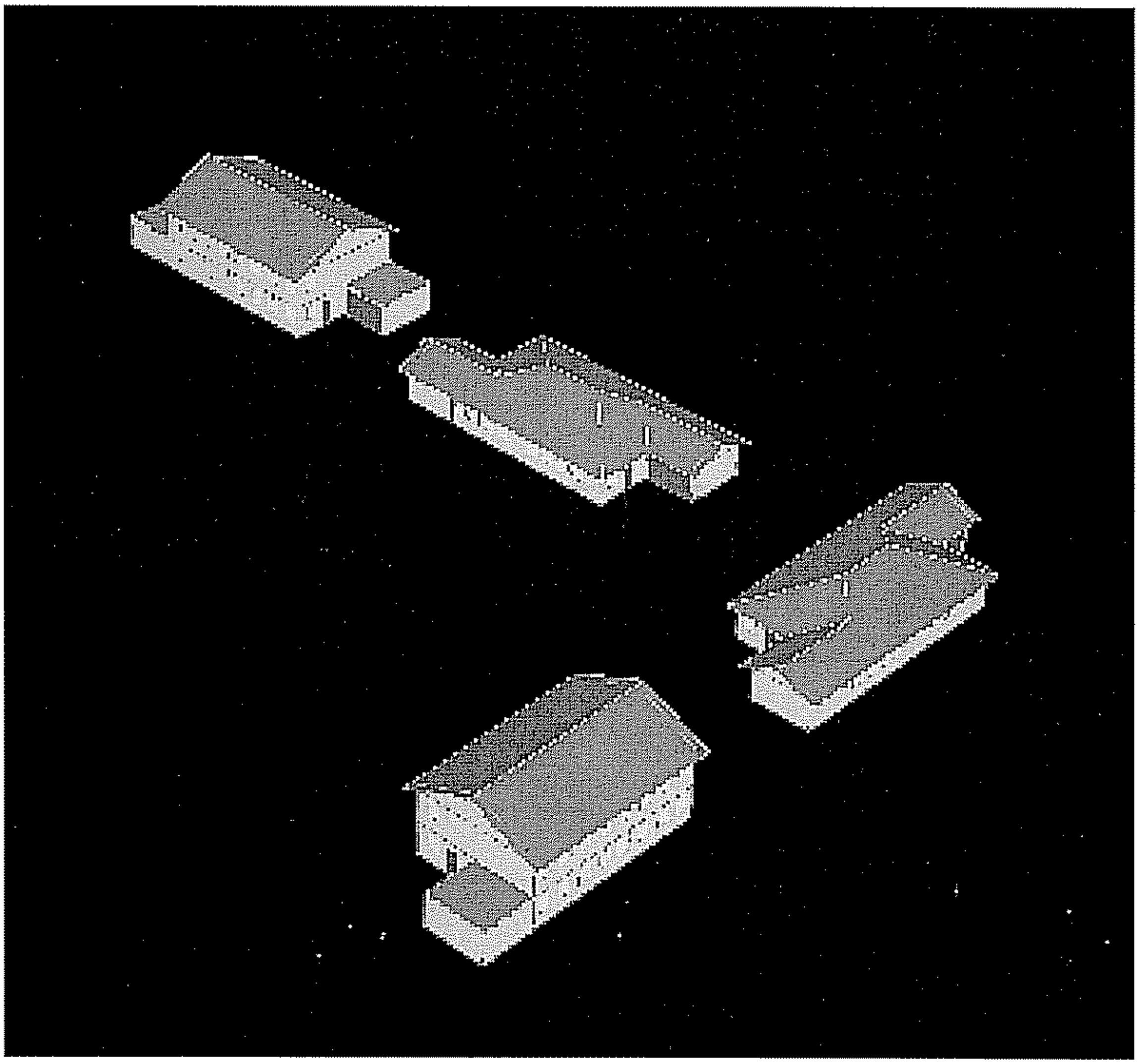

Figure 9. Computer Rendering of Residential Building Prototype Model

The general characteristics of the residential building prototype model are summarized below:

Residential Building Prototype Description

Characteristic	Value
Conditioned floor area	1 story house: 1465 SF 2 story house: 2930 SF
Wall construction and R-value	Wood frame with siding, R-11
Roof construction and R-value	Wood frame with asphalt shingles, R-19
Glazing type	Single pane clear
Lighting and appliance power density	0.51 W/SF average
HVAC system type	Packaged single zone AC or heat pump
HVAC system size	Based on peak load with 20% oversizing Average 640 SF/ton
HVAC system efficiency	SEER = 8.5
Thermostat setpoints	Heating: 70°F with setback to 60°F Cooling: 75°F with setup to 80°F
Duct location	Attic (unconditioned space)
Duct surface area	Single story house: 390 SF supply, 72 SF return Two story house: 505 SF supply, 290 SF return
Duct insulation	Uninsulated
Duct leakage	26%; evenly distributed between supply and return
Cooling season	Charlotte – April 17 to October 6 Covington
Natural ventilation	Allowed during cooling season when cooling setpoint exceeded and outdoor temperature < 65°F. 3 air changes per hour

References

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EPRI, 1993. Engineering Methods for Estimating the Impacts of DSM Programs, Volume 2: Fundamental Equations for Residential and Commercial End-Uses, EPRI TR-100984 V2., Electric Power Research Institute, Palo Alto, CA. 1993.

Itron, 2005. "2004-2005 Database for Energy Efficiency Resources (DEER) Update Study, Final Report," Itron, Inc., J.J. Hirsch and Associates, Synergy Consulting, and Quantum Consulting. December, 2005. Available at http://eega.cpuc.ca.gov/deer

Appendix B: Program Manager Interview Instrument

Name: ____

Title: ____

Position description and general responsibilities:

____

____

____

We are conducting this interview to obtain your opinions about and experiences with the Home Energy House Call program. We'll talk about the Home Energy House Call Program and its objectives, your thoughts on improving the program, and the technologies the program covers. The interview will take about an hour to complete. May we begin?

Program Objectives

1. In your own words, please describe the Home Energy House Call's current objectives. How have these changed over time?

2. In your opinion, which objectives do you think are best being met or will be met?

3. Are there any program objectives that are not being addressed or not being addressed as well as possible or that you think should have more attention focused on them? If yes, which ones? How should these objectives be addressed? What should be changed?

4. Should the program objectives be changed in any way due to technology-based, market-based, or management based conditions? What objectives would you change? What program changes would you put into place as a result, and how would it affect the operations of the program?

Operational Efficiency

5. Please describe your role and scope of responsibility in detail. What is it that you are responsible for as it relates to this program?

6. Please review with us how the Home Energy House Call operates relative to your duties, that is, please walk us through the processes and procedures and key events that allow you do currently fulfill your duties.

7. Have any recent changes been made to your duties? If so, please tell us what changes were made and why they were made. What are the results of the change?

8. Describe the evolution of the Home Energy House Call Program. How has the program changed since it was it first started?

9. Do you have suggestions for improvements to the program that would increase participation rates or interest levels?

10. Do you have suggestions for improving or increasing energy impacts?

11. Do you have suggestion for the making the program operate more smoothly or effectively?

Program Design & Implementation

12. *(If not captured earlier)* Please explain how the interactions between the auditors, customers and Home Energy House Call's management team work. Do you think these interactions or means of communication should be changed in any way? If so, how and why?

13. Describe your quality control and tracking process.

14. Are key industry experts, trade professionals or peers used for assessing what the technologies or models should be included in the program? If so, how does this work?

15. Are key industry experts and trade professionals used in other advisory roles? If so how does this work and what kinds of support is obtained?

16. Describe Home Energy House Call's auditor program orientation training and development approach. Are auditors getting adequate program training and program information? What can be done that could help improve auditor effectiveness? Can we obtain training materials that are being used?

17. In your opinion, do the audits cover enough different kinds of energy efficient products or recommendations?

 1. ❑ Yes 2. ❑ No 99. ❑ DK/NS

 If no, 20b. What other products or equipment should be included? Why?

18. What market information, research or market assessments are you using to determine the best target markets or market segments to focus on?

19. What market information, research or market assessments are you using to identify market barriers, and develop more effective delivery mechanisms?

20. Overall, what about the Home Energy House Call program works well and why?

21. What doesn't work well and why? Do you think this discourages participation or interest?

22. Can you identify any market, operational or technical barriers that impede a more efficient program operation?

23. In what ways can these operations or operational efficiencies be improved?

24. In what ways can the program attract more participants?

25. How do you make sure that the best information and practices are being used in Home Energy House Call operations?

26. *(If not collected above)* What market information, research or market assessments are you using to determine the best target markets and program opportunities, market barriers, delivery mechanisms and program approach?

27. If you had a magic wand, what one thing would you change and why?

28. Are their any other issues or topics you think we should know about and discuss for this evaluation?

Appendix C: Participant Survey Protocol

The questions below require mostly short, scaled replies from the interviewee, and not all questions will be asked of all participants. This interview should take approximately 10 to 15 minutes.

Home Energy House Call Program

Participant Survey

Contact Module
SURVEY INTRODUCTION

If Home Energy House Call participant, then contact for survey. Use seven attempts at different times of the day and different days before dropping from contact list. Call times are from 10:00 a.m. to 8:00 p.m. EST or 9-7 CST Monday through Saturday. No calls on Sunday. (Sample size N =150-200)

SURVEY

Introduction

Note: Only read words in bold type.

Hello, my name is ______. I am calling on behalf of Duke Energy to conduct a customer survey about the Home Energy House Call Program. May I speak with ____________ please?
If person talking, proceed. If person is called to the phone reintroduce.
If not home, ask when would be a good time to call and schedule the call-back:

Call back 1:	Date: __________,	Time: ____________	❑AM or ❑PM
Call back 2:	Date: __________,	Time: ____________	❑AM or ❑PM
Call back 3:	Date: __________,	Time: ____________	❑AM or ❑PM
Call back 4:	Date: __________,	Time: ____________	❑AM or ❑PM
Call back 5:	Date: __________,	Time: ____________	❑AM or ❑PM
Call back 6:	Date: __________,	Time: ____________	❑AM or ❑PM
Call back 7:	Date: __________,	Time: ____________	❑AM or ❑PM
	❑ Contact dropped after seventh attempt.		

We are conducting this survey to obtain your opinions about the Home Energy House Call Program. Duke Energy's records indicate that you participated in the Home Energy House Call Program. We are not selling anything. The survey will take about 10 minutes and your answers will be confidential, and will help us to make improvements to the program to better serve others. May we begin the survey?

Note: If this is not a good time, ask if there is a better time to schedule a callback.

1. **Do you recall participating in the Home Energy House Call Program?**

1. ❑ Yes, *begin* → *Skip to Q3.*
2. ❑ No,
99. ❑ DK/NS

This program was provided through Duke Energy. In this program, you registered to receive a home energy audit. In return, the auditors provided you with custom energy-saving recommendations for you and your home, and you were provided with a free energy efficiency kit with 10 measures, such as a low-flow showerhead, CFLs, and outlet gaskets.

Do you remember participating in this program?

1. ❑ Yes, *begin* → *Go to Q2.*
2. ❑ No,
99. ❑ DK/NS

If No or DK/NS terminate interview and go to next participant.

2. Please think back to the time when you were deciding to participate in the Home Energy House Call program. What factors motivated you to participate? ***(do not read list, place a "1" next to the response that matches best)***

1. ____ The audit
2. ____ The energy efficiency kit
3. ____ The program incentives
4. ____ The technical assistance from the auditor
5. ____ Recommendation of someone else (*Probe*: **Who?**___________)
6. ____ Wanted to reduce energy costs
7. ____ The information provided by the Program
8. ____ Past experience with this program
9. ____ Because of past experience with another Duke Energy program
10. ____ Recommendation from other utility program

i. (*Probe*: **What program?** ____________________________)

11. ____ Recommendation of family/friend/neighbor
12. ____ Advertisement in newspaper (*Probe*: **For what program?** ____________)
13. ____ Radio advertisement (*Probe*: **For what program?** ___________)
14. ____ Other (SPECIFY) ____
15. ____ Don't know/don't remember/not sure (DK/NS)

If multiple responses: 2.a. **Were there any other reasons?** *(number responses above in the order they are provided - Repeat until 'no' response.)*

Free-Ridership Questions

3. **Before you heard about the Home Energy House Call from Duke Energy, had you already been considering getting a home energy audit?**

1. ❑ Yes
2. ❑ No
3. ❑ Don't Know

4. **If the audit from Duke Energy's Home Energy House Call Program had not been available, would you still have:**

4a. **Purchased an audit?**

1. ❑ Yes
2. ❑ No – *skip to question 5*
3. ❑ Don't Know – *skip to question 5*

4b. **Would you have purchased the audit within the next year?**

1. ❑ Yes
2. ❑ No
3. ❑ Don't Know

5. **Now I'd like to talk about the energy efficiency kit that you received for participating in the Home Energy House Call program. I'm going to read a list of the items included in the kit, and for each one, please tell me if you have installed the item. Are you using the...**

5a. **15-watt CFL** ❑ Yes – *triggers follow up questions 6a-6d.*

❑ No **Do you plan on using this item?** ❑ Yes – *triggers 6a-6d.* ❑ No ❑ Maybe/DK

❑ DK

5b. **20-watt CFL** ❑ Yes – *triggers follow up questions 6a-6d.*

❑ No **Do you plan on using this item?** ❑ Yes – *triggers 6a-6d.* ❑ No ❑ Maybe/DK

❑ DK

5c. **Low-flow showerhead** ❑ Yes – *triggers follow up questions 7a-7d*

❑ No **Do you plan on using this item?** ❑ Yes – *triggers 7a-7d.* ❑ No ❑ Maybe/DK

❑ DK

5d. **kitchen faucet aerator** ❑ Yes – *triggers follow up questions 8a-8d*

❑ No **Do you plan on using this item?** ❑ Yes – *triggers 8a-8d.* ❑ No ❑ Maybe/DK

❑ DK

5e. **bathroom faucet aerator** ❑ Yes – *triggers follow up questions 8a-8d*

❑ No **Do you plan on using this item?** ❑ Yes – *triggers 8a-8d.* ❑ No ❑ Maybe/DK

❑ DK

5f. **outlet gaskets** ❑ Yes – *triggers follow up questions 9a-9d*

❑ No **Do you plan on using this item?** ❑ Yes – *triggers 9a-9d.* ❑ No ❑ Maybe/DK

❑ DK

5g. **window shrink kit** ❑ Yes – *triggers follow up questions 10a-10d*

❑ No **Do you plan on using this item?** ❑ Yes – *triggers 10a-10d.* ❑ No ❑ Maybe/DK

❑ DK

5h. **weather stripping** ❑ Yes – *triggers follow up questions 11a-11d*

❑ No **Do you plan on using this item?** ❑ Yes – *triggers 11a-11d.*
❑ No ❑ Maybe/DK

❑ DK

6a. **Did you have any CFLs installed in your home before you received the kit from the Home Energy House Call program?**

❑ Yes ❑ No ❑ DK

6b. **Were you planning on buying** <additional> **CFLs for your home before you received the kit from the Home Energy House Call program?**

❑ Yes ❑ No ❑ Maybe ❑ DK

❑ No, already have them installed in all available sockets – *skip to next series*

6c. **Have you purchased any CFLs since receiving the kit from Home Energy House Call?**

❑ Yes ❑ No ❑ DK

If yes, 6d. **How many?** ____________________

7a. **Did you have any low-flow showerheads installed in your home before you received the kit from the Home Energy House Call program?**

❑ Yes ❑ No ❑ DK

7b. **Were you planning on buying a low-flow showerhead for your home before you received the kit from the Home Energy House Call program?**

❑ Yes ❑ No ❑ Maybe ❑ DK

❑ No, already have them installed in all showers – *skip to next series*

7c. **Have you purchased any additional low-flow showerheads since receiving the kit from Home Energy House Call?**

❑ Yes ❑ No ❑ DK

If yes, 7d. **How many?** ____________________

8a. **Did you have any faucet aerators installed in your home before you received the kit from the Home Energy House Call program?**

❑ Yes ❑ No ❑ DK

8b. **Were you planning on buying any faucet aerators for your home before you received the kit from the Home Energy House Call program?**

❑ Yes ❑ No ❑ Maybe ❑ DK

❑ No, already have them installed in all available faucets – *skip to next series*

8c. **Have you purchased any additional faucet aerators since receiving the kit from Home Energy House Call?**

❑ Yes ❑ No ❑ DK

If yes, 8d. **How many?** ____________________

9a. **Did you have any outlet gaskets installed in your home before you received the kit from the Home Energy House Call program?**

❑ Yes ❑ No ❑ DK

9b. **Were you planning on buying any outlet gaskets for your home before you received the kit from the Home Energy House Call program?**

❑ Yes ❑ No ❑ Maybe ❑ DK

❑ No, already have them installed in all available outlets – *skip to next series*

9c. **Have you purchased any additional outlet gaskets since receiving the kit from Home Energy House Call?**

❑ Yes ❑ No ❑ DK

If yes, 9d. **How many?** ____________________

10a. **Did you have any window shrink kits installed in your home before you received the kit from the Home Energy House Call program?**

❑ Yes ❑ No ❑ DK

10b. **Were you planning on buying any window shrink kits for your home before you received the kit from the Home Energy House Call program?**

❑ Yes ❑ No ❑ Maybe ❑ DK

❑ No, already have them installed in all available windows – *skip to next series*

10c. **Have you purchased any additional window shrink kits since receiving the kit from Home Energy House Call?**

❑ Yes ❑ No ❑ DK

If yes, 10d. **For how many windows?**

____

11a. **Did you have any weather stripping installed in your home before you received the kit from the Home Energy House Call program?**

❑ Yes ❑ No ❑ DK

11b. **Were you planning on buying any weather stripping for your home before you received the kit from the Home Energy House Call program?**

❑ Yes ❑ No ❑ Maybe ❑ DK

❑ No, already have them installed around all available doors – *skip to next series*

11c. **Have you purchased any additional weather stripping since receiving the kit from Home Energy House Call?**

❑ Yes ❑ No ❑ DK

If yes, 11d. **For how many doors?**

____

Spillover Questions

12. Since you participated in the Home Energy House Call Program, have you purchased and installed any other type of energy efficiency equipment or made energy efficiency improvements in your home that were recommended by the audit report?

1. ❑ Yes
2. ❑ No
3. ❑ Don't Know

13. What type and quantity of high efficiency equipment did you install on your own? *PROBE TO GET EXACT TYPE AND QUANTITY AND LOCATION*

Type 1: ________________ Quantity 1: _____ Location 1:__________
Type 2: ________________ Quantity 2: _____ Location 2:__________
Type 3: ________________ Quantity 3: _____ Location 3:__________
Type 4: ________________ Quantity 4: _____ Location 4:__________

14. Was this improvement suggested by the home energy audit provided to you through the Home Energy House Call program?

Type 1: ________________ ❑ Yes ❑ No ❑ DK
Type 1: ________________ ❑ Yes ❑ No ❑ DK
Type 1: ________________ ❑ Yes ❑ No ❑ DK
Type 1: ________________ ❑ Yes ❑ No ❑ DK

15. *For each type listed in 13 above,* **How do you know that this equipment is high efficiency? For example, was it Energy Star rated?**

Type 1: ____
Type 2: ____
Type 3: ____
Type 4: ____

I'm going to read a statement about this equipment that you purchased on your own. On a scale from 1-10, with 0 indicating that you strongly disagree, and 10 indicating that you strongly agree, please rate the following statement.

16. **My experience with the Home Energy House Call Program in** <2006, 2007, 2008> **influenced my decision to install** <Type 1/Type 2/Type 3/Type 4> **on my own.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

17. What other actions, if any, have you taken in your home to save energy and reduce utility bills at least in part as a result of what you learned in this program?
Response:1 ____________________

Response:2 ____________________

Response:3 ____________________

Response:4 ____________________

Now I am going to ask you some general satisfaction statements. On a scale from 1-10, with 0 indicating that you strongly disagree, and 10 indicating that you strongly agree, please rate the following statements.

18. **The web site's form for getting the kit was easy to understand and complete.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

If 7 or less, **How could this be improved?**____________________

____

19. **Scheduling the home energy audit was easy to do.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

If 7 or less, **How could this be improved?**____________________

____

20. **The interactions and communications I had with the energy auditor were satisfactory.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know ❑ Not Applicable (no interaction)

If 7 or less, **How could this be improved?**____________________

____

21. **The energy auditor was friendly, helpful, and knowledgeable.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know ❑ Not Applicable (no interaction)

If 7 or less, **How could this be improved?**___________________________________

____

22. **The audit report was easy to read and understand.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

If 7 or less, **How could this be improved?**___________________________________

____

23. **The recommendations in the audit report provided new ideas that I was not previously considering.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

If 7 or less, **How could this be improved?**___________________________________

____

24. **The recommendations in the audit report confirmed by thinking and increased the likelihood that I would take recommended actions.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

If 7 or less, **How could this be improved?**___________________________________

____

25. **The interactions and communications I had with Duke Energy staff was satisfactory.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know ❑ Not Applicable (no interaction)

If 7 or less, **How could this be improved?**__________________________________

____

26. **The measures I installed from in the energy efficiency kit were of satisfactory quality.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

If 7 or less, **How could this be improved?**__________________________________

____

27. **Overall I am satisfied with the program.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

If 7 or less, **How could this be improved?**__________________________________

____

28. What additional services would you like the program to provide that it does not now provide?
Response:

____

____

29. Are there any other things that you would like to see changed about the program?

Response:

____

30. **What do you think can be done to increase people's interest in participating in the Home Energy House Call Program?**

Response:1 ____
Response:2 ____
Response:3 ____
Response:4 ____

32. What do you like most about this program?

Response:

____

33. What do you like least about this program?

Response:

____

Appendix D

Energy Impact Evaluation of the NEED Program in Kentucky

Final Report

Reviewed for
Duke Energy
139 East Fourth Street
Cincinnati, OH 45201

September 15, 2008

Submitted by:

Johna Roth and Nick Hall
TecMarket Works
165 West Netherwood Road
Oregon, WI 53575
(608) 835-8855

TECMARKET Works

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This study was conducted via a joint evaluation effort between Duke Energy and TecMarket Works. Duke Energy staff obtained the NEED student survey data and estimated the energy savings from the survey responses using the savings calculations developed by the TecMarket Works and Building Metrics analysis team. TecMarket Works reviewed the survey data and the energy estimation approach to confirm the objectivity and accuracy of the savings estimates and adjusted the findings to account for self selection bias. This report provides the results of that evaluation collaboration.

Introduction

As a part of the National Energy Education Development (NEED) program, the Residential Comprehensive Energy Education program provides educational materials, lessons, and other learning opportunities for both teachers and students to learn about scientific, economic, and environmental impacts of energy.

As one part of the program, energy savings are encouraged through the distribution of an energy efficiency kit and encouragement for the students to work with their parents to install the measures in the kit. This is done as part of the classroom lessons on energy use and energy efficiency approaches. Kits are distributed to participating schools located within the service territory after the teachers enroll in the NEED program. The items included in the kit:

- One compact fluorescent light bulb,
- One low-flow showerhead,
- 12 switch/outlet gaskets,
- One bathroom faucet aerator, and
- One kitchen faucet aerator.

Students are then given a short survey, implemented by the teacher, which is taken from the curriculum guide. Students are asked to answer questions about the items from the kit that they or their family have installed. The students then bring the survey back to school. The teacher returns the completed surveys to the NEED Coordinators, who tabulate the data. The survey data is then used to estimate the level of energy savings achieved by the installation of the measures as reported by the students or their parents on the survey instrument. The survey received by the students is found at the end of this report in Appendix A: Example of Questions on Kentucky Kit Installation Student Survey.

Program Participation

For the 2007-2008 school year, the Kentucky NEED program distributed 551 energy efficiency kits to students. Of these distributions, 100 surveys were returned, for an 18.1% response rate. The survey data was collected from 4 schools: St. Thomas, Lincoln, Holy Family, and St. Augustine. The total number of responses from each school is presented in Table 1.

Table 1. KY Kit Surveys Returned.

School	Kit Survey Responses	Percent
St. Thomas	17	17.0%
Lincoln	12	12.0%
Holy Family	9	9.0%
St. Augustine	62	62.0%
Total	100	100.0%

Survey Response and Energy Savings

The CFL was the most frequently installed kit item. This may be due to ease of installation compared to the other kit items, since the installation of the CFL does not require the use of any tools, and can often be completed without or with less parental help/supervision than the other kit items. The rest of the kit items were installed in at levels less than the CFLs, however, installation rates for the non-CFL measures fall above the 30% range. The following table provides the installation rates for the measures included in the kits. As presented in the following table, the rest of the kit items were installed in similar quantities, with the next most frequent installation being the outlet gaskets, and the least frequent installation being the showerhead.

Table 2. Frequency of Kit Item Installation.

Kit Item	Installations	Total Responses	Percent Install
CFL	60	100	60.0%
Outlet Gaskets	36	97	37.1%
Bath Aerator	35	99	35.4%
Kitchen Aerator	34	98	34.7%
Showerhead	32	100	32.0%
Total	197	494	39.9%

The student survey asks many follow-up questions regarding the installation and use conditions of each kit item, however, due to data collection issues, only the frequency of the installation of each kit item was captured from the survey. Thus, to estimate energy savings from the kit items the evaluation used the survey results from a different program that collected installation and use conditions associated with the measures installed in residential homes by people receiving Duke Energy's energy saving kits. The evaluation used to assess the installation and use conditions for the NEED program was taken from the survey of the people who received the kit via the Kentucky Personalized Energy Report. The items students receive in the energy efficiency kit through the Kentucky NEED program are nearly identical to those received by customers as a part of the KY PER program. As a result, if the measures are used in the same way, the savings should be representative of the NEED program kit measure use. The calculation of the KY PER savings uses engineering algorithms developed from DOE-2 models, as well as standard engineering texts linked to questions about installation and use practices. These algorithms are presented in Appendix B: Impact Estimation Algorithms from KY PER Impact Evaluation.

The savings for each measure included in the kit and the average savings per install for the 100 responding participants are presented in Table 3, below. The CFL included in the kit is of a slightly lower wattage than the bulb included in the KY PER kits (13W instead of 15W), and therefore has slightly higher savings associated with it. To estimate the savings for installing the 13W bulb, the savings for the 15W bulb was increased by two times the average savings per watt to account for the two watt difference. That is:

$$13WCFLSavings = 15WCFLSavings + 2\left(\frac{15WCFLSavings}{15W}\right)$$

In total, a savings of 0.27 kW, 3,630 kWh, and 296 Therms are realized for the kit measures installed by the 100 participants that returned the survey. Note that the Therm savings for the CFL bulb installation are negative, indicating an increase in natural gas consumption due to less heat being produced by the CFL compared to a standard incandescent. This loss of heat has to be captured via increased natural gas usage in the winter while saving air conditioning energy in the summer.

Table 3. Kit Item Savings.

		Average PER Savings			KY NEED Kit Installation Savings[1]		
	Installs	kW	kWh	Therm	kW	kWh	Therm
CFL (13W)	60	0.01	136.53	-0.20	0.37	8191.96	-8.35
Showerhead	32	0.01	127.09	12.8	0.45	4066.88	279.35
Bath Aerator	35	0.00	6.68	0.38	0.00	233.80	9.07
Kitchen Aerator	34	0.00	5.69	0.37	0.00	193.46	8.58
Outlet Gaskets	36	0.00	14.37	0.29	0.15	517.32	7.12
Total					0.98	13203.42	295.77

[1] Savings account for customer fuel type.

Adjusted Energy Impacts

This program is provided to students and their families without any enrollment requirements, under a condition in which the measures are given to participants. It is assumed that the measures in the kit represent additional items beyond what they would have obtained on their own if the measures were reported as installed. That is, each install is counted as an action that would not have occurred if the student did not bring home the kit and arrange for the measures to be installed. Therefore there is no freeridership calculated for this program. However, we do not know how representative the results of the 100 returned surveys are of the whole population of 386. That is, there is reason to believe that the students and parents returning the survey have more of an interest in the measures and in installing them because of their child's involvement in the program.

Self-Reporting Bias

There are substantial risks associated with relying on self-reported behavioral changes, because the foundation of the savings estimates are based solely on the participant's responses, with no means within the evaluation budget to verify that the respondent has installed the measures and are using them effectively or to document past installation or measure use behaviors. The 100 survey respondents are more likely to be interested in the kit's measures and the associated savings than those who did not respond. Likewise, they are also more likely to have a past behavior associated with saving energy than people who are less interested in the subject. In this analysis, the survey response rate of 18.1% is low, leading TecMarket Works (as the reviewer of this analysis) to believe that the self-reporting bias may be somewhat high for this program. While we are unable to measure this bias, based on our evaluation experience and the literature regarding self selection, we estimate that the self-reporting bias is probably between 25 and 50 percent of the behavior change and associated savings when applied to the entire participant population.

Table 4 presents the total gross energy impact estimates for the installed measures for the population based on the 100 returned surveys. Table 5 presents the savings after a 25% self-reporting bias is applied, and Table 6 presents the savings after a 50% self-reporting bias is applied.

The true energy savings from this program and its 551 participants is likely between the estimates provided in Table 5 and Table 6.

Table 4. Gross Energy Impacts of 551 Kits

	Percent Install	kW	kWh	Therm
CFL (13W)	60.00%	2.06	45137.70	-46.00
Showerhead	32.00%	2.46	22408.51	1539.20
Bath Aerator	35.35%	0.02	1301.25	50.48
Kitchen Aerator	34.69%	0.01	1087.72	48.24
Outlet Gaskets	37.11%	0.86	2938.59	40.44

Total		5.40	3630.941	1632.37

Table 5. Net Energy Impacts of 551 Kits; Adjusted for 25% Self-Reporting Bias

	Percent Install	kW	kWh	Therm
CFL (13W)	60.00%	1.55	33853.27	-34.50
Showerhead	32.00%	1.84	16806.38	1154.40
Bath Aerator	35.35%	0.01	975.94	37.86
Kitchen Aerator	34.69%	0.01	815.79	36.18
Outlet Gaskets	37.11%	0.64	2203.94	30.33
Total		4.05	54655.33	1224.28

Table 6. Net Energy Impacts of 551 Kits; Adjusted for 50% Self-Reporting Bias

	Percent Install	kW	kWh	Therm
CFL (13W)	60.00%	1.03	22568.85	-23.00
Showerhead	32.00%	1.23	11204.25	769.60
Bath Aerator	35.35%	0.01	650.63	25.24
Kitchen Aerator	34.69%	0.01	543.86	24.12
Outlet Gaskets	37.11%	0.43	1469.30	20.22
Total		2.70	36436.88	816.19

Using the average expected savings associated with the mid-point of the expected self selection bias provides a net energy savings for the total 551 participants in this program of 3.38 kW, 45,546 kWh, and 1020.23 Therms.

Effective Useful Life

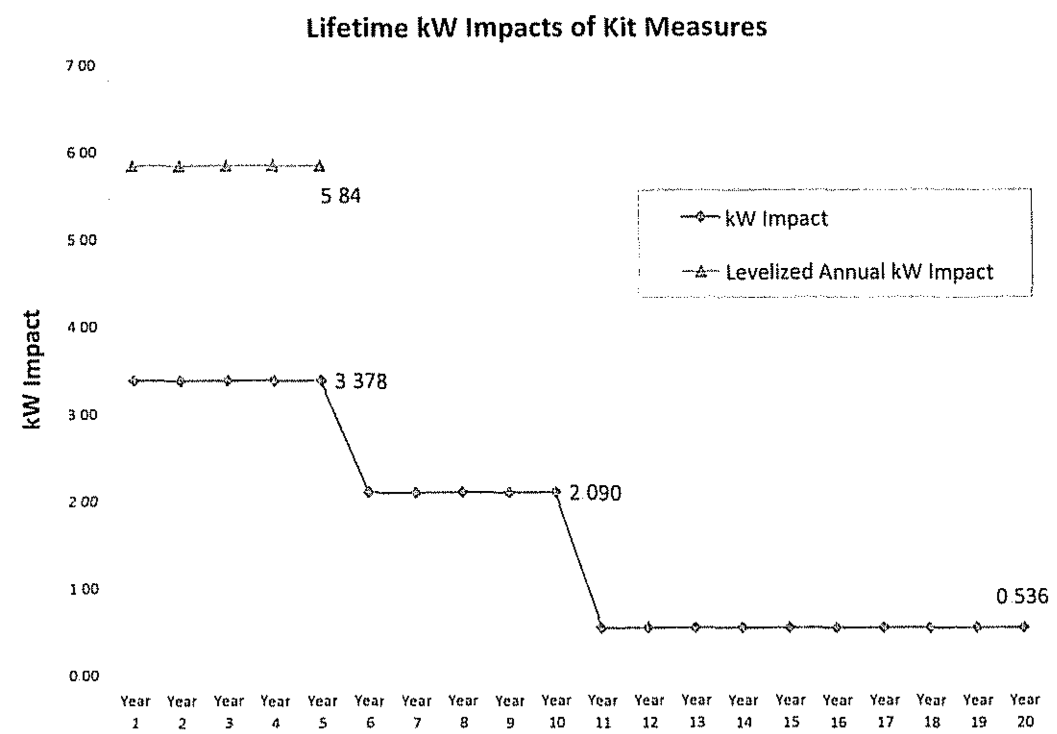
The energy impacts over the lifetime of the measures were calculated using the following life spans:

Table 7. Lifetimes of Kit Measures.

Kit Measures	Effective Useful Life
13-watt CFL	5
Outlet gaskets	20
Showerhead	10
Bathroom aerator	10
Kitchen aerator	10

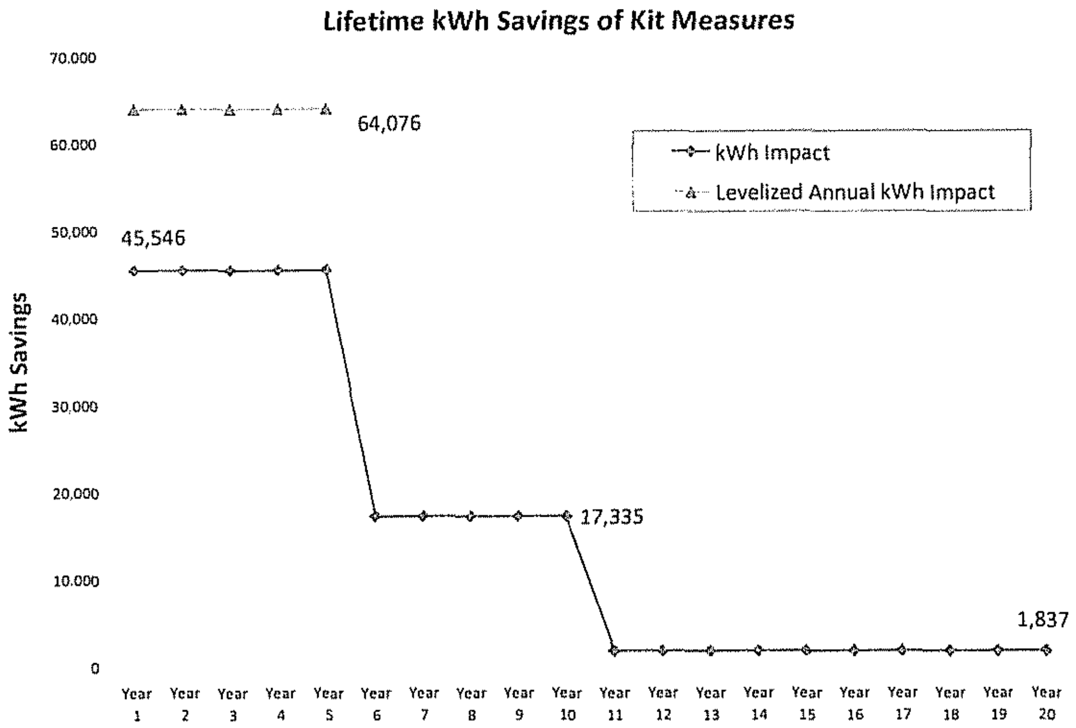
The kW impacts begin at 3.378 kW for the first 5 years, then drop to 2.090 starting at year 6. By year 11, kW impacts have dropped to 0.536 kW and remain there for the lifetime of the measures. The levelized annual kW impact is 5.84 kW over 5 years.

Table 8. Lifetime kW Impacts of Kit Measures.



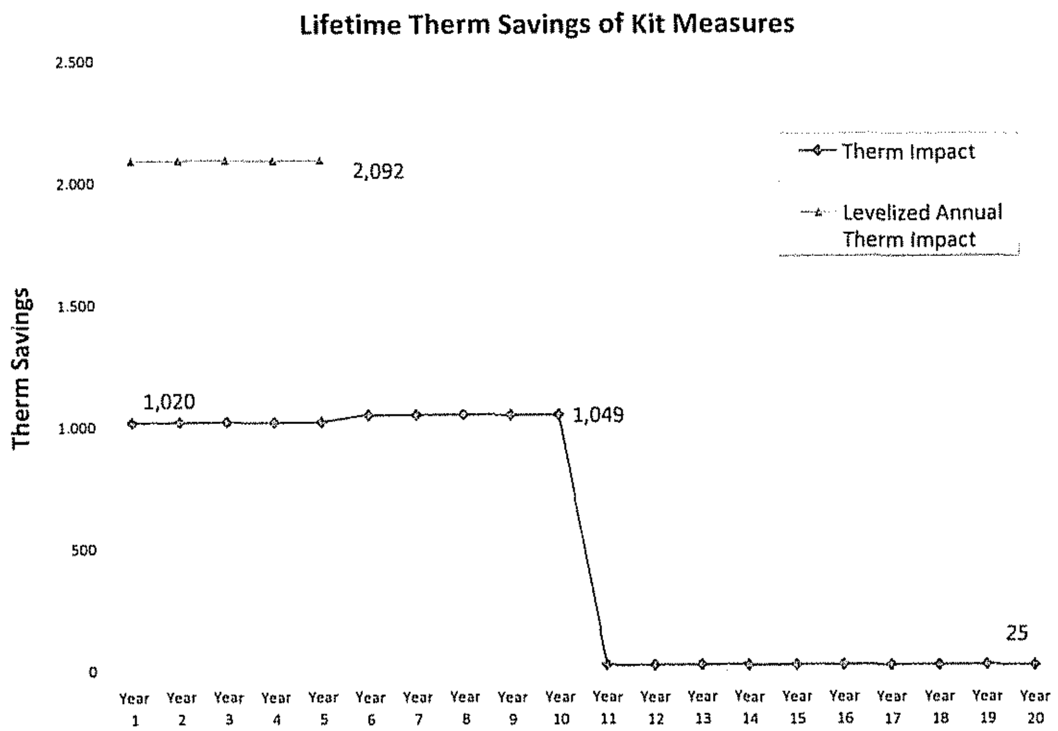
The kWh impacts begin at 45,546 kWh for the first 5 years, then drop to 17,335 kWh starting at year 6. By year 11, kWh impacts have dropped to 1,837 kWh and remain there for the lifetime of the measures. The levelized annual kWh impact is 64,076 kWh over 5 years.

Table 9. Lifetime kWh Savings of Kit Measures.



The Therm impacts for the kit measures begin at 1,020 Therm through year 5. At year 6, the lifetime of the CFL bulb ends, and due to the CFL having negative Therm savings during its lifetime, savings rise slightly to 1,049 Therm. At year 11, kWh impacts have dropped significantly to 25 Therm and remain there for the lifetime of the measures. The levelized annual kWh impact is 2,092 Therm over 5 years.

Table 10. Lifetime Therm Savings of Kit Measures.



Recommendations

Improve Survey Approach Used to Estimate Savings

In order to more accurately account for energy savings for this program, participant installation and measure use conditions need to be collected and assessed. The NEED program needs to focus more attention on making sure the students and parents complete and return the survey used to document savings and program effects. The program needs to devise an approach for increasing the response rates for the student survey with a target of receiving 60% of the surveys distributed to the students. This survey should have the information necessary to calculate expected savings. That is, it needs to contain information about the measure baseline condition (type of measure replaced and measure use conditions) that can feed an impact estimation analysis.

These responses provide the utility and evaluators with the measure use detail needed to more accurately predict and assign reasonable evaluation estimates where students install the energy efficiency kit measures. Toward this end, the program manager should work with the schools and NEED coordinators to ensure that survey data is collected and provided to Duke Energy to cover as many of the energy efficiency kits distributed through this program as possible.

Increase Program Savings

In addition to the recommendation above, program managers should also work to increase energy savings for the program. Possible ways to increase savings include:

- Duke Energy should consider including clear participant-focused, easily accessible information on the effectiveness of installing the items that provide the highest level of savings so that participants see the benefit information as soon as they open the kit and look at that measure.

- Encourage the participants to install the CFLs in high-usage fixtures and/or offer more CFLs to boost the program savings for the program.

Appendix A: Example of Questions on Kentucky Kit Installation Student Survey

Lesson 11

HOME ACTIVITY 11-2

INSTALLATION SURVEY

1 Did you install the compact fluorescent lightbulb (CFL) from the kit?

_____ yes What was the wattage of the bulb you replaced? __________

In what room did you install it? __________________________

How many hours a day (on average) is that light used? __________

_____ no Why not? ____

Do you plan to install the CFL? _____ yes _____ no

If yes when and in which room? ______________________________________

2. Did you install the low-flow showerhead from the kit?

_____ yes Flow BEFORE _______ Flow AFTER _______ (see page 41)

_____ no Why not? ____

Do you plan to install the showerhead? _____ yes _____ no

3 Did you install the bathroom sink aerator from the kit?

_____ yes Flow BEFORE _______ Flow AFTER _______ (see page 41)

_____ no Why not? ____

Do you plan to install the bathroom aerator? _____ yes _____ no

4 Did you install the kitchen sink aerator from the kit?

_____ yes Flow BEFORE _______ Flow AFTER _______ (see page 41)

_____ no Why not? ____

Do you plan to install the kitchen aerator? _____ yes _____ no

5. Did you install the outlet and switch gaskets?

_____ yes

_____ no Why not? ____

Do you plan to install the gaskets? _____ yes _____ no

6 Did you adjust the temperature setting on the following?

Water Heater:

_____ yes Temp BEFORE _______ Temp AFTER _______

_____ no Why not? ____

Refrigerator:

_____ yes Temp BEFORE _______ Temp AFTER _______

_____ no Why not? ____

Freezer:

_____ yes Temp BEFORE _______ Temp AFTER _______

_____ no Why not? ____

7 Have you made any other changes to your home as a result of this unit (insulation weatherstripping etc)?

____

Appendix B: Impact Estimation Algorithms from KY PER Impact Evaluation

CFLs

General Algorithm

Gross Summer Coincident Demand Savings

$$\Delta kW_S = \text{units} \times \left[\frac{(Watts \times DF_s)_{base} - (Watts \times DF_s)_{ee}}{1000}\right] \times CF_S \times (1 + HVAC_{d,\,s})$$

Gross Annual Energy Savings

$$\Delta kWh = \text{units} \times \left[\frac{(Watts \times DF)_{base} - (Watts \times DF)_{ee}}{1000}\right] \times FLH \times (1 + HVAC_c)$$

$$\Delta therm = \Delta kWh \times HVAC_g$$

where:

ΔkW	= gross coincident demand savings
ΔkWh	= gross annual energy savings
$\Delta therm$	= gross annual therm interaction
units	= number of units installed under the program
$Watts_{ee}$	= connected (nameplate) load of energy-efficient unit
$Watts_{base}$	= connected (nameplate) load of baseline unit(s) displaced
FLH	= full-load operating hours (based on connected load)
DF	= demand diversity factor
CF	= coincidence factor
$HVAC_c$	= HVAC system interaction factor for annual electricity consumption
$HVAC_d$	= HVAC system interaction factor for demand
$HVAC_g$	= HVAC system interaction factor for annual gas consumption

15 W CFL Measure

$Watts_{ee}$ = 15, which is the input power of program supplied CFL

$Watts_{base}$ - calculated from survey responses as shown below:

Wattage of bulb removed	$Watts_{base}$	Notes
<= 44	40	Most popular size < 44 W
45 - 70	60	Lumen equivalent of 15 W CFL

71 - 99	75	Most popular size in range
> = 100	100	Most popular size in range

FLH - calculated from survey responses as shown below:

Hours of use per day	FLH	Notes
<1	183	Average value over range
1-2	548	Average value over range
3-4	1278	Average value over range
5-10	2738	Average value over range
11-12	4198	Average value over range
13-24	6753	Average value over range

DF = 1.0 and CF = 0.10

The coincidence factor for this analysis was taken as the average of the coincidence factors estimated by PG&E and SCE for residential CFL program peak demand savings. The PG&E and SCE coincidence factors are combined factors that consider both coincidence and diversity, thus the diversity factor for this analysis was set to 1.0

$HVAC_c$ - the HVAC interaction factor for annual energy consumption depends on the HVAC system, heating fuel type, and location. The HVAC interaction factors for annual energy consumption were taken from DOE-2 simulations of the residential prototype building described at the end of this Appendix.

Covington, KY

Heating Fuel	Heating System	Cooling System	HVACc	HVACg
Other	Any except Heat Pump	Any except Heat Pump	0	0
Any	Heat Pump	Heat Pump	-0.16	0
Gas Propane Oil	Central Furnace	None	0	-0.0021
		Room/Window	0.079	-0.0021
		Central AC	0.079	-0.0021
	Other	None	0	-0.0021
		Room/Window	0.079	-0.0021
		Central AC	0.079	-0.0021
Electricity	Central furnace	None	-0.45	0
		Room/Window	-0.36	0
		Central AC	-0.36	0
	Electric baseboard	None	-0.45	0
		Room/Window	-0.36	0
		Central AC	-0.36	0

	Other	None	-0.45	0
		Room/Window	-0.36	0
		Central AC	-0.36	0

$HVAC_d$ - the HVAC interaction factor for demand depends on the cooling system type. The HVAC interaction factors for summer peak demand were taken from DOE-2 simulations of the residential prototype building described at the end of this Appendix.

Covington, KY

Cooling System	HVACd
None	0
Room/Window	.17
Central AC	.17
Heat Pump	.17

Outlet Gaskets

Gross Summer Coincident Demand Savings

$\Delta kW_S = \text{units} \times (\Delta cfm/unit) \times (kW / cfm) \times DF_S \times CF_S$

Gross Annual Energy Savings

$\Delta kWh = \text{units} \times (\Delta cfm/unit) \times (kWh / cfm)$

$\Delta therm = units \times (\Delta cfm / unit) \times (therm / cfm)$

where:

ΔkW	= gross coincident demand savings
ΔkWh	= gross annual energy savings
units	= number of buildings sealed under the program
$\Delta cfm/unit$	= unit infiltration airflow rate (ft^3/min) reduction for each measure
DF	= demand diversity factor = 0.8
CF	= coincidence factor = 1.0
kW/cfm	= demand savings per unit cfm reduction
kWh/cfm	= electricity savings per unit cfm reduction
therm/cfm	= gas savings per unit cfm reduction

Unit cfm savings per measure

The cfm reductions for each measure were estimated from equivalent leakage area (ELA) change data taken from the ASHRAE Handbook of Fundamentals (ASHRAE, 2001).

The equivalent leakage area changes were converted to infiltration rate changes using the Sherman-Grimsrud equation:

$$Q = ELA \times \sqrt{A \times \Delta T + B \times v^2}$$

where:

A	= stack coefficient ($ft^3/min\text{-}in^4\text{-}°F$) = 0.015 for one-story house
ΔT	= average indoor/outdoor temperature difference over the time interval of interest (°F)
B	= wind coefficient ($ft^3/min\text{-}in^4\text{-}mph^2$) = 0.0065 (moderate shielding)
v	= average wind speed over the time interval of interest measured at a local weather station at a height of 20 ft (mph)

The location specific data are shown below:

Location	Average outdoor temp	Average indoor/outdoor temp difference	Average wind speed (mph)	Specific infiltration rate (cfm/in^2)
Covington	33	35	22	1.92

Measure ELA impact and cfm reductions are as follows:

Measure	Unit	ELA change (in^2/unit)	ΔCfm/unit (KY)
Outlet gaskets	Each	0.357	0.69

Unit energy and demand savings

The energy and peak demand impacts of reducing infiltration rates were calculated from infiltration rate parametric studies conducted using the DOE-2 residential building prototype models, as described at the end of this Appendix. The savings per cfm reduction by heating and cooling system type are shown below:

Heating Fuel	Heating System	Cooling System	kWh/cfm	kW/cfm	therm/cfm
Other	Any except Heat Pump	Any except Heat Pump	1.14	0.00000	0.000
Any	Heat Pump	Heat Pump	12.85	0.00248	0.000
Gas Propane Oil	Central Furnace	None	0	0	0.124
		Room/Window	1.14	0.00000	0.124
		Central AC	1.14	0.00000	0.124
	Other	None	0	0	0.124
		Room/Window	1.14	0.00000	0.124

		Central AC	1.14	0.00000	0.124
Electricity	Central furnace	None	23.27	0.01238	0.000
		Room/Window	23.84	0.01485	0.000
		Central AC	23.84	0.01485	0.000
	Electric baseboard	None	23.27	0.01238	0.000
		Room/Window	23.84	0.01485	0.000
		Central AC	23.84	0.01485	0.000
	Other	None	23.27	0.01238	0.000
		Room/Window	23.84	0.01485	0.000
		Central AC	23.84	0.01485	0.000

Low-Flow Showerhead

Gross Summer Coincident Demand Savings

$$\Delta kW_S = units \times \frac{(GPD_{base} - GPD_{ee}) \times 8.33 \times \overline{\Delta T}}{3413_s} \times DF_s \times CF_s$$

Gross Annual Energy Savings

$$\Delta kWh = \text{units} \times \frac{(\text{GPD}_{\text{base}} - \text{GPD}_{\text{ee}}) \times 8.33 \times \overline{\Delta T}}{3413} \times 365$$

$$\Delta therm = units \times \frac{(GPD_{base} - GPD_{ee}) \times 8.33 \times \overline{\Delta T}}{\eta_{waterheater}} \times \frac{365}{100000}$$

where:

ΔkW	= gross coincident demand savings
ΔkWh	= gross annual energy savings
units	= number of units installed under the program
GPD_{base}	= daily hot water consumption before installation
GPD_{ee}	= daily hot water consumption after flow reducing measure installation
ΔT	= average difference between entering cold water temperature and the shower use temperature
DF	= demand diversity factor for electric water heating
CF	= coincidence factor
8.33	= conversion factor (Btu/gal-°F)
3413	= conversion factor (Btu/kWh)

24	= conversion factor (hr/day)
365	= conversion factor (days/yr)
100000	= conversion factor (Btu/therm)

Showerhead

GPD_{base} = showers/week / 7 x 3.1 gpm x 5 minutes/shower

GPD_{ee} = showers/week / 7 x 1.5 gpm x 5 minutes/shower

ΔT

City	Average cold water temperature	Shower use temperature	Average ΔT
Covington	53.9°F	100°F	46.1°F

Water heater efficiency

Combustion efficiency for residential gas water heater = 0.70

Demand diversity factor = 0.1

Coincidence factor = 0.4

The diversity and coincidence factors were taken from *Engineering Methods for Estimating the Impacts of DSM Programs, Volume 2* (EPRI, 1993). These values are typical for the residential water heating end-use in a summer peaking utility.

Faucet Aerators

This measure used the Efficiency Vermont deemed savings (Efficiency Vermont, 2003) adjusted for entering water temperature:

Demand Savings
$\Delta kW = 0.0171\ kW \times \Delta T / \Delta T_{VT} \times DF \times CF$

Energy Savings
$\Delta kWh_i = 57\ kWh \times \Delta T / \Delta T_{VT}$
$\Delta therms = 2.0 \times \Delta T / \Delta T_{VT\ i}$

City	Average cold water temperature	Hot water use temperature	Average ΔT
Covington	53.9°F	100°F	46.1°F

Burlington VT	44.5	100°F	55.5

Demand diversity factor = 0.1

Coincidence factor = 0.4

The diversity and coincidence factors were taken from *Engineering Methods for Estimating the Impacts of DSM Programs, Volume 2* (EPRI, 1993). These values are typical for the residential water heating end-use in a summer peaking utility.

Prototypical Building Model Description

The impact analysis for many of the HVAC related measures are based on DOE-2.2 simulations of a set of prototypical residential buildings. The prototypical simulation models were derived from the residential building prototypes used in the California Database for Energy Efficiency Resources (DEER) study (Itron, 2005), with adjustments make for local building practices and climate. The prototype "model" in fact contains 4 separate residential buildings; 2 one-story and 2 two-story buildings. The each version of the 1 story and 2 story buildings are identical except for the orientation, which is shifted by 90 degrees. The selection of these 4 buildings is designed to give a reasonable average response of buildings of different design and orientation to the impact of energy efficiency measures. A sketch of the residential prototype buildings is shown in Figure 1.

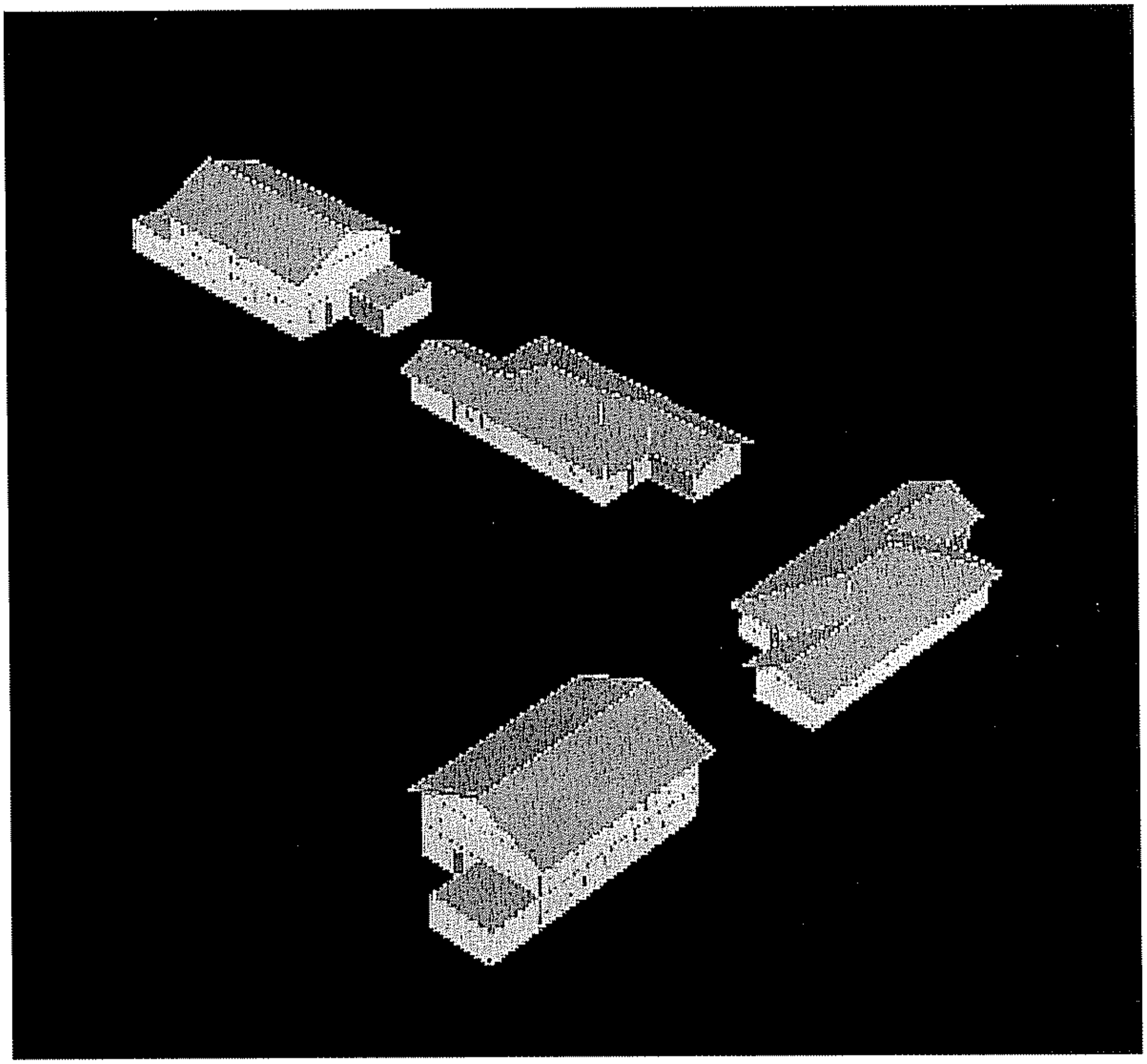


Figure 1. Computer Rendering of Residential Building Prototype Model

The general characteristics of the residential building prototype model are summarized below:

Residential Building Prototype Description

Characteristic	Value
Conditioned floor area	1 story house: 1465 SF 2 story house. 2930 SF
Wall construction and R-value	Wood frame with siding, R-11
Roof construction and R-value	Wood frame with asphalt shingles, R-19
Glazing type	Single pane clear
Lighting and appliance power density	0.51 W/SF average
HVAC system type	Packaged single zone AC or heat pump
HVAC system size	Based on peak load with 20% oversizing Average 640 SF/ton

Characteristic	Value
HVAC system efficiency	SEER = 8.5
Thermostat setpoints	Heating: 70°F with setback to 60°F Cooling: 75°F with setup to 80°F
Duct location	Attic (unconditioned space)
Duct surface area	Single story house: 390 SF supply, 72 SF return Two story house: 505 SF supply, 290 SF return
Duct insulation	Uninsulated
Duct leakage	26%; evenly distributed between supply and return
Cooling season	Charlotte – April 17 to October 6 Covington
Natural ventilation	Allowed during cooling season when cooling setpoint exceeded and outdoor temperature < 65°F. 3 air changes per hour

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Appendix E

Final Report

An Evaluation Energy Star Products

Results of a Process and Impact Evaluation of Duke Energy's CFL Promotion and Lighting Logger Programs

September 24, 2008

Prepared for

Duke Energy
139 East Fourth Street
Cincinnati, OH 45202

Prepared by:

Nick Hall, Johna Roth

TecMarket Works
165 West Netherwood Road, Suite A
Oregon, WI 53575
Voice: (608) 835-8855
Fax: (608) 835-9490
Mail@TecMarket.net

Pete Jacobs

BuildingMetrics
2540 Frontier Ave
Boulder, CO 80301
Voice: (303) 444-4149
Fax: (608) 835-9490
pjacobs@archenergy.com

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This evaluation was conducted by TecMarket Works and BuildingMetrics with support from Duke Energy

The process evaluation was conducted by TecMarket Works. The impact evaluation was conducted by Duke Energy with BuildingMetrics supervision and approval. The CFL surveys were conducted by Duke Energy and the analysis was supervised and approved by TecMarket Works. TecMarket Works and BuildingMetrics are independent evaluation firms providing energy efficiency program evaluation services to government and utility clients.

Executive Summary

This report presents the findings of the CFL Promotions Programs for Duke Energy from November 2007 through February 2008. This report reviews the program's customer satisfaction, customer demographics, customer CFL use, and the impacts from the CFLs purchased through the program. The evaluation is separated into the two components: first is the Wal-Mart CFL Promotion; the second is the Logger Study (Initial and Final). In addition, four surveys were conducted across various program participant groups, including:

- **Wal-Mart CFL Promotion (October-December 2007)**
  - Description: Customers were mailed coupons to purchase General Electric CFLs for $1 at Wal-Mart Stores.
  - Surveys:
    - Wal-Mart CFL Redeemer Survey
    - Wal-Mart CFL Non-redeemer Survey
    - Wal-Mart In-Store Purchases Survey (same as Wal-Mart CFL Redeemer Survey but also included additional in-store purchase questions).

- **Initial Lighting Logger Study (November 2007)**
  - Description: 41 households participated in a lighting logger study in which four or five light bulbs in the homes were fitted with loggers. Usage was tracked for approximately one month.
  - Survey:
    - Premeasure Survey

- **Final Lighting Logger Study (February 2008)**
  - Description: 51 households who indicated that they redeemed Wal-Mart CFL coupons were fitted with loggers on four or five bulbs in their homes. Their lighting usage was tracked for approximately one month.
  - Survey:
    - Wal-Mart CFL Redeemer Survey

Each of the program's participant groups (as bulleted above) are first presented separately, then Section 6 compares the program's demographics and survey results to each other for the reader to better understand the results and optimal demographics to target in future outreach efforts of CFL promotions and programs.

According to the program manager, the primary objective of this program is for Duke Energy customers to purchase and install 500,000 CFLs in Ohio. Other objectives include identifying new ENERGY STAR® products to promote, and to improve customer satisfaction with Duke Energy. Program staff is continuing to look at new products that they can include - cost effectively - into the mix of program offerings, such as clothes washers and LED Christmas lights. However, this evaluation report focuses on CFLs only.

Methodology

To conduct the energy impact analysis this study combined the information from two data collection approaches that together allowed the estimation of saved energy. In addition, this study conducted interviews with program managers and retail store managers, that when combined with customer surveys allowed for the assessment of the operations of the program.

The kilowatt hour savings were calculated using the data obtained from the initial and final logger studies performed on homes in the area, which provided average hours of use by room type. The savings were then applied to the CFL programs based on customer responses to the survey which indicated the room type and wattage of lamp replaced. The surveys were sent to customers who both redeemed the CFL coupons sent to them and those that did not redeem the coupons sent to them, and were also filled out by customers that participated in the Logger study.

The surveys can be found in the appendices of this report, and the statistical analysis of the populations of the logger study can be found in Appendix 5.

Program operations were evaluated through an in-depth interview with two program managers, five retail store managers from Kentucky, and 16 retail store managers from Ohio.

Process Evaluation Summary

The retailers are overall very happy with the program's operations and offerings. They are experiencing increased foot traffic in their stores, are happy to offer more energy efficient options to their customers, and are very happy with their communications with Duke Energy. According to the store managers interviewed, this program is a success for them, Duke Energy, and customers.

Other key findings include:

- All but one of the retailers is doing special advertising or displays for the CFL promotion. The exception is Retailer B. All five Retailer B managers interviewed indicated that they do not do any additional or special marketing for the CFLs.
- Most retailers believe that this program is needed. The most common reason given is that there needs to be more awareness of energy efficient options among their customers. The immediate savings of the coupon and long-term savings through reduced energy consumption are both needed to encourage previously unaware customers to try out the CFLs.

Energy Savings Summary

Gross Energy Savings Calculations – Wal-Mart CFL promotion

Using hourly use data from the initial and final lighting logger studies energy savings were extrapolated according to the participant's responses to the survey. From this calculation a gross yearly energy savings of 207,526 kWh/year was estimated for those customers participating in the Wal-Mart CFL promotion. This estimation includes those that responded to the Wal-Mart CFL Redeemer survey as well as those who responded to the Wal-Mart In-Store Purchases survey.

Free Riders and Free Drivers – Wal-Mart CFL Promotion

From the Wal-Mart CFL Redeemer and In-Store Purchases survey results, it was determined that 22.6% of purchases made were due to free riders[1], while 13.2% of purchases made were due to free drivers[2].

Total Program Net Energy Savings Calculations

The final total program energy savings was 14,378,038 kWh/year, based on a net savings of 188,019 kWh/year calculated from the survey and lighting logger data and the number of bulbs redeemed. Program impacts are presented in Table 1 below.

Table 1. CFL Program Impacts

Gross program savings	207,526
Gross savings per bulb	67.7 kWh/year
Freeridership level	22.6%
Freedriver (spillover) level	13.2%
Net program savings = 207,526*(1-(22.6%-13.2%))	188,019 kWh/year*
Total bulbs in gross and net savings calculations	3,067
Net savings per bulb	61.3 kWh/year
Total bulbs purchased using coupons	234,552
Total program savings	14,378,038 kWh/year

Table 2 below shows a summary of the usage in various rooms calculated from the logger data from both the initial and the final lighting logger studies. The kitchen lights were turned on for a longer period of time than the lights in other rooms that were monitored, followed closely by the living room lights. Table 3 shows the location of where the purchased CFLs were installed in the participants' homes, what the average wattage of the bulb replaced was, and the self-reported average number of hours the CFL is turned on each day. Purchased CFLs could include 13W, 20W, and/or 26W bulbs.

Table 2. Average hours of use and wattages replaced from Lighting Logger Study

[1] Free rider: someone who would have taken the same action without the program's influence
[2] Free driver: someone who takes additional actions as a result of the influence of the program

Room	Average Logged Hours Bulb was Used[3] per Day
Kitchen	5.15
Living Room	4.65
Basement	3.29
Dining Room	3.15
Bedroom	2.41
Other	2.16
Bathroom	2.05

Table 3. CFL Redeemer Survey: Location of Purchased Bulbs, n=583

Room	Number of Replacements in This Room	Percent of Respondents Replacing Bulb in This Room	Average Wattage of Bulb Replaced[4]	Average Self-Reported Hours bulb used[5]
Living Room	384	65.9%	70	5.09
Bedroom	262	44.9%	67	2.89
Kitchen	185	31.7%	67	5.46
Bathroom	147	25.2%	63	3.19
Basement	91	15.6%	68	4.08
Dining Room	65	11.1%	63	4.21
Outside	58	9.9%	67	9.65
Hallway	56	9.6%	64	3.92
Office	43	7.4%	73	4.44
Garage	23	3.9%	79	3.34
Utility Room	14	2.4%	75	2.29
Closet	7	1.2%	66	1.29

[3] From logger studies
[4] From In-Store Purchase Survey Median wattage = 60 for all locations
[5] From In-Store Purchase Survey

Section 1: Program Operations

Two program managers and 21 retail store managers were interviewed for this evaluation. Store manager responses are split into the following categories:

- **Kentucky Retailers** – includes responses from five different retailers in Kentucky.
- **Ohio Retailers** – includes responses from:
  - **Retailer A** (n=2)
  - **Retailer B** (n=8)
  - **Retailer C** (n=1)
  - **Retailer E** (n=5) [6]

The Ohio Retailers have been with the program for a few months to about a year, so their program experience is somewhat limited. Kentucky retailers estimate that they've been a partner in the program for 2 to 4 years.

To ensure confidentiality, the Kentucky Retailer responses are grouped together, and the Ohio Retailer responses are all grouped together or are grouped by the store.

The program manager and the retail store managers feel that the program objectives are being met (or on track to be met). However, there are some recommendations that were made for improvements to the program and possible expansion of offerings.

Program Operation Overview

Duke Energy, Wal-Mart and the manufacturer were involved in the program planning process, however, the coupons and the mailer (in which the coupons went out) had to be approved by Wal-Mart, GE and Duke Energy staff. The initial planning for the program involved both Duke Energy and Wal-Mart managers who designed a program in which customers were sent coupons to purchase CFLs. The coupons lowered the price of a CFL to $1 per bulb. The product and packaging offered was a three-pack of GE bulbs ($3 for a package of three 20watt or 26 watt bulbs).

The coupons (4 in a single mailer) were mailed to the Ohio customers. To ease the purchase burden and help maintain program records at the same time the coupons had a customer ID barcode on the back (to identify the customer), and a regular checkout product barcode on the front (to speed the check-out process). Images of the coupon mailer are in Appendix 6. When customers redeemed the coupon the transaction record went back to GE via a national rebate clearinghouse. Duke Energy paid GE for the processed coupons and retrieved the coupons (with the customer ID's) back from GE for evaluation and tracking purposes.

This type of campaign has since been replicated with Sam's Club, Home Depot, and other big box stores.

[6] Note: Retailer D refused to participate in any interviews for this program evaluation

While this approach was successful, other program tracking mechanisms are being tested and used in other stores and states. For example, campaigns with Retailer C have included in-store promotions with the coupons available in the store. The customers print their name and address on the coupon before it is redeemed.

Duke Energy is also testing a campaign with Retailer A, in which they are asking customers to go to Duke Energy's website and print coupons. Promotion of this program consists of 10,000 customer mailings and electronic bill messages that direct customers to the coupons.

Retailer Participation

Reasons for Participating

Retailers were asked about their reasons for participating in the program. Their responses are mostly related to their desire to increase customer foot traffic in their store. Their responses are below:

Kentucky Retailers:

- Feel like we have to because customers come in and want to know about them and you don't want them to go to a competitor
- It brings a lot of people into the store and helps overall sales
- The customers really come after them
- Increases traffic flow to the store
- Drive foot traffic

Ohio Retailers:

- Retailer A:
  - Make them more aware or offer the retailers something in return for participating.
  - To give our customers the best possible shopping experience. I think it's a wise business move to provide as many options as possible, plus I believe in energy conservation.
- Retailer B:
  - Retailer B does it as a whole, so my store does it as well. Wise business move, service to the customers and helps reduce energy consumption
  - Giving the customer more options. I think energy reduction is important, and everyone likes to save money.
  - It is a company program. Personally, I think anything that can be done to save energy is great, so I fully support the program.
  - All Retailer B stores are involved.
  - Good to save energy and work with Duke to reduce costs, and we can carry their products and get good publicity.
  - Satisfying customers.... We do it to provide the best service possible to our customers.

  - To offer the customers a wider variety of products at the best possible prices. It is a company-wide initiative. It provides a service to our customers and I believe in it professionally.

- Retailer C:
  - To offer the customers a wider variety of products. I think it is a good idea to sell energy efficient products.
- Retailer E:
  - Energy savings for the customer
  - It's a company program. I believe it provides better service to our customers by offering them more products.
  - It's required
  - Mandatory. I think it is always good to give customers more choices and rebates always encourage people to purchase things, especially those that can save them money immediately and in the long run.

Impact of Participation on Business

We also asked the retailers if the program has made any difference in their businesses. Many think that their participation in this program has increased the stores' traffic and customer satisfaction.

Kentucky:

- Very seldom do people buy something else in addition to the bulbs
- Yes, picks up business during the slow times of the year
- Brought new people in, yes, driving in more traffic
- Yes and no, increases traffic flow from people looking for bulbs but nothing else
- Yes, bringing in more customers

Ohio:

- We're selling a lot of the CFLs with the coupons, it boosted the sales for a while
- Boost in light bulb business
- Keeping customers satisfied.
- Increased sales
- We are able to sell a product at a cheaper price than we'd otherwise be able to.
- Good PR, keeping our customer's satisfied and involved in a program that is energy conscious
- Increased options for our customers therefore increased sales.
- The perception that we offer the products and participate.
- It shows we are energy conscious
- More options for the customers which leads to increased customer satisfaction.
- A wider variety of products for our customers

Retailers Promoting the Program to Customers

After retailers agree to participate in the program, they are free to promote the CFLs as they wish. We asked the retailers how they make their customers aware of the program and the CFLs offered. The responses are below:

Kentucky:

- If they don't see the information and they ask about a normal bulb we show them the CFLs and the program and tell them about it
- Advertise it in local paper and point of sale in the store, lots of signage
- Right at the front door so they can see it when they come in
- Signage, advertisement

Ohio:

- Retailer A:
    - I let the customers know that they can purchase better, longer lasting light bulbs for less money through the program.
    - I make sure our employees are up to date on the program and answer any questions customers may have about it.
    - Inform them verbally and mail things to frequent customers.
- Retailer B:
    - If I am asked a question pertaining to lighting, I inform them about the program. Otherwise I remind my employees to do the same.
    - Promotions and literature, in the store and mailed to customers
    - Eligibility is not an issue, and I simply tell them about the program and the bulbs.
    - My employees and I tell them upon any inquiries.
    - Unless approached, I don't introduce it to customers. I make the employees aware so they can tell the customers; otherwise I believe we mail something out to certain customers.
    - We sell the products that Duke is pushing and we use them in the store as well. We have signs around the store directing people. We mail things directly to the customers or sometimes just promote the visibility of the products.
    - Unless approached, I do very little to introduce the program. I make sure all employees are aware of it and in turn are able to answer customers' questions.
    - Signs and flyers
    - If I am questioned about it or about lighting in general, I briefly mention that such a program exists and tell the customer where to find more information if they so desire.
    - There was a lot of marketing and promotion initially but it has declined since then.
- Retailer C:
    - Explain the products and program.
- Retailer E:
    - They get the mailer so they know about it

  - Signage and put them up front
  - I tell the customers about the differences between incandescent and compact fluorescent bulbs, the savings they receive instantly as well as that they will save money on their energy bills.
  - I inform them the program exists if they ask anything related; otherwise the employees handle their questions.
  - Through the mail and through our employees engaging in conversation with them.

The retailers told us about how they market and/or display the CFLs and Energy Star products. Most of the retailers do some kind of special advertising or displays for these products. Ohio Retailer B managers all stated that they do not do any kind of special advertising or displays for these products.

Kentucky:

- Set them aside separate from the other bulbs so it's the first thing they see
- Put up all the signage and make our own signs, put them on endcaps
- Put it right up front in easy line of sight
- We use more direct advertising methods such as radio and newspaper advertising

Ohio:

- Retailer A:
  - Yes, by offering a rebate and grouping them all together so they are more noticeable.
- Retailer C:
  - They are all grouped together and are more noticeable, plus we offer the rebate.
- Retailer E:
  - Energy star logo is on the label for it, occasionally an ad for them but not too often
  - Just put them up front
  - We offer a rebate and make them more noticeable.
  - Yes, the rebate makes them easier to market. Also, we have them all grouped together and close to regular incandescent light bulbs so people can see the difference

All but one of the Kentucky retailers indicated that they would still offer the energy efficient options if the program were discontinued, however, most believe that the program is still needed (Four were not sure). Their reasons they believe the program is still needed are below:

Kentucky:

- As long as the customers feel like they're saving money by buying the bulbs it's still needed.

- It's a good program to help the customer save energy in the long term and we need to save energy in this country. Right for the customer, the country, and business.
- The people won't buy the energy efficient bulbs unless they're close to the price of the other bulbs.
- People come back every year asking when light bulbs are on sale, customers want it.
- Still many people unaware of the need for energy conservation

Ohio:

- I think we need to continue to promote energy awareness and energy conservation on all possible fronts.
- Until people are aware of the good that they can do for them, they need people to show them. Once everyone knows what they are and can do, it won't be necessary
- People are looking for eco options and any way to save money
- Not sure. I don't know if it convinces people to buy the bulbs if they had no original intent to do so.
- It encourages people to buy energy efficient bulbs, which in turn increases their knowledge of energy conservation and may encourage them to look into other means of energy efficiency.
- Energy is still in short supply and every little bit helps
- Most likely, because there is still an energy crisis
- Yes, energy is still in short supply
- It's always beneficial to save energy.
- Yes. It saves energy.

Customer Awareness and Satisfaction

Kentucky retailers estimate that 50-90% (mean=60%) of their customers are aware of the program when they enter the store, and that 40-80% (mean=65%) of them take advantage of the savings offered through the program's coupon.

Ohio retailers estimate that 0-100% (mean=40%) of their customers are aware of the program when they enter the store, and that 60-90% (mean=78%) of them take advantage of the savings offered through the program's coupon.

All retailers stated that the customers are satisfied with the CFLs, with the exception of one stating that there are some concerns over the mercury content.

Retailer Recruitment

The retailers offered suggestions for recruiting more stores to participate in the program. The responses center around increased advertising and more signage that details the benefits of CFLs:

Kentucky:

- Magazine advertising
- Have Duke program staff go out and meet one on one with store managers
- Just ask them

Ohio:

- By making more retailers aware or by offering them some sort of rebate.
- Tell more of them about it
- Offer retailers some sort of incentive
- Contact more of them or offer rebates to the retailers
- With the energy crunch, I think more and more retailers will jump on the wagon.
- Make it more well known
- Increased or improved marketing
- Offer them something in return.
- It will happen as energy savings becomes more public and demand increases
- If they marketed it to more retailers I'm sure they would get more participation
- Maybe get rid of the rebates and just charge less right off the bat

Marketing Materials

All Kentucky retailers indicated that they have and have had enough marketing materials to properly promote the program. Most Ohio retailers agreed, however, when asked a few retailers offered suggestions for other materials that would be helpful. Their responses include:

- We could use more [product information], then I would have less to explain, although that may be a biased answer. Signs or graphics that explain the difference and give an actual idea of money/energy saved over some period of time. (Retailer A)
- We could use a little more [advertising] right on the actual shelf space. (Retailer B)
- Some sort of graphic displaying actual savings would be a good way to show customers tangible savings. (Retailer E)

What Works Well

Retailers were asked to indicate what they thought works well about the CFL/Energy Star promotion. All of the retailers are happy with the program and offered the following responses as to what they thought worked well:

Kentucky:

- The people are getting a good product for their money and getting the point of sale advertising, people are saving money and energy
- So inexpensive and people realize the savings
- Works because it gets people to try it and then they continue using

Ohio:

- Retailer A:

    - People always are enticed to at least consider something with a rebate.
    - It saves money
- Retailer B:
    - It saves people money as well as helps reduce the burden on energy companies and natural resources
    - The fact that people can purchase several energy saving bulbs cheaper than a regular bulb saves them money instantly as well as on bills.
    - It is an above average product at a below average price.
    - It saves the customers money.
    - It helps people save money and energy and it shows that Duke actually cares about saving energy.
    - Money is offered back on a superior product.
- Retailer C:
    - It offers customers money back on a money saving product.
- Retailer E:
    - They send it to their house, it's a piece of mail all on its own and it's immediate
    - Savings that it gives the customer
    - It offers the customers money back on a money and energy-saving product.
    - It is a step in the right direction concerning energy conservation.
    - The bulbs actually are energy efficient and the fact that there is a rebate is encouraging.

Suggested Changes To the Program

Even though the retailers are generally happy with the program and its offerings, operations, and impact on their business, they did have suggestions for improving the program. Retailers were asked to suggest changes to the program, their responses include:

Kentucky:

- Make the customers aware of how to get replacement bulbs when they're defective before they're supposed to be
- Putting it in a commercial would really help
- More advertising and promotion

Ohio:

- Offer instant rebates. (Retailer B)
- A place to dispose of the bulbs to prevent mercury contamination. (Retailer B)
- Offer different wattages and do it for a longer period of time each year. (Retailer E)

Retailers' Experiences with Duke Energy

All the retailers expressed that their communications with Duke Energy have been satisfactory and none of them could offer any suggestions for improvement.

Limitations of Promotion

The program experienced a minor and limited amount of coupon abuse. For example, a customer can use a self-check-out lane and not hand in the coupon to the cashier. When this occurs the coupon is not bundled and shipped to Duke Energy for updating participant records. If the customer then re-uses the same coupon this can result in the purchase of more bulbs than intended by the program to a single individual. However, the occurrence of this can be documented by comparing the sales records with the participant records. To date this has not been a significant problem for the program and corrective action is not recommended unless this becomes more of an issue.

Items Promoted Through the Program

One change that Duke Energy may want to research is expanding the types of CFLs that they are promoting. At the current time only the standard sized "curly que" are offered. However, specialty lamps may be another part of the market that has potential, such as the LED Christmas lights. Another option is to look into residential CFL fixtures (not bulbs). Any of these new products will have to be evaluated for their cost effectiveness and market potential before the campaigns can be planned and organized.

All of the Kentucky Retailers that were interviewed felt that the proper technologies were being offered through the program, and did not suggest that there were any inappropriate technologies included. However, one did suggest that high efficiency ballasts with high efficient bulbs be included in the program offerings.

Four out of five of the Kentucky retailers reported that they have heard some customer complaints about the program and the CFLs offered. These include:

- Someone buys the bulb and it doesn't last as long as it's supposed to and people don't know what to do to get it replaced
- People questioning on what to do to dispose of the light bulbs
- Some don't like the slight hesitation of the light coming on
- Some bulbs have been dying early, brought back in a couple months

All of the Ohio Retailers that were interviewed felt that the proper technologies were being offered through the program, and did not suggest that there were any inappropriate technologies included. However, two retailers (Retailer C, Retailer E) did suggest that faucet aerators be included in the program offerings. A Retailer E manager suggested that the program expand its CFL offerings and include dimmable bulbs.

Seven out of sixteen of the Ohio retailers reported that they have heard customer complaints about the CFLs offered. These include:

- Retailer B:
  - Some worry about the mercury in the bulbs, but minimally.
  - Some customers have issues with the fact that the CFLs contain mercury
  - The bulbs contain mercury.
  - Mercury in the bulbs.
  - I have heard some customers raise concerns over the mercury in the CFLs
- CFLs contain mercury (Retailer C)
- Some customers are uneasy over the fact that the CFLs contain mercury (Retailer E)

Retrieving Program Information

The interactions between program staff and retailers are working pretty well. However, one program manager suggested that it would be nice if there could be more shared information in real time about the rebate processing. It can be difficult to get information from some of the retailers either because they don't have the technology in place to give real time feedback, or they are not willing to share the data. The national retailers are getting many requests from utility companies; they may have 30-40 utilities asking them to process rebates. While standardization within the retailers about how the rebates need to be processed would be ideal, this does not seem to be a feasible venture for Duke Energy. This is a Duke Energy program that is asking the retailers for implementation assistance. To place additional costs or burdens on the retailer by asking them to adapt to a different standard approach may not be in the best interests of the program.

Program Training

Currently there is no program training mechanism associated with this program. The program's campaigns are planned and negotiated directly with the retailers. The retailers then provide training to their employees on how to process the rebates. Retailer training is not recommended; it would be very time-consuming, costly, and can be met with resistance from the retailers, each of which have their own way of running their stores.

Program Promotion

Duke Energy is working on refining their program targeting by using market information from GE and purchased customer data from the Nielson Group.

Retailer versus Manufacturer Rebate Coupons

The program could be made more efficient if it were possible to have a manufacturer's coupon that worked in any retail store. At the current time retailer's operational issues do not allow for a universal coupon, because each retailer has specific and different barcodes for the purchase transaction, for tracking sales and for stock management, and few, if any, retailers want to handle coupons without their codes used for those transactions.

All of the Kentucky Retailers feel that the coupon levels are appropriate and customers are responding to the program. Each of the retailers was asked questions pertaining to the level of the rebate and the impact of the coupon on customer choice decisions. The retailer provided the following responses:

- Yes [the coupon amounts are fine] and yes [they change customer behavior]
- Yes, they definitely influences people buying more efficient bulbs
- Yes, it's a no brainer for them [to make this decision]
- Yes they work
- Yes, this makes the sale

All of the Ohio Retailers also feel that the coupon levels are appropriate and customers are responding to the program. They provided the following responses:

- Yes, it's a great deal for them. They are eager to save money, especially on something that will last longer than a regular bulb.
- Yes
- Yes
- Yes. It makes them more willing to try them especially if they are initially skeptical.
- I think so. They encourage them to try the product.
- Yes. Most are willing to try them out at such a cheap price
- Yes. Most buy the CFLs once they hear of the program.
- Yes. I think any rebate encourages customers to buy a product.
- Yes. I imagine they encourage them to buy the energy efficient light bulbs.
- Yes. Rebates are always encouraging.
- I think so, yes. Those initially skeptical are more willing to try something new.
- Yes. They increase the likelihood that they will buy the CFLs.

Section 2: Impact Evaluation of the Wal-Mart CFL Promotion

The savings presented in this section were calculated using Wal-Mart CFL Redeemer Survey Data and Wal-Mart In-Store Purchases Survey Data. The total gross savings based on these two surveys is 221,351 kWh/year. After adjusting for freeridership and free drivers (spillover), the net savings are 200,544 kWh/year. The findings are described below.

Free Riders and Free Drivers

Based on survey responses, 23% of purchases made by those participating in the Wal-Mart In-Store Purchases survey were due to free riders, which are people that intended to purchase CFLs before learning of the program, so they took the "free ride" by using the coupons and saving money, while 13% of purchases were made due to free drivers: purchases made beyond initial plans.

Overall Savings

Customers who returned surveys indicating their participation in the Wal-Mart CFL program (some of whom also participated in the final lighting logger study) were asked to indicate where the CFL bulbs were installed, what wattage of bulb the CFLs replaced, and approximately how many hours the bulbs were used each day. Table 4 below presents the responses from the 583 survey responses obtained from those that redeemed the CFL coupons at Wal-Mart.

Table 4. CFL Redeemer Survey: Location of Purchased Bulbs, n=583

Room	Number of Replacements in This Room	Percent of Respondents Replacing Bulb in This Room	Average Wattage of Bulb Replaced[7]	Average Self-Reported Hours bulb used[8]
Living Room	384	65.9%	70	5.09
Bedroom	262	44.9%	67	2.89
Kitchen	185	31.7%	67	5.46
Bathroom	147	25.2%	63	3.19
Basement	91	15.6%	68	4.08
Dining Room	65	11.1%	63	4.21
Outside	58	9.9%	67	9.65
Hallway	56	9.6%	64	3.92
Office	43	7.4%	73	4.44
Garage	23	3.9%	79	3.34
Utility Room	14	2.4%	75	2.29
Closet	7	1.2%	66	1.29

Additionally, those participating in the Wal-Mart In-Store Purchases Survey were asked the same questions regarding CFL installation, along with the additional questions regarding their purchases at Wal-Mart.

7 From In-Store Purchase Survey Median wattage = 60 for all locations
8 From In-Store Purchase Survey

The total gross savings based on these two results is 207,526 kWh/year. After adjusting for freeridership and free drivers (spillover), the net savings are 188,019 kWh/year.

Gross program savings	207,526
Gross savings per bulb	67.7 kWh/year
Freeridership level	22.6%
Freedriver (spillover) level	13.2%
Net program savings = 207,526*(1-(22.6%-13.2%))	188,019 kWh/year*
Total bulbs in gross and net savings calculations	3,067
Net savings per bulb	61.3 kWh/year
Total bulbs purchased using coupons	234,552
Total program savings	14,378,038 kWh/year

Savings Grouped by Wattage and Bulb Type

Mean kWh/year savings were also calculated based on the Wal-Mart CFL Redeemer and In-Store Purchases survey responses. Based on the eight locations reported from the four wattage categories, the following were the mean energy savings for each category:

Table 5

Mean kWh/year per bulb savings by wattage of bulb replaced and bulb location					
	Wattage of Old Bulb				
Bulb Location	≤ 25	≤ 60	≤ 90	>90	Total
basement	23	52	71	83	66
bathroom	8	33	47	58	37
bedroom		32	42	56	37
dining room	11	50	60	81	54
downstairs		59			59
kitchen	21	82	107	141	94
living room	18	83	102	139	100
other		33		54	43

A more detailed table describing frequency of bulb replacement by location and wattage can be found in Appendix 2.

Characteristics of Wal-Mart CFL Promotion Participants

A logit model analysis was also performed on demographic and usage characteristics of the customers participating in the Wal-Mart CFL promotion. The model compared characteristics of participants in the Wal-Mart CFL promotion to a random sample of equal size. The demographics of these customers are presented later in this report. The demographic variables included in the model were:

1. Head of Household Age
2. Family Income Detector

3. Likelihood Home is Owned or Rented
4. Length of Residence in Years
5. Delivery Unit Size
6. Number of Children
7. Number of Named Adults
8. Sale Price of Home
9. Early Internet Adopter Model
10. Wealthfinder Code
11. Revolver Minimum Payment Model

The usage variables included in the model were:

12-23: Electricity usage from 2007. Jan. to Dec.
24. Total sum of monthly usage
25: Average monthly usage (total usage / 12)
26: Summer total usage: sum of monthly usage from June to Sep.
27. Winter total usage: sum of monthly usage from Nov. to Feb.
28: Average summer usage
29: Average winter usage

The model used a log transformation of the dependent variable (participation in the program), and then an OLS (ordinary least squares) regression was run against the independent variables. Based on this model, nine significant drivers were found to affect the likelihood that a customer will participate in the CFL program, at a p value of .05. The significances are shown in the table below. For the distribution of customer characteristics for the significant variables (below), see Appendix 8.

A more negative estimate means a lower value of the parameter indicates a customer who may be interested in participating, while a more positive parameter means a higher value of the variable indicates a customer who may be interested in participating in the program. For example, "head of household age" has a positive estimate (0.7958) suggesting the older the head of household, the more likely a customer would be interested in participating. Meanwhile, "sale price of home" has a negative estimate (-0.00119), suggesting that the lower the sale price of a customer's home, the more likely they are to be interested in participating. Finally, an estimate closer to zero, such as "family income", suggests that even though this variable is important, higher or lower values do not as strongly indicate a customer's willingness to participate in the program.

Table 6. Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr>ChiSq	Standardized Estimate
Intercept	1	-1.6304	0.1053	239.8614	<.0001	
December Usage	1	0.000098	0.000028	11.8677	0.0006	0.0451
Head of Household Age	1	0 7968	0 0621	164 4861	< 0001	0 2103
Family Income	1	1.63E-06	6.42E-07	6.4581	0.011	0.0487

Own Home	1	0.7533	0.0616	149.2984	<.0001	0.1496
"Permanent" Resident	1	0 1275	0 0475	7 2081	0 0073	0 0326
"New" Resident	1	0.1602	0.0478	11.2301	0.0008	0.0405
Number of Adults	1	0.0984	0.0187	27.8287	<.0001	0.0605
Sale price of home	1	-0.00119	0.000272	19.0643	<.0001	-0.0662
Frequency of Internet Use	1	0 0554	0 0121	20 8766	< 0001	0 0824
Revolves Credit Card Payments	1	0 109	0 0537	4 1125	0 0426	0 03

Customers who were more interested in participating tended to exhibit one or more of the following characteristics:

1. **Higher Usage** – Customers who lived in a household with high usage in December were more likely to be interested in participating.
2. **Head of Household Age greater than 57** - Customers who were head of household and 57 or older were more likely to be interested in participating.
3. **Higher Family Income** - Customers with higher household incomes tend to be more interested in participating in the program.
4. **Owning a home** – Customers who owned their home tended to be more interested in participating in the program.
5. **Either a permanent resident or a newcomer** – Customers who had been a resident for 6 years or less, or customers who had been a resident for more than 21 years tended to be more interested in participating in the program.
6. **Higher number of adults in household** – The more adults in a customer's home, the more likely the customer would be interested in participating in the program.
7. **Lower sale price of units** – The lower the sale price of the unit, the more likely that the customer was interested in participating in the program. This indicates that energy efficiency is not a main issue for luxury/expensive homes.
8. **Frequent internet user** – Frequent internet users (suggesting users more familiar with technology) tended to be more interested in participating in the program.
9. **Revolves credit card payment** – Customers who tend to revolve credit card payment were more likely to be interested in participating in the program. (Revolving credit card payments involves making the minimum payment rather than paying in full each month. Customers are ranked from 1 (most likely) to 10 (less likely) based on their raw score for revolving monthly payments.)

Based on this information, there are many ways in which customers could be targeted for this program. For example, anyone who has just created a new account with Duke Energy could be sent an invitation to participate in this program with their confirmation of account or their first bill. Second, neighborhoods with lower sale price of units may also be the location of units with high energy usage, and customers in these neighborhoods were found to be more likely to be interested in participating in the program. Similarly, identification of customers who have a higher family income may also identify customers who have a higher number of adults in their household, both of which were characteristics of customers who tended to be more interested in participating in the program. These are just some of the ways in which customers could be targeted for future CFL programs.

Section 3: Initial Lighting Logger Study

CFL Placement and Wattage of Bulbs Replaced

Over one third (37.5%) of the bulbs logged were GE brand. Most of the bulbs logged were randomly placed in either the bathroom, kitchen, living room, or one bedroom. Almost one third of the fixtures logged were a ceiling fixture (31.3%). Almost all (80%) of the bulbs logged were incandescent. Over one third of the bulbs logged (38.1%) were 60 watts.

Brand of Logged Bulb – 2007

	Count	%
GE	60	37.5%
Unknown	43	26.9%
Sylvania	24	15.0%
WestH	7	4.4%
Phillips	6	3 8%
Marathon	4	2.5%
Nvision	3	1.9%
DuraMax	2	1 3%
Miser	2	1.3%
Niagra	2	1.3%
Comm Serv	1	.6%
Do It	1	.6%
Greenlite	1	.6%
Mini Spiral	1	.6%
Polaroid	1	.6%
Sunbeam	1	.6%
Supreme	1	.6%
Total	160	100.0%

Location of Bulb – 2007

	Count	%
Bathroom	29	18 1%
Kitchen	23	14.4%
Living Room	22	13.8%
Bedroom 1	21	13.1%
Family Room	15	9.4%
Hall	13	8.1%
Basement	9	5.6%
Bedroom 2	6	3.8%
Office	5	3.1%
Dining Room	3	1.9%
Entryway	3	1.9%
Laundry Room	3	1.9%
Bedroom 3	2	1 3%
Bathroom/Basement	1	.6%
Closet	1	.6%
Front Porch	1	6%
Master Bedroom Closet	1	.6%
Porch	1	.6%
Rear Entry	1	6%
Entry Way	0	.0%
Total	160	100.0%

Type of Fixture Logged – 2007

	Count	%
Ceiling	50	31.3%
Table lamp	40	25.0%
Wall	25	15.6%
Ceiling Fan	22	13.8%
Floor lamp	9	5.6%
Ceiling Can	7	4.4%
Track	3	1 9%
Can	1	.6%
Chandelier	1	.6%
End Table	1	.6%

Outdoor Wall	1	.6%
Total	160	100.0%

Bulb Type – 2007		
	Count	%
Incandescent	128	80.0%
CFL	17	10.6%
Fluorescent	7	4.4%
Flood	7	4.4%
Candle	1	.6%
Total	160	100.0%

Wattage – 2007		
	Count	%
60	61	38 1%
40	27	16 9%
75	21	13 1%
100	12	7 5%
50-100-150	6	3 8%
13	5	3 1%
23	5	3.1%
65	5	3.1%
25	4	2 5%
14	3	1.9%
26	3	1.9%
30-70-100	2	1.3%
Unknown	2	1.3%
15	1	.6%
50	1	.6%
120	1	.6%
50-75-100	1	.6%
Total	160	100.0%

Initial Lighting Logger Study – Premeasure Survey

This survey was given to participants in the November 2007 lighting logger study after the loggers were in place. There were 41 participants in the November lighting logger study, and the same number of surveys returned. This survey was given at the very start of the Wal-Mart CFL promotion.

Performance Ratings

Over half (52.5%) of the participants surveyed stated they received coupons in the mail. As is described in Section 1 and Appendix 6, the mailer contains 4 coupons each good for a 3-pack of GE CFL bulbs. Nearly all of the respondents DID NOT purchase any CFLs with the coupon (91.2%), but only 54.8% state they would have purchased 0 CFLs without the coupon. This suggests that some customers were not motivated by the coupon to purchase CFLs, but were planning on purchasing CFLs regardless of receiving the coupon, possibly at another store.

	No	Yes	Total
Did you receive coupons in the mail from Duke/GE/Wal-Mart for CFL bulbs?	19 47.5%	21 52.5%	40 100.0%

	0	1-2	3	4	5	6	7-11	12+	Total
How many CFLs did you purchase with the coupon?	31 91.2%	1 2.9%	0 .0%	1 2.9%	0 .0%	0 .0%	0 .0%	1 2.9%	34 100.0%

	0	1-2	3	4	5	6	7-11	12+	Total
How many bulbs would you have purchased without the coupon?	17 54.8%	2 6.5%	1 3.2%	0 .0%	0 .0%	3 9.7%	4 12.9%	4 12.9%	31 100.0%

Continued purchase of CFLs after the coupon promotion has ended may be dependent on the actual cost of the CFL. Bulb cost seems to significantly decrease a customer's willingness to purchase a CFL if the bulb costs between $1 and $2 more than a standard bulb. Over twice as many customers will not purchase a bulb that is $2 more than a standard bulb than will not purchase a bulb that is $1 more than a standard bulb. Raising the price to $3 more than a standard bulb does not seem to have an additional significant effect. In addition, about ¾ of customers would be willing to purchase one or more CFLs if the bulbs were free with a mail-in rebate.

How many CFLs would you purchase if they were:

	0	1-2	3	4	5	6	7-11	12+	Total
... the same price as a standard	4	3	0	5	1	3	5	14	35

bulb	11 4%	8.6%	0%	14.3%	2.9%	8.6%	14.3%	40.0%	100.0%

	0	1-2	3	4	5	6	7-11	12+	Total
.. $1.00 more than a standard bulb	5 15 2%	6 18.2%	0 0%	4 12.1%	4 12.1%	4 12 1%	4 12.1%	6 18.2%	33 100.0%

	0	1-2	3	4	5	6	7-11	12+	Total
... $2.00 more than a standard bulb	11 34 4%	5 15 6%	3 9.4%	2 6 3%	2 6.3%	3 9.4%	2 6.3%	4 12 5%	32 100.0%

	0	1-2	3	4	5	6	7-11	12+	Total
. $3.00 more than a standard bulb	14 45.2%	7 22 6%	2 6.5%	2 6 5%	1 3 2%	2 6.5%	0 0%	3 9.7%	31 100 0%

	0	1-2	3	4	5	6	7-11	12+	Total
... free with mail-in rebate	8 22.9%	2 5.7%	1 2.9%	2 5.7%	2 5.7%	4 11.4%	3 8.6%	13 37.1%	35 100.0%

Bulb Installation

Of the customers who bought bulbs, almost 40% state that they did not install any of the bulbs they purchased. Over 2/3 of customers (68%) replaced a standard bulb with a CFL. The most frequent wattage of the bulb replaced was 60 watts.

Of the bulbs you bought:

	0	1-2	3	4	5	6	7-11	12+	Total
How many did you install?	11 37 9%	4 13.8%	2 6 9%	2 6.9%	1 3.4%	1 3.4%	4 13.8%	4 13.8%	29 100.0%

	No	Yes	Total
Did you replace a standard bulb with a CFL?	8 32.0%	17 68 0%	25 100.0%

	40	60	75	100 or g	Total
What was the typical wattage of the bulb that was replaced?	2 9 5%	10 47.6%	8 38.1%	1 4.8%	21 100.0%

No customers stated they changed their usage since installing the CFLs, but one customer stated that his or her usage was decreased.

	No	Yes	Total
Did you change the hours of use since installing the CFLs?	22 100 0%	0 .0%	22 100.0%

	Decrease	Increase	Total
If yes – how did your usage change?	1 100 0%	0 .0%	1 100.0%

Over 40% of customers stated that the bulbs they installed get 3 – 4 average hours of use. Almost all (86.4%) customers did not remove the CFLs they installed, but those that did stated equally that they did not like the light, or had some other concern (42.9% each), with one customer noting the bulb was too slow to start. Although customers did not feel brightness was an issue for them, informing customers either through enclosures with the coupon or in-store advertising about the hotter and cooler shades of CFL bulbs available may help customers to choose a type of CFL light that they prefer.

	<1	1-2	3-4	5-9	10-12	13-24	Total
On average, about how many hours do you use each bulb?	2 9.1%	4 18 2%	9 40.9%	5 22.7%	1 4.5%	1 4.5%	22 100.0%

	No	Yes	Total
Did you remove any of the CFLs you installed?	19 86.4%	3 13 6%	22 100.0%

	0	1-2	3	4	5	6	7-11	12+	Total
If yes, how many did you remove?	7 70.0%	3 30 0%	0 .0%	0 0%	0 0%	0 .0%	0 0%	0 0%	10 100.0%

	Did not like the light	Not bright enough	Too slow to start	Other	Total
Why did you remove them?	3 42.9%	0 .0%	1 14.3%	3 42.9%	7 100.0%

Of the bulbs purchased, 57.1% of customers stated that they stored 1-2 bulbs for later use.

	1-2	3	4	5	6	7-11	12+	Total

Of the bulbs purchased, how many did you store for a later time?	8 57.1%	2 14.3%	1 7.1%	0 .0%	2 14.3%	0 .0%	1 7.1%	14 100.0%

95% of customers have NOT bought additional CFLs at retail price since buying CFLs through the Duke Energy program. This suggests that the coupons were a motivating factor in encouraging customers to purchase the CFLs, which is supported by the previous finding that 54.8% of customers would have purchased 0 bulbs without the coupon. As previously stated, the retail price of the CFL as compared to the standard bulb may have had an effect on the customer's willingness to purchase additional bulbs as well. The single customer that did buy additional bulbs purchased 7-11 bulbs.

	No	Yes	Total
Have you bought any CFLs for retail price after buying these CFLs through the Duke program?	23 95.8%	1 4.2%	24 100.0%

	0	1-2	3	4	5	6	7-11	12+	Total
If yes, how many did you purchase?	0 0%	0 .0%	0 .0%	0 .0%	0 .0%	0 .0%	1 100.0%	0 .0%	1 100.0%

	Not at a	Somewhat	Very Sat	Total
Overall, how satisfied are you with the CFLs?	2 10.0%	7 35.0%	11 55.0%	20 100.0%

Over half (55%) of respondents state that they were very satisfied with the CFLs, and even more respondents (60%) stated that they had CFLs previously in their home. One third (33.3%) of these respondents had 4 CFLs in their home previously.

	No	Yes	Total
Did you have any CFLs in your house before you bought these discounted CFLs?	8 40.0%	12 60.0%	20 100.0%

	0	1-2	3	4	5	6	7-11	12+	Total
If yes, how many?	0 .0%	3 25.0%	0 .0%	4 33.3%	0 .0%	2 16.7%	1 8.3%	2 16.7%	12 100.0%

Three quarters of customers (75%) had knowledge of CFLs before receiving the coupon. Over half (55.6%) of customers were planning on buying CFLs before learning of the promotion. A majority of the customers stated that the promotion did not lead them to buy any more CFLs than they were already planning on purchasing.

	No	Yes	Total
Were you aware of CFLs before you received your coupons?	7 25.0%	21 75 0%	28 100.0%

	No	Yes	Total
If yes, were you planning on buying CFLs before you saw the promotion?	12 44 4%	15 55.6%	27 100.0%

	No	Yes	Total
If yes, did the promotion lead you to buy more CFLs than you were planning?	15 65.2%	8 34 8%	23 100 0%

	0	1-2	3	4	5	6	7-11	12+	Total
If yes, how many more did you purchase?	0 0%	0 0%	1 25.0%	1 25.0%	0 0%	1 25.0%	1 25.0%	0 0%	4 100.0%

General Lighting Characteristics and Usage Estimates

Customers also stated the characteristics of the lighting in their homes, including fixture type, number of fixtures, and hours used. The room lighted most often on average was the kitchen, with an average estimated fixture use of 5.85 hours. The room lighted least often on average was the entryway, with an average estimated fixture use of 1.11 hours.

Descriptive Statistics

	Mean	N	Minimum	Maximum	Std. Deviation
Bathroom Hours	2.78	39	0.5	15	2.64
Bathroom Fixtures	1 75	37	0	6	1 47
Basement Hours	3.20	29	0	13	3.57
Basement Fixtures	3	27	0	8	2 02
Bedroom Hours 1	2.85	41	0.5	10	2.19
Bedroom Fixtures 1	1 79	38	0	4	0 99
Bedroom Hours 2	2.07	28	0	8	2.20
Bedroom Fixtures 2	1 48	25	1	3	0 65
Bedroom Hours 3	2.36	16	0	8	2.43

Bedroom Fixtures 3	1.5	14	1	3	0.76
Bedroom Hours 4	3.63	8	0	12	4.20
Bedroom Fixtures 4	1.5	8	1	3	0.76
Dining Room Hours	3.55	29	0	15	3.50
Dining Room Fixtures	1.19	26	1	3	0.49
Entryway Hours	3.14	30	0	24	4.44
Entryway Fixtures	1.11	28	0	3	0.50
Hall Hours	2.46	31	0	12	3.19
Hall Fixtures	1.54	28	0	6	1.23
Kitchen Hours	5.85	39	1	24	4.32
Kitchen Fixtures	2.35	37	0	10	2.06
Family Room Hours	5.21	28	0	15	3.55
Family Room Fixtures	3.27	26	0	14	2.96
Porch Hours	4.20	27	0	24	5.58
Porch Fixtures	1.15	26	0	4	0.73
Other Hours 1	4.93	7	0	12	5.10
Other Fixtures 1	1.43	7	0	3	0.98
Other Hours 2		0			
Other Fixtures 2		0			

Hours of Use By Room

Customers were asked to "please state below the number of hours, on average, you use your lighting in the following rooms":

Bathroom:

The bathroom was lighted most frequently for 2 hours (30.8%), with just over half of the bathrooms (54.1%) having one fixture.

Bathroom Fixtures		
Hours Used	Count	%
.5	2	5.1%
1	10	25.6%
2	12	30.8%
3	6	15.4%
3.5	1	2.6%
4	4	10 3%
5	1	2.6%
8	2	5.1%
15	1	2 6%
Total	39	100.0%

Bathroom Fixtures		
Number	Count	%
0	1	2.7%
.25	1	2.7%
1	20	54.1%
2	11	29.7%
5	1	2.7%
5.5	1	2 7%
6	2	5.4%
Total	37	100.0%

Basement:

25.9% of customers stated that they use their basement lighting for two hours. Almost a quarter (24.1%) of customers had one fixture in their basement.

Basement Fixtures		
Number	Count	%
0	2	7.4%
1	4	14.8%
2	7	25.9%
3	5	18.5%
4	3	11 1%
5	3	11.1%
6	1	3.7%
7	1	3.7%
8	1	3.7%
Total	27	100 0%

Basement Fixtures		
Hours Used	Count	%
0	3	10.3%
.25	1	3.4%
.5	4	13.8%
1	7	24.1%
2	2	6.9%
3	1	3.4%
4	2	6.9%
4.5	1	3.4%
5	2	6.9%
6	1	3.4%
7	1	3.4%
8	2	6.9%
12	1	3.4%
13	1	3.4%
Total	29	100.0%

Bedroom 1:
Fixtures in the first bedroom listed were utilized for two hours in nearly one quarter of the cases (24.4%). Almost half of customers (47.4%) only have one fixture in their bedroom.

Bedroom 1		
Number	Count	%
0	1	2.6%
1	18	47.4%
2	9	23.7%
3	8	21 1%
4	2	5.3%
Total	38	100.0%

Bedroom 1		
Hours Used	Count	%
.5	3	7.3%
1	8	19.5%
1.5	3	7.3%
2	10	24.4%
3	5	12 2%
3.5	1	2.4%
4	2	4.9%
4.5	1	2.4%
5	3	7.3%
6	2	4.9%
7	1	2.4%
8	1	2.4%
10	1	2.4%
Total	41	100%

Bedroom 2:
Fixtures in the second bedroom listed were utilized for 1 hour in almost one third of the cases (28.6%). Almost two thirds of customers reported having only one fixture in the second bedroom they listed (60.0%)

Bedroom 2		
Hours Used	Count	%
0	5	17.9%
.5	3	10.7%
1	8	28.6%
1.5	1	3.6%
2	2	7 1%
2.5	1	3.6%
3	1	3.6%
3.5	1	3.6%
4	2	7 1%
6	3	10.7%
8	1	3 6%
Total	28	100.0%

Bedroom 2 Fixtures		
Number	Count	%
1	15	60 0%
2	8	32.0%
3	2	8.0%
Total	25	100.0%

Bedroom 3:
The third bedroom listed by customers was used for one hour by nearly one third of customers (31.3%). Almost two thirds of customers also reported having 1 fixture in the third bedroom listed (64.3%).

Bedroom 3 Fixtures		
Hours Used	Count	%
0	2	12.5%
.25	1	6.3%
.5	1	6.3%
1	5	31.3%
2.5	1	6.3%
3	2	12.5%
3.5	1	6.3%
6	2	12.5%
8	1	6.3%
Total	16	100.0%

Bedroom 3 Fixtures		
Number	Count	%
1	9	64.3%
2	3	21.4%
3	2	14.3%
Total	14	100.0%

Bedroom 4:
The fourth bedroom listed by customers typically had one fixture (63.5%), which was not consistently used for any particular length of time (12.5% for all).

Bedroom 4 Fixtures		
Hours Used	Count	%
0	1	12.5%
.5	1	12.5%
1	1	12.5%
2	1	12.5%
2.5	1	12.5%
3	1	12.5%
8	1	12.5%
12	1	12.5%
Total	8	100.0%

Bedroom 4 Fixtures		
Number	Count	%
1	5	62.5%
2	2	25.0%
3	1	12.5%
Total	8	100.0%

Dining Room:
The dining room was reported to be used between .5 and one hour by 34.4% of respondents (17.2% each). Almost all respondents (84.6%) reported having one fixture in the dining room.

Dining Room Fixtures		
Hours Used	Count	%
0	1	3.4%
.5	5	17.2%
1	5	17.2%
1.5	2	6.9%
2	2	6.9%
3	1	3.4%
4	4	13.8%
5	1	3.4%
5.5	1	3.4%
6	3	10.3%
8	2	6.9%
10	1	3.4%
15	1	3.4%
Total	29	100.0%

Dining Room Fixtures		
Number	Count	%
1	22	84.6%
2	3	11.5%
3	1	3.8%
Total	26	100.0%

Entryway:
Almost a quarter of participants (23.3%) reported using their entryway lighting for one hour. Nearly all participants (85.7%) reported having only one fixture in their entryway.

Entryway Fixtures		
Hours Used	Count	%
.17	1	3.3%
.5	3	10.0%
0	2	6.7%
1	7	23.3%
2	4	13.3%
24	1	3.3%
3	3	10.0%
3.5	1	3.3%
4	4	13.3%
5	2	6.7%
7	1	3.3%
8	1	3.3%
Total	30	100.0%

Entryway Fixtures		
Number	Count	%
0	1	3.6%
1	24	85.7%
2	2	7.1%
3	1	3.6%
Total	28	100.0%

Hall:
Approximately one quarter (25.8%) of customers stated that they use their hall fixtures for one half hour, and just over two thirds of customers reported having one fixture in their hall.

Hall Fixtures		
Hours Used	Count	%
0	1	3.2%
.25	3	9.7%
5	8	25 8%
1	6	19.4%
2	3	9.7%
3	4	12 9%
4	1	3.2%
4 5	1	3 2%
7	1	3.2%
8	1	3.2%
12	2	6.5%
Total	31	100.0%

Hall Fixtures		
Number	Count	%
0	1	3.6%
1	19	67.9%
2	5	17.9%
4	2	7 1%
6	1	3.6%
Total	28	100 0%

Kitchen:
Respondents' use of kitchen fixtures varied, with 35.8% of customers reporting that they use their fixtures for 2 hours or 6 hours (17.9% each). Over one third of respondents (37.8%) report having one fixture in their kitchen, while almost one third of respondents (29.7%) having two fixtures in their kitchen.

Kitchen Fixtures		
Hours Used	Count	%
1	1	2.6%
1.5	1	2.6%
2	7	17.9%
3	4	10.3%
4	4	10.3%
5	2	5.1%
5.5	1	2.6%
6	7	17.9%
7	2	5.1%
8	4	10.3%
9	1	2.6%
10	2	5.1%
12	1	2.6%
15	1	2.6%
24	1	2.6%
Total	39	100 0%

Kitchen Fixtures		
Number	Count	%
0	1	2 7%
1	14	37.8%
10	1	2.7%
2	11	29 7%
3	6	16.2%
4	2	5 4%
7	1	2.7%
8	1	2 7%
Total	37	100.0%

Family Room:
Approximately two thirds of customers reported having two or three fixtures in their family room (30.8% and 34.6% respectively), and over half (60.7%) of customers report using their family room fixtures between 2 and 6 hours.

Family Room Fixtures		
Hours Used	Count	%
5	1	3 6%
0	1	3.6%
1	1	3.6%
10	1	3.6%
12	1	3 6%
15	1	3.6%
2	3	10.7%
2 5	1	3 6%
3	3	10.7%
4	4	14 3%
5	3	10.7%
6	3	10.7%
7	1	3.6%
8	2	7 1%
9	2	7.1%
Total	28	100 0%

Family Room Fixtures		
Number	Count	%
0	2	7.7%
1	2	7.7%
2	8	30.8%
3	9	34.6%
5	2	7.7%
6	1	3.8%
10	1	3.8%
14	1	3.8%
Total	26	100 0%

Porch:
Almost one fifth (18.5%) of customers report never using their porch fixture, with a similar number of customers (14 8%) reporting one hour of use. A large number of customers (76 9%) have one fixture on their porch.

Porch Fixtures		
Hours Used	Count	%
0	5	18.5%
25	2	7.4%
.5	2	7.4%
1	4	14.8%
2	3	11.1%
4	2	7.4%
5	1	3.7%
6	1	3.7%
8	3	11.1%
11	1	3.7%
12	2	7.4%
24	1	3.7%
Total	27	100.0%

Porch Fixtures		
Number	Count	%
0	2	7.7%
1	20	76.9%
2	3	11.5%
4	1	3.8%
Total	26	100.0%

Other Fixtures:
Over one fourth of respondents report using other fixtures for 12 hours, and almost half of participants mentioned one other fixture. These fixtures included "table, driveway, backyard, lamp, overhead, table lamp" and one unnamed, unused fixture.

Other Fixtures		
Hours Used	Count	%
0	1	14.3%
.5	1	14.3%
2	1	14.3%
3	1	14.3%
5	1	14.3%
12	2	28.6%
Total	7	100.0%

Other Fixtures		
Number	Count	%
0	1	14.3%
1	3	42.9%
2	2	28.6%
3	1	14.3%
Total	7	100.0%

Customers were also asked to describe the type of lighting fixture in each room. The question was open-ended, so the responses were wide and varied. The most frequent responses are in the table below.

Bathroom Fixture Type	Wall, Ceiling
Basement Fixture Type	Ceiling
Bedroom 1 Fixture Type	Lamps
Bedroom 2 Fixture Type	Ceiling
Bedroom 3 Fixture Type	Ceiling, Lamps
Bedroom 4 Fixture Type	Lamps

Dining Room Fixture Type	Chandelier
Entryway	Ceiling
Hall	Ceiling
Kitchen	Ceiling
Family Room	Lamps
Porch	Sensor, various
Other Fixture 1	Table, various

General Information About Participant Homes

Most of the participants (63.4%) lived in a detached single family home. Over half (55.3%) of the participants' homes were built before 1959. Almost one third of the participants (30.6%) were unsure of the square footage of their home, with the most frequently reported square footage value being less than 1200 square feet (19.4%). Over half (60%) of the participants had one or two people living in their home. Three quarters of the homes (75%) use a central heating system, while almost two thirds of participants' homes (65.9%) use a central cooling system. Three quarters of participants use gas to heat their homes (75%), while even more participants (82.9%) use electric to cool their homes. Finally, almost two thirds (65.9%) of participants stated that they own their home rather than rent.

	Apartment	Condominium	Detached single family	Manufactured home	Townhouse	Total
How would you best describe the type of house in which you live?	7 17.1%	4 9.8%	26 63.4%	2 4.9%	2 4.9%	41 100.0%

	Before 1959	1960-1979	1980-1989	1990-1997	1998 - 2000	2001 or later	Total
In what year was your home built?	21 55.3%	8 21.1%	6 15.8%	1 2.6%	0 .0%	2 5.3%	38 100.0%

	< 1200	1201-1600	1601 - 1900	1901-2400	2401 - 3000	>=3001	Don't know	Total
What is the approximate square footage (heated area) of your home?	7 19.4%	6 16.7%	5 13.9%	4 11.1%	0 .0%	3 8.3%	11 30.6%	36 100.0%

	1	2	3	4	5	6	7	8 or more	Total
How many people live in your home?	12 30.0%	12 30.0%	3 7.5%	6 15.0%	7 17.5%	0 0%	0 .0%	0 .0%	40 100.0%

	Central	Electric	Geo-thermal	Heat pump	Other	Total
Type of heating system?	30 75 0%	3 7.5%	0 0%	3 7.5%	4 10.0%	40 100.0%

	Central	Geo-thermal	Heat pump	Window unit	Other	Total
Type of cooling system?	27 65 9%	0 0%	2 4 9%	10 24 4%	2 4.9%	41 100.0%

	Electric	Gas	Other	Total
Primary heating fuel?	9 22.5%	30 75.0%	1 2 5%	40 100.0%

	Electric	Gas	Other	Total
Primary cooling fuel?	34 82.9%	5 12 2%	2 4 9%	41 100 0%

	Own	Rent	Total
Do you own or rent your home?	27 65 9%	14 34 1%	41 100.0%

Section 4: Wal-Mart CFL Promotion – Redeemer Survey

This survey focused on customers who, according to program tracking records, did redeem Wal-Mart CFL coupons that they received. The survey was mailed out to 1000 customers who redeemed Wal-Mart CFL coupons. 576 surveys were returned, for a 57.6% response rate.

Nearly all customers responding to the survey (99.5%) recall receiving CFL coupons in the mail. Similarly, almost all the customers did not give their coupons away (97.9%), and did use at least one coupon themselves (98.2%).

	Yes	No	Total
Do you recall receiving CFL bulb coupons from Duke Energy, for use in Wal-Mart GE bulbs?	568	3	571
	99.5%	5%	100.0%

	Yes	No	Total
Did you give all of your coupons to someone else to use?	12	549	561
	2.1%	97.9%	100.0%

	Yes	No	Total
Did you use at least one coupon?	560	10	570
	98.2%	1.8%	100.0%

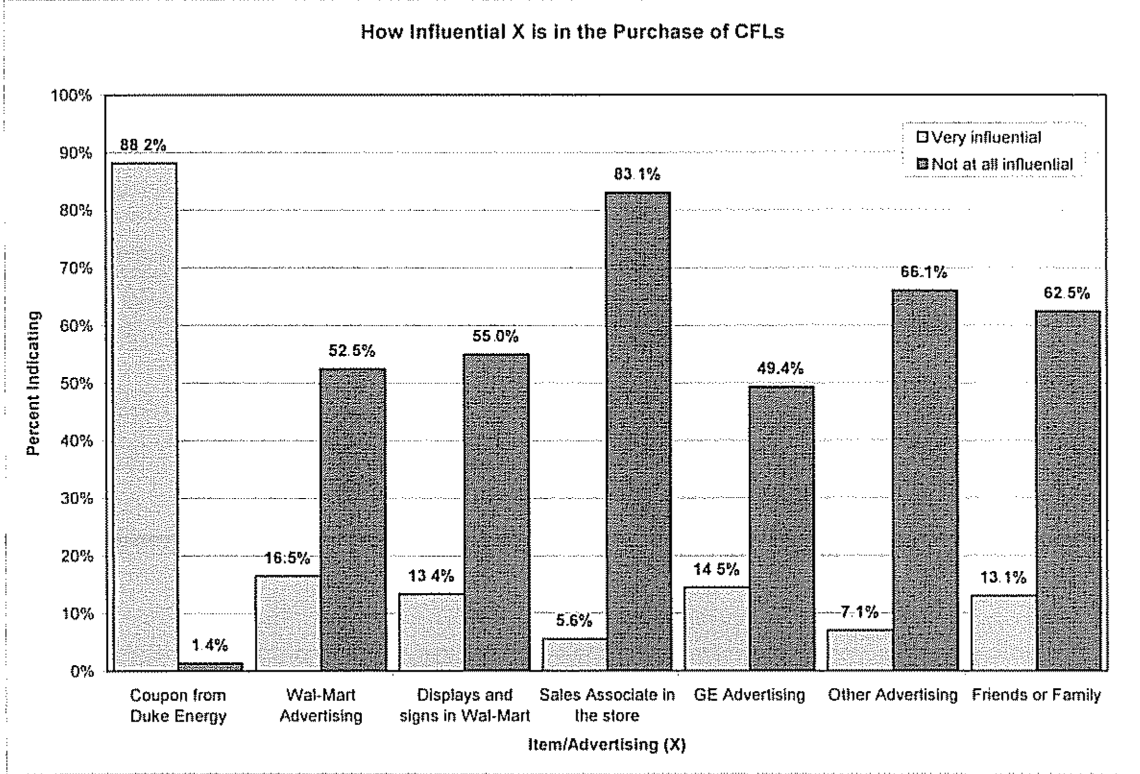
Customers found receiving the coupon from Duke Energy to be the most influential in their decision to purchase CFLs (88.2%). Over half of the customers did not find advertising, including Wal-Mart advertising, in-store advertising, sales associates, GE advertising, other advertising, and the influence of friends/family, to be influential in their decision, and rated these categories as not at all influential. The table below presents the responses, and Figure 1 shows which are not at all influential, and which were very influential in their purchase decisions.

How influential were the following in your decision to purchase CFL(s)?

	Very influential	Somewhat influential	Not at all influential	Total
Coupon from Duke Energy	491	58	8	557
	88.2%	10.4%	1.4%	100.0%
Wal-Mart Advertising	80	151	255	486
	16.5%	31.1%	52.5%	100.0%

Displays and signs in Wal-Mart	64	151	263	478
	13.4%	31.6%	55 0%	100 0%
Sales Associate in the store	26	52	384	462
	5.6%	11.3%	83.1%	100.0%
GE Advertising	68	170	232	470
	14.5%	36.2%	49.4%	100.0%
Other Advertising	33	125	308	466
	7.1%	26.8%	66 1%	100 0%
Friends or Family	62	116	297	475
	13.1%	24.4%	62.5%	100.0%

Figure 1. Influences on the Purchase of CFLs



CFL Installation

Customers purchased between 1 and 4 packs of CFLs, with the most customers stating that they purchased 2 packs (32.0%). With three bulbs in a pack, the majority of customers purchased between 6 and 10 bulbs in total (47.8%). A majority of customers state that they would not have bought any CFLs without the coupon (52.8%), and an even larger number of customers (69.8%) state that they have not purchased any additional CFLs since using the coupon. These two statements corroborate the previous statement made by customers that receiving the coupon in the mail was most influential in a participant's decision to purchase CFLs.

	0	1	2	3	4	5	6-10	11+	Total
How many CFL packs did you purchase with the Duke Energy Coupon?	0	82	180	131	108	7	45	9	562
	.0%	14.6%	32 0%	23 3%	19 2%	1 2%	8 0%	1 6%	100 0%

	0	1	2	3	4	5	6-10	11+	Total
How many CFL bulbs did you purchase in total?	1	8	30	66	40	11	266	134	556
	.2%	1 4%	5.4%	11 9%	7 2%	2 0%	47 8%	24 1%	100.0%

	0	1	2	3	4	5	6-10	11+	Total
How many CFL bulbs would you have bought without the coupon?	292	46	71	60	26	12	33	13	553
	52.8%	8 3%	12.8%	10.8%	4 7%	2 2%	6 0%	2.4%	100 0%

	0	1	2	3	4	5	6-10	11+	Total
How many CFL bulbs have you since purchased without coupons?	392	29	48	22	26	10	25	10	562
	69 8%	5 2%	8 5%	3.9%	4 6%	1.8%	4 4%	1 8%	100 0%

Close to one third of customers (29.7%) state that they currently have 6-10 CFLs installed in their homes. Nearly all customers state that they have not changed their hours of use since installing the CFLs (92.7%). Those that did change their usage state that their usage tended to increase (71.4%). Almost all customers have left their CFLs installed in their home (93.7%), and those that did remove bulbs on average removed 1-2 bulbs (86.7%).

	0	1	2	3	4	5	6-10	11+	Total
How many CFLs are now installed?	25	27	72	92	79	42	166	56	559
	4 5%	4 8%	12 9%	16 5%	14 1%	7 5%	29 7%	10 0%	100.0%

	Yes	No	Total
Did you change the hours of use since installing the CFLs?	37	472	509
	7 3%	92 7%	100 0%

	Increased usage	Decreased usage	Total
If yes, how did your usage change?	25	10	35

	71.4%	28.6%	100.0%

	Yes	No	Total
Have you removed any of the CFLs you installed?	32	474	506
	6.3%	93.7%	100.0%

	1-2	3	4	5	6	7-11	12+	Total
If yes, how many did you remove?	26	2	1	1	0	0	0	30
	86.7%	6.7%	3.3%	3.3%	.0%	.0%	.0%	100.0%

Customers most frequently stated that they removed the CFLs they installed because the light was not bright enough. The second most frequent response was that the bulbs did not work at all or did not work with a particular fixture type. Although customers stated that in-store and other advertising was not influential in their decision to purchase CFLs, these reasons for removing the CFLs suggest that some type of additional education regarding how to choose a CFL that is at the level of brightness that the customer prefers, as well as how to choose a type of CFL that is appropriate for a particular fixture, may encourage these customers to reconsider purchasing CFLs.

		Count
Why did you remove them?	Bulb broke	1
	Light flickered	2
	Burned out replaced	4
	changed 60 to 75 to make brighter	1
	did not like the light it gave off compared to regular light	1
	Bulbs did not work/Bulbs did not work with my type of fixture	7
	Not bright enough	9
	how do i dispose	1
	I plan to remove the basement light because i do not like the type of light	1
	Installed 50 first 2 wouldn't dim so I took them out	1
	removed am radio static	1
	Too bright	1

About half of the customers stated that they had CFLs in their house previously, and half stated that they did not have CFLs in their house previously. Of those that did have CFLs in their home, almost 40% had just 1-2 bulbs, while the rest of the customers were using anywhere from 3 to more than 12 bulbs.

	Yes	No	Total
Did you have any CFLs in your house before you bought these discounted CFLs?	248	271	519

	47.8%	52.2%	100.0%

	1-2	3	4	5	6	7-11	12+	Total
If yes, how many?	94	38	30	17	21	31	16	247
	38.1%	15.4%	12.1%	6.9%	8.5%	12.6%	6.5%	100.0%

Overall, customers are very satisfied with their CFLs (76.4%). Approximately half of the customers had never purchased a CFL before receiving the coupon (49.8%), again suggesting that receiving the coupon in the mail may be a strong motivating factor in the decision to purchase a CFL.

	Very satisfied	Somewhat satisfied	Not at all satisfied	Total
Overall, how satisfied are you with the CFLs?	391	108	13	512
	76.4%	21.1%	2.5%	100.0%

	Never purchased a CFL until now	A year ago	2 to 3 years ago	4 or more years ago	Total
How long have you been using CFL light bulbs?	256	134	82	42	514
	49.8%	26.1%	16.0%	8.2%	100.0%

Energy Star Awareness

Over three quarters of customers state that they do not use the Duke Energy website (76.1%). A similar number of customers (76.4%) state that they have not added any electrical appliances in the past year. 50.6% of respondents state that they are aware of ENERGY STAR, but 50.6% of respondents also state that they do not look for the ENERGY STAR label when purchasing an appliance.

	Often	Sometimes	Never	Total
Do you use the Duke Energy website?	18	106	395	519
	3.5%	20.4%	76.1%	100.0%

	Yes	No	Total
Have you added any electrical appliances to your home in the past year?	121	392	513
	23.6%	76.4%	100.0%

	Yes	No	Total
Are you aware of ENERGY STAR?	256 50.6%	250 49.4%	506 100.0%

	Yes	No	Total
Do you look for the ENERGY STAR label when purchasing an appliance?	244 49 4%	250 50 6%	494 100 0%

General Information About Redeemers' Homes

Most customers who used the CFL coupons live in a detached single-family home. These customers also tend to live in homes that were built before 1980 (33.7% before 1959, 29.7% 1960-1979). Customers' home size varied widely, with the fewest number of customers living in a home greater than 3000 square feet (4.3%).

	Detached single-family	Townhouse	Condominium	Duplex/2-family	Apartment	Manufactured home	Multi-Family (3 or more units)	Total
How would you best describe the type of home in which you live?	406 77 9%	10 1 9%	43 8 3%	10 1 9%	24 4 6%	16 3 1%	12 2 3%	521 100 0%

	Before 1959	1960-1979	1980-1989	1990-1997	1998-2000	After 2001	Total
In what year was your home built?	174 33 7%	153 29 7%	66 12 8%	48 9 3%	38 7.4%	37 7 2%	516 100 0%

	Less than 1200	1201-1600	1601-1900	1901-2400	2401-3000	Greater than 3000	Don't know	Total
What is the approximate square footage (heated area) of your home?	67 13 1%	106 20 8%	69 13 5%	98 19 2%	61 12 0%	22 4 3%	87 17 1%	510 100 0%

Participants who purchased CFLs tended to have at least completed high school, with one quarter of customers having graduated college, and about 12% of customers having completed a graduate degree. Almost half of the customers surveyed were 65 years old or older. Over a third of the respondents stated their household income was between $25,000 and $50,000, while approximately one quarter of customers stated their income was over $75,000. Over half of customers had two people living in their home (54.9%), and nearly all of the respondents stated that they own their home (90.1%).

	Some high school	Completed high school	Some college	Graduated college	Some grad school	Grad school degree	Total
Last year of schooling?	25	169	113	130	14	61	512
	4 9%	33 0%	22.1%	25.4%	2 7%	11.9%	100 0%

	18 to 35	36 to 45	46 to 55	56 to 65	65 or over	Total
What range best describes your age group?	39	55	107	118	241	560
	7.0%	9.8%	19.1%	21 1%	43 0%	100 0%

	Less than 25000	25000 to 50000	50000 to 75000	Over 75000	Total
What range best describes your household income?	94	193	97	132	516
	18.2%	37.4%	18.8%	25 6%	100 0%

	1	2	3	4	5	6	7	more than 7	Total
How many people live in your home?	115	306	70	49	12	3	2	0	557
	20.6%	54 9%	12 6%	8 8%	2 2%	.5%	.4%	0%	100 0%

	Own	Rent	Total
Do you own or rent your home?	500	55	555
	90.1%	9.9%	100.0%

A large number of participants had a central furnace (78.0%) and central air (76.6%). Over half of participants stated that their primary heating fuel was gas (64.0%), while nearly all of the customers (93.5%) use electric as their primary cooling fuel.

	Central furnace	Electric baseboard	Heat pump	Geo-thermal	Other	Total
Type of heating system?	432	15	84	2	21	554
	78.0%	2.7%	15 2%	.4%	3.8%	100.0%

	Central air	Window/Room unit air conditioner	Heat pump	Geo-thermal	Other	No cooling system	Total
Type of cooling system?	430	60	61	2	3	5	561
	76.6%	10.7%	10.9%	.4%	.5%	.9%	100.0%

	Electric	Gas	Other	Total
Primary heating fuel?	142	357	59	558
	25.4%	64.0%	10.6%	100.0%

	Electric	Gas	Other	Total
Primary cooling fuel?	507	26	9	542
	93.5%	4.8%	1.7%	100.0%

Wal-Mart CFL Non-Redeemer Survey

This survey focused on customers who according to program tracking records did not redeem CFL coupons, and was mailed out to 1000 respondents who did not redeem coupons. 302 surveys were returned, for a 30.2% response rate.

Awareness of Advertising

42.3% of respondents do not remember receiving any CFL coupons, and of those who did receive the coupons, 78.0% stated that they did not use any of the coupons. Nearly half of customers stated that they had heard about the CFL program (49.6%). Almost 40% of customers stated that they did not redeem the coupons because they do not shop at Wal-Mart (37.7%). These customers might be interested in participating in a CFL program located at another store.

	YES	NO	Total
Do you recall ever receiving CFL coupon?	169	124	293
	57.7%	42 3%	100.0%

	NO	YES	Total
Did you use any of these coupons?	216	61	277
	78.0%	22.0%	100.0%

	YES	NO	Total
Had you heard anything about the CFL coupons from Duke Energy, for use in Wal-Mart for GE bulbs?	128	130	258
	49.6%	50.4%	100.0%

	Too much hassle	Do not use CFLs	Do not shop at WalMart	Did not understand program	Thought there was a catch	Couldn't be bothered	Other	Total
Why did you decide NOT to use these coupons?	4	10	52	10	6	0	56	138
	2 9%	7 2%	37 7%	7 2%	4 3%	.0%	40 6%	100 0%

Summary of text of "Other" write-in responses Note: some customers included multiple responses		
	No response	241
	Already had enough bulbs/already had CFLs	17
	CFL seemed to affect grandsons epilepsy condition	1
	Coupons expired	7
	Unable or unwilling to shop at Wal-Mart	3
	Did not receive any coupons/Unaware of program	12
	Do not like fluorescent lighting	1
	Expense/cost/hidden cost	6
	Forgot about the coupons	2
	Lost coupon	4
	Out of stock	3

	Risk of Mercury Contamination	2
	Unable to go to store/haven't had time to shop	3
	Try not to buy merchandise made in China	1
	Total	303

Over half of participants stated that the CFL coupons neither increased their awareness of how to save energy using CFLs (50.7%), nor inspired them to purchase CFLs somewhere else without the coupon (65.5%). This reflects the findings of the redeemer survey that the CFL coupon itself, and the associated discount are the most influential factors in a customer's decision to purchase the CFLs. Of those who did purchase bulbs elsewhere, almost one third purchased 4 bulbs (31.6%).

	Yes	NO	Somewhat	Total
Did the CFL coupons increase your awareness of how you could save energy by using CFL bulbs?	45	73	26	144
	31.3%	50.7%	18.1%	100.0%

	NO	YES	Total
Did the CFL bulb coupons inspire you to purchase CFL bulbs without using the coupon somewhere else?	95	50	145
	65.5%	34.5%	100.0%

	1	2	3	4	5	6	More than 6	Total
If yes, how many did you buy without the coupon?	4	3	10	18	4	10	8	57
	7.0%	5.3%	17.5%	31.6%	7.0%	17.5%	14.0%	100.0%

For those respondents who purchased bulbs without the coupon, the coupon from Duke Energy and other advertising were found to be "somewhat influential" (42.2% and 44.9% respectively). Nearly all did not find Wal-Mart advertising or displays/signs in Wal-Mart to be influential (81.3% and 86.1% respectively), possibly because they purchased bulbs at a store other than Wal-Mart. An even greater number did not find the sales associate at the store to be influential (94.9%).

How influential were the following in your decision to purchase CFL(s) without the coupon?

	Very Influential	Somewhat Influential	Not at all Influential	Total
The coupon from Duke Energy	24	38	28	90
	26.7%	42.2%	31.1%	100.0%
Wal-Mart advertising	4	11	65	80
	5.0%	13.8%	81.3%	100.0%
Displays and signs in Wal-Mart	6	5	68	79
	7.6%	6.3%	86.1%	100.0%
Sales Associate at the store	2	2	75	79
	2.5%	2.5%	94.9%	100.0%

GE advertising	10	30	41	81
	12.3%	37.0%	50 6%	100.0%
Other advertising	18	40	31	89
	20.2%	44.9%	34.8%	100.0%
Friends or family	19	31	35	85
	22.4%	36.5%	41.2%	100.0%

Almost 1/3 of respondents stated that they have 0 CFLs in their house (29.1%). Of those who do have CFLs in their house, nearly 20% of customers state that they have 6 to 10 CFLs in their house. The high number of installed bulbs reflects customers' earlier statements that they did not purchase bulbs using the coupons because they already had enough bulbs in their home.

	0	1	2	3	4	5	6-10	11+	Total
How many CFLs are in your house?	76	19	36	22	22	16	52	18	261
	29.1%	7.3%	13.8%	8.4%	8.4%	6.1%	19 9%	6 9%	100.0%

	Very Satisfied	Somewhat Satisfied	Not at all Satisfied	Total
Overall, how satisfied are you with the CFLs?	104	77	16	197
	52 8%	39.1%	8.1%	100.0%

	Never	3-6 months	6-9 months	9-12 months	1-2 years ago	2-3 years ago	More than 3 years ago	Total
How long have you been using CFL light bulbs?	63	72	35	17	31	17	15	250
	25.2%	28 8%	14.0%	6 8%	12 4%	6.8%	6.0%	100 0%

Energy Star Awareness

Almost two thirds of customers (61.1%) have not added any electrical appliances to their homes, but a large number of those that have state that the appliances are energy efficient (85.3%). Over half of respondents state that they are aware of ENERGY STAR (59.2%), and over half of customers look for the ENERGY STAR label when purchasing an appliance (57.9%). Nearly equal numbers of participants state that they have never used the Duke Energy website (70.1%) and do not feel that Duke Energy has influenced them to use energy efficient products (70.0%). The responses to these questions are similar to the responses given in the Wal-Mart CFL Redeemer survey.

	YES	NO	Total
Have you added any electrical appliances to your home in the past year?	103	162	265
	38.9%	61.1%	100.0%

	YES	NO	Total

If yes, are the appliances energy efficient?	87	15	102
	85.3%	14.7%	100.0%

	YES	NO	Total
Are you aware of ENERGY STAR?	157	108	265
	59.2%	40.8%	100.0%

	YES	NO	Total
Do you look for the ENERGY STAR label when purchasing an appliance?	147	107	254
	57.9%	42.1%	100.0%

	Often	Sometimes	Never	Total
Do you use the Duke Energy website?	22	58	188	268
	8.2%	21.6%	70.1%	100.0%

	YES	NO	Total
Has Duke Energy influenced your decision to purchase energy efficient products?	60	140	200
	30.0%	70.0%	100.0%

General Information About Non-Redeemers' Homes

Almost three quarters of respondents (75%) live in a detached single family home. Nearly one third of participants stated that their home was built before 1959 (32.7%). Approximately 20.4% of customers state that their home is between 1500 and 1999 square feet in heated area.

	Detached single-family	Mobile Home	Condo	Duplex/2-family	Multi-Family	Townhouse	Total
How would you describe the type of home in which you live?	200	4	20	17	25	6	272
	73.5%	1.5%	7.4%	6.3%	9.2%	2.2%	100.0%

	Before 1959	1960-1979	1980-1989	1990-1997	1998-2000	2001-2007	Don't know	Total
In what year was your home built?	89	76	24	25	12	25	21	272
	32.7%	27.9%	8.8%	9.2%	4.4%	9.2%	7.7%	100.0%

	Less than 500	500-999	1000-1499	1500-1999	2000-2499	2500-2999	3000-3499	3500-3999	4000 or more	Don't know	Total
What is the approximate square footage (heated area) of your home?	2	25	49	54	37	32	14	7	7	38	265
	8%	9.4%	18.5%	20.4%	14.0%	12.1%	5.3%	2.6%	2.6%	14.3%	100.0%

70.7% of customers stated that they have completed high school, had some college, and/or graduated college. Nearly one quarter of those surveyed were 65 years old or older. Nearly 40% of participants stated they make over $75,000 in combined household income. Almost one half (44.3%) of participants had two people living in their home, and 83.5% stated that they own their home.

	Some high school	Completed high school	Some College	Graduated college	Some grad school	Grad school degree	Total
Last year of schooling?	13	56	63	72	21	45	270
	4.8%	20.7%	23.3%	26.7%	7.8%	16.7%	100.0%

	18-35	36-45	46-55	56-65	65 or over	Total
What range best describes your age group?	48	46	55	56	67	272
	17.6%	16.9%	20.2%	20.6%	24.6%	100.0%

	Less than 25000	25000-50000	50000-75000	Over 75000	Total
What range best describes your combined household income?	35	65	50	96	246
	14.2%	26.4%	20.3%	39.0%	100.0%

	1	2	3	4	5	6	7	More than 7	Total
How many people live in your home?	62	121	38	29	15	8	0	0	273
	22.7%	44.3%	13.9%	10.6%	5.5%	2.9%	.0%	.0%	100.0%

	Own	Rent	Total
Do you own or rent your home?	228	45	273
	83.5%	16.5%	100.0%

A large number of respondents (71.8%) use a central furnace for heat, and a larger number (76.3%) use central air for cooling. Almost two thirds of participants use gas as their primary heating fuel (60.2%) and a very large number of customers (89.0%) use electric as their primary cooling fuel.

	Central furnace	Electric baseboard	Heat pump	Geo-thermal Heat Pump	Hot water or steam boiler	Other	Total
Type of heating system?	199	18	32	2	19	7	277
	71.8%	6.5%	11.6%	.7%	6.9%	2.5%	100.0%

	Central air	Window/Room unit air conditioner	Heat pump	Geo-thermal Heat Pump	Other	No cooling system	Total
Type of cooling system?	209	33	22	1	1	8	274
	76.3%	12.0%	8.0%	.4%	.4%	2.9%	100.0%

	Electric	Gas	Oil	Propane	Other	Total
Primary heating fuel?	78	157	9	10	7	261

	29.9%	60.2%	3.4%	3.8%	2.7%	100.0%

	Electric	Gas	Other	Total
Primary cooling fuel?	218	24	3	245
	89.0%	9.8%	1.2%	100.0%

Final Lighting Logger Study

CFL Placement and Wattage of Bulbs Replaced

About three quarters (75.4%) of bulbs logged were GE brand. Just over one quarter (27.6%) of the bulbs logged were in table lamps, with one quarter of bulbs installed in a ceiling fixture (25.1%). Nearly one fourth of bulbs were 13 watts (22.6%), and almost equal numbers of CFLs (44.7%) and incandescents (43.7%) were logged. The most frequent locations for logged bulbs were bathroom, kitchen, living room, and family room. The higher frequencies of GE brand bulbs, CFL bulbs, and low-watt bulbs is likely due to the characteristics of the Wal-Mart CFL Promotion, which featured GE brand CFLs.

Brand of Logged Bulb – 2008

	Count	%
GE	150	75.4%
Phillips	21	10.6%
Sylvania	12	6.0%
Unknown	7	3.5%
Nvison	4	2.0%
Lights of America	2	1.0%
Feit	1	.5%
Halco	1	.5%
Satco	1	.5%
Total	199	100.0%

Type of Fixture Logged - 2008

	Count	%
Table Lamp	55	27.6%
Ceiling	50	25.1%
Wall Light	44	22.1%
Ceiling Fan	20	10.1%
Floor	18	9.0%
Under Cabinet	7	3.5%
Can	2	1.0%
Desk Lamp	1	.5%
Torchier	1	.5%
Track	1	.5%
Total	199	100.0%

Wattage of Logged Bulb – 2008

	Count	%
13	45	22.6%
60	31	15.6%
40	27	13.6%
23	15	7.5%
26	13	6.5%
20	11	5.5%
75	11	5.5%
25	10	5.0%
100	10	5.0%
50-100-150	9	4.5%

Bulb Type – 2008

	Count	%
CFL	89	44.7%
Flood	5	2.5%
Fluorescent	18	9.0%
Incandescent	87	43.7%
Total	199	100.0%

15	3	1 5%
30	2	1.0%
50	2	1 0%
150	2	1.0%
12-23-29	2	1 0%
10	1	.5%
14	1	.5%
32	1	5%
45	1	.5%
120	1	.5%
12-23-32	1	5%
Total	199	100.0%

Location of Bulb - 2008

	Count	%
Bathroom	46	23.1%
Kitchen	36	18 1%
Living Room	32	16.1%
Family Room	28	14.1%
Bedroom 1	15	7.5%
Dining Room	11	5 5%
Hall	8	4 0%
Laundry Room	8	4.0%
Office/Den	8	4 0%
Basement	2	1 0%
Bedroom 2	2	1.0%
Closet	1	5%
Play Room	1	.5%
Workout/Gym	1	.5%
Total	199	100 0%

Section 5: Wal-Mart In-Store Purchases Survey

This evaluation is based on surveys conducted with customers who were mailed a Wal-Mart CFL coupon in the mail. According to program tracking records, these customers redeemed Wal-Mart CFL coupons. Customers received $10 for filling out the survey.

The survey was mailed out to 1,000 customers that received the coupons. There were 583 responses received for a 58.3% response rate.

Awareness of Advertising

	Yes	No	Total
Do you recall receiving CFL bulb coupons from Duke Energy, for use in Wal-Mart?	565	7	572
	98.8%	1.2%	

	Yes	No	Total
Did you give all of your coupons to someone else to use?	32	520	552
	5.8%	94.2%	

	Yes	No	Total
Did you use at least one coupon?	552	19	571
	96.7%	3.3%	

Customers found receiving the coupon from Duke Energy to be the most influential in their decision to purchase CFLs (83.2% very influential). This is the same result as was found in both the Wal-Mart CFL Redeemer and Non-Redeemer surveys. More than half of the customers found the other program marketing methods "not influential at all", including advertising, etc., at Wal-Mart, as well as other advertising methods and friends/family.

How influential were the following in your decision to purchase CFL(s)?

	Very influential	Somewhat influential	Not at all influential	Total
The coupon from Duke Energy	454	87	5	546
	83.2%	15.9%	.9%	
Wal-Mart Advertising	85	140	233	458
	18.6%	30.6%	50.9%	

Display and signs in Wal-mart	56	146	250	452
	12.4%	32.3%	55.3%	
Sales Associate at the store	22	33	391	446
	4.9%	7.4%	87.7%	
GE Advertising	70	155	229	454
	15.4%	34.1%	50.4%	
Other Advertising	52	99	297	448
	11.6%	22.1%	66.3%	
Friends or Family	71	107	281	459
	15.5%	23.3%	61.2%	

Additional Purchases from Wal-Mart

Almost all customers (90.6%) who shopped for the CFLs at Wal-Mart already shop at that store, and a slightly lower number (82.9%) shopped there soon after redeeming the coupon, with over half (54.3%) making 1 to 2 visits per month. Overall, the frequency of customers' visits to Wal-Mart before and after participating in the Wal-Mart CFL Light Bulb Program are similar. Most participants (88.1%) bought other items from Wal-Mart while they were shopping for their CFLs, and nearly all of those spent $10 or more.

	Never	1-2	3-4	5 or more	Total
How often did you visit a Wal-Mart store before your recent visit to redeem the CFL coupon?	52	293	128	85	558
	9.3%	52.5%	22.9%	15.2%	

	Yes	No	Total
Did you purchase additional items on your visit to Wal-Mart?	480	65	545
	88.1%	11.9%	

	< $10	$10-25	$26-50	>$50	Total
If yes, What was the estimated amount you spent on those additional items?	36	175	161	121	493
	7.3%	35.5%	32.7%	24.5%	

	Yes	No	Total

Have you returned to Wal-Mart since redeeming the CFL coupon?	344 82.9%	71 17.1%	415

	1-2	3-4	5 or more	Total
If yes, How many visits a month?	261 54.3%	143 29.7%	77 16.0%	481

Use of CFL packs

Almost half (46.8%) of the participants purchased between 6 and 10 CFLs with the coupon, and a similar number state they would have purchased no bulbs without the coupon. These results coincide with the results of the Wal-Mart CFL Redeemer survey.

	0	1	2	3	4	5	6-10	11+	Total
How many CFL packs did you purchase with the Duke Energy coupon?	0 0%	85 15.2%	167 29.9%	149 26.7%	109 19.5%	12 2.2%	27 4.8%	9 1.6%	558
How many CFL bulbs did you purchase in TOTAL?	1 2%	13 2.3%	20 3.6%	65 11.7%	53 9.5%	10 1.8%	260 46.8%	134 24.1%	556
How many CFL bulbs would you have bought without the coupon?	268 48.4%	69 12.5%	72 13.0%	53 9.6%	36 6.5%	6 1.1%	33 6.0%	17 3.1%	554
How many CFL bulbs have you purchased without coupons?	386 69.2%	34 6.1%	43 7.7%	28 5.0%	26 4.7%	6 1.1%	25 4.5%	10 1.8%	558

Just over one third of respondents (33.9%) installed between 6 and 10 CFL bulbs, and 90% of participants have not removed the CFLs they installed. Of those who did remove the bulbs they installed, many stated that the type or brightness of light was also a factor. In addition, many customers also experienced some type of defective bulb. Again, some type of education regarding the different types of CFLs as well as the different levels of brightness and types of lighting available may encourage customers to continue to use CFLs in the future.

Of the bulb packs you bought with Duke Energy/Wal-Mart coupons:

	0	1	2	3	4	5	6-10	11+	Total
How many CFLs are now	17	36	65	77	70	39	189	65	558

installed?	3 0%	6 5%	11 6%	13 8%	12 5%	7 0%	33 9%	11 6%	

	Yes	No	Total
Did you change the hours of use since installing the CFLs?	50 9.6%	470 90.4%	520

	Increase	Decrease	Total
If yes, how did your usage change?	35 63.6%	20 36.4%	55

	Yes	No	Total
Have you removed any of the CFLs you installed?	52 10.0%	466 90.0%	518

	1-2	3	4	5	6	7-11	12+	Total
If yes, How many did you remove?	39 67.2%	5 8.6%	4 6.9%	2 3.4%	4 6.9%	2 3.4%	2 3.4%	58

Why did you remove them?

	Frequency
CHANGED READING LAMP	1
DEFECTIVE	1
Flickering and dimming. Not functioning properly.	1
LAMP SHADE WOULD NOT HOLD BULB	1
Less desirable light for reading.	1
Light too bright when looking at it. Also made horrible buzz in ceiling fan fixture.	1
light was too yellow.	1
NOT BRIGHT ENOUGH FOR OLDER PERSON	1
noticed brown stain on light bulb	1
One burnt out the other has low lighting.	1
Replaced 60 with 75 because the 60 was not enough light	1
Stopped working	1
Switched sizes in ceiling fan to shorter length bulbs.	1
They did please me Too long for shades	1
TOO LARGE FOR LIGHT FIXTURE	1
Unsatisfactory	1
Wanted to use dimmer.	1
Would not work/Didn't turn on	2

Burnt Out	10

Just over half of the customers responding stated they did not have any CFLs in their house before they bought these bulbs. Almost three quarters of customers are "very satisfied" with their CFLs (70.5%), and almost half of customers (47.3%) had not been using CFLs before now.

	Yes	No	Total
Did you have any CFLs in your house before you bought these discounted CFLs?	250 47.1%	281 52.9%	531

	1-2	3	4	5	6	7-11	12+	Total
If yes, about how many?	96 37.6%	41 16.1%	40 15.7%	17 6.7%	27 10.6%	19 7.5%	15 5.9%	255

	Very Satisfied	Somewhat Satisfied	Not at All Satisfied	Total	Mean
Overall, how satisfied are you with the CFLs?	375 70.5%	146 27.4%	11 2.1%	532	2.7

	Never before now	A year ago	2-3 years ago	4 or more years ago	Total
How long have you been using CFL light bulbs?	248 47.3%	141 26.9%	99 18.9%	36 6.9%	524 100.0%

Energy Star Awareness

Almost three quarters of customers stated that they never use the Duke Energy website (71.6%) and have not added any electrical appliances to their home in the past year (72.9%). Over half of the customers are aware of ENERGY STAR (57.8%) and look for the ENERGY STAR label when purchasing an appliance (54.0%). These responses are similar to those given by customers responding to the Wal-Mart CFL Redeemer survey.

	Often	Sometimes	Never	Total
Do you use the Duke Energy Website?	42 7.6%	114 20.7%	394 71.6%	550

	Yes	No	Total

Have you added any electrical appliances to your home in the past year?	151 27.1%	406 72.9%	557

	Yes	No	Total
Are you aware of ENERGY STAR?	319 57.8%	233 42.2%	552

	Yes	No	Total
Do you look for the ENERGY STAR label when purchasing an appliance?	288 54.0%	245 46.0%	533

General Information about Responders' Homes

Almost all respondents live in a detached single family home (79.2%). Almost two thirds of customers state that their home was built in 1979 or earlier (65.7%). Just over one fifth of customers (22.4%) have a square footage between 1201 and 1600.

How would you best describe the type of home in which you live?

Detached single family	Townhouse	Condo	Duplex	Apartment	Manufactured home	Multi family 3 or more units	Total
462 79.2%	14 2.4%	27 4.6%	11 1.9%	35 6.0%	27 4.6%	7 1.2%	583

In what year was your home built?

Before 1959	1960-1979	1980-1989	1990-1997	1998-2000	After 2001	Total
188 33.1%	185 32.6%	59 10.4%	59 10.4%	29 5.1%	48 8.5%	568

What is the approximate square footage (heated area) of your home?

Less than 1200	1201-1600	1601-1900	1901-2400	2401-3000	Greater than 3000	Don't know	Total
72 12.7%	127 22.4%	78 13.8%	89 15.7%	61 10.8%	40 7.1%	100 17.6%	567

Nearly three quarters of participants have completed high school, started college, and/or graduated college (74.9%). Over one third of the customers surveyed were 65 years old or over (36.9%). Almost half of customers (48.4%) have two people living in their home, and 90.0% own their home.

Last year of schooling?

Some high school	Completed high school	Some college	Graduated college	Some grad school	Grad school degree	Total
26	164	130	137	33	86	576
4.5%	28.5%	22.6%	23.8%	5.7%	14.9%	

What range best describes your age group?

18-35	36-45	46-55	56-65	65 or over	Total
53	78	114	121	214	580
9.1%	13.4%	19.7%	20.9%	36.9%	

What range best describes your household income?

Less than $25,000	$25,000-50,000	$50,000-75,000	Over $75,000	Total
80	160	117	167	524
15.3%	30.5%	22.3%	31.9%	

How many people live in your home?

1	2	3	4	5	6	7	Total
105	279	84	67	31	9	2	577
18.2%	48.4%	14.6%	11.6%	5.4%	1.6%	.3%	

	Own	Rent	Total
Do you own or rent your home?	521	58	579
	90.0%	10.0%	

Almost all customers have a central furnace (80.4%) and central air (80.9%). Over two thirds of customers use gas as their primary heating fuel (68.3%), while nearly all customers use electric as their primary cooling fuel (88.7%).

Type of Heating System?

Central furnace	Electric baseboard	Heat pump	Geothermal	Other	Total
465	27	64	2	20	578
80.4%	4.7%	11.1%	.3%	3.5%	

Type of Cooling System?

Central air	Window units	Heat pump	Other	No cooling system	Total
469	46	45	2	18	580
80.9%	7.9%	7.8%	.3%	3.1%	

Primary heating fuel?

Electric	Gas	Other	Total
132 22.8%	395 68.3%	51 8.8%	578

Primary cooling fuel?

Electric	Gas	Other	Total
501 88.7%	52 9.2%	12 2.1%	565

Section 6: Comparison of Survey Results

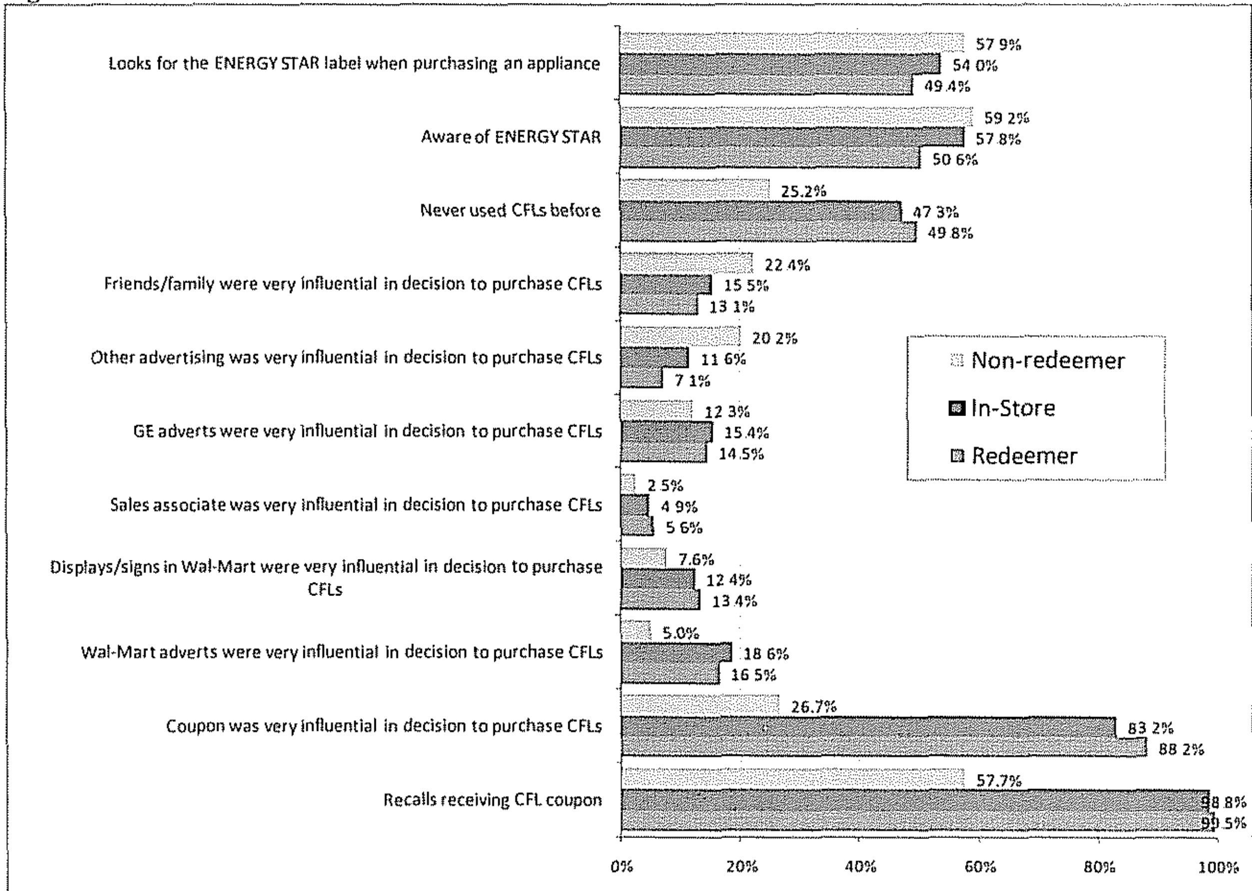
This section of the report presents the results of portions of the surveys that are directly comparable. The following figures show results from those that redeemed the Wal-Mart coupons and those that did not. The "In-Store" responses are part of the redeemer group, but were surveyed in the store.

Promotional Information

Figure 2 below shows the percent of responders that are aware of the Energy Star label, their lack of experience with CFLs, and what promotional materials were "very influential" in their decision to purchase CFLs.

From the survey responses, it is interesting to note that the Non-redeemers are more likely to be aware of Energy Star and to look for the Energy Star label when purchasing an appliance. They are also the least likely to have never used CFLs before. This indicates that the non-redeemers are aware of energy efficiency measures that are available to them, and probably did not have the need to use the CFL coupon that was sent to them through the CFL program.

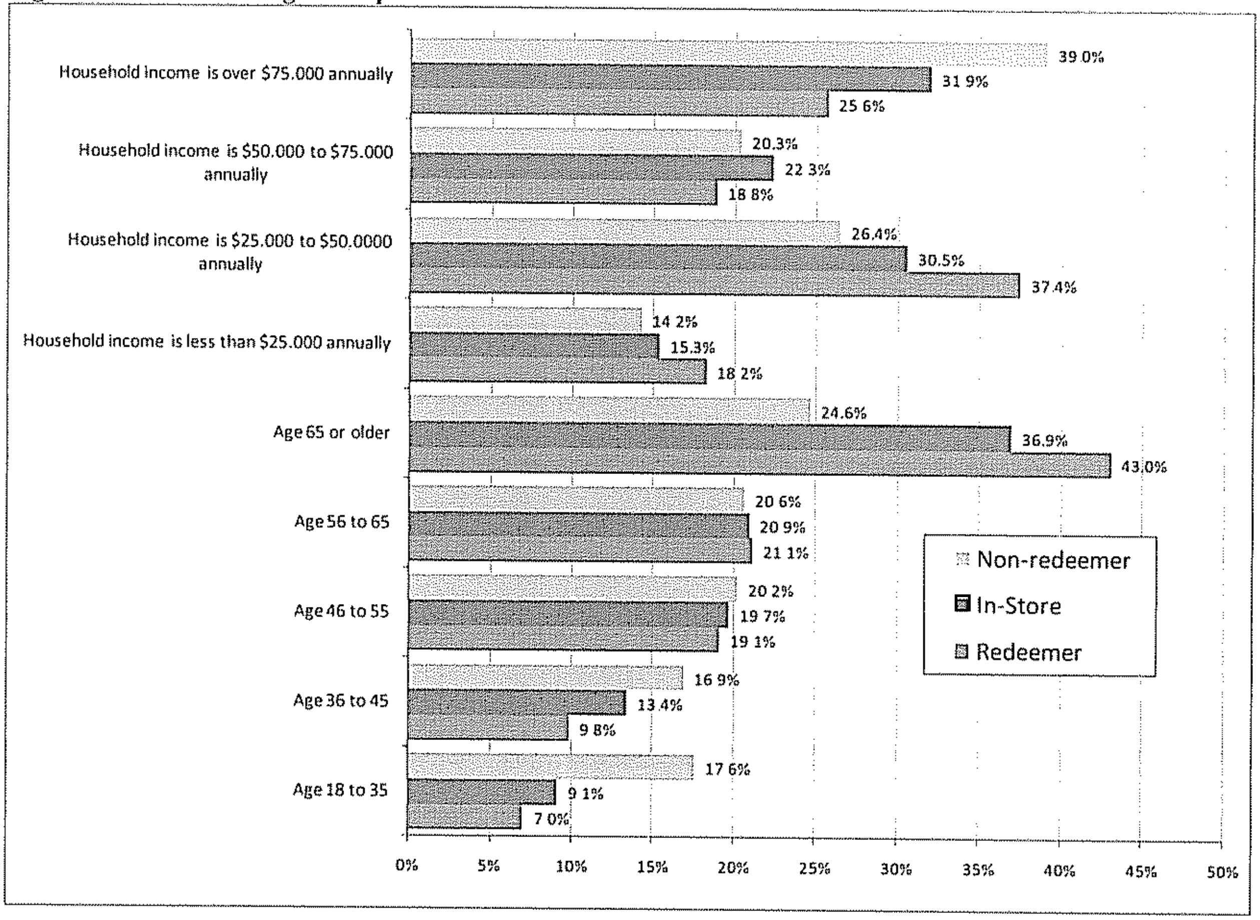
Figure 2. Promotional Information



Income and Age

The Non-Redeemers stand out again in the figure below. The non-redeemers are more likely to have higher incomes (over $75,000 annually) and be younger than those that redeemed the coupons. The largest age group to redeem the coupons are those 65 years of age or older.

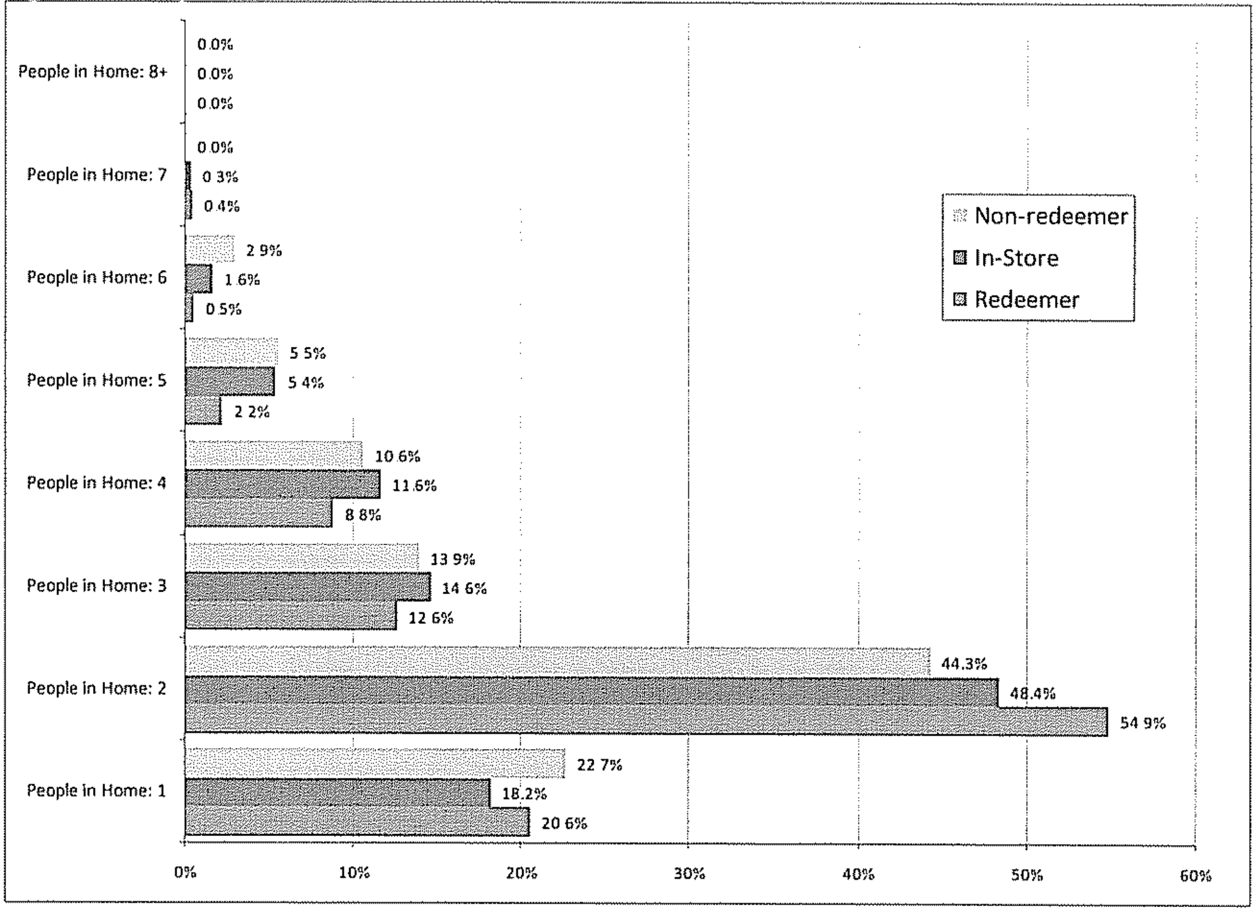
Figure 3. Income and Age Groups



Number of Occupants

The number of occupants in the home doesn't seem to have much of an impact on whether or not the coupons were redeemed.

Figure 4. Occupants in Home



Characteristics of Redeeming Population

Customers who redeemed Wal-Mart CFL coupons were compared to a random population of equal size. A regression model shows that customers over the age of 57, are the head of the household, own a home, and have been a resident in their current home for 6 years or less are the customers who would be more interested in participating in the program.

Other indications a customer was more likely to redeem Wal-Mart CFL Program coupons include if they had a higher income, higher energy usage in December, frequent internet usage, revolved their credit cards, had a higher number of adults in their home, had a lower sale price of their home, or were a long-time resident (21 years or more). More details are in Section 2 of the report.

Section 7: Assessment of Potential Freeriders from Repeat Redemption of CFL Discount Coupons

This analysis was conducted to determine if the distribution of additional Duke Energy CFL Coupons to customers who have already received and redeemed coupons will result in excessive freerider purchases. A freerider is a person who would have purchased the bulb without the coupon, but who took advantage of the coupon to lower the cost. The conclusion of this analysis is that when the retail price of a CFL bulb begins to drop significantly below the $3.00 range, freeridership may begin to erode net energy impacts for the redeemers.

Analysis of the survey results indicates that about 50% of the redeemers are likely to begin buying CFLs on their own when the price reaches $3.00 a bulb and increases to 80% when the price reaches $2.00 or less. This means that in hardware stores, where bulbs are normally $3.00 and above per bulb, the coupons are likely to be more effective. In discount and big box stores, where the bulb prices are beginning to approach $2.00 to $3.00 a bulb, freeridership will begin to potentially erode net savings for the program.

This conclusion is based on customer responses to Duke Energy's CFL Survey conducted in August of 2008.

1. **Coupon users appear to be bargain-hunters:** Redeemers generally appear to be price sensitive and require a lower priced bulb than non-redeemers. They need the coupons to buy bulbs within their price range. From this perspective, the coupons are being used by customers who either need the discount to buy or are free riders. Non-redeemers need to see the per-bulb price below an average of $3.67. Redeemers like to see the price below $2.95. Non-redeemers will, on average, pay $0.76 more per bulb than redeemers. As the price of the CFL drops, more of the redeemers are likely to buy more bulbs without an incentive.

2. **Redeemers want more bulbs:** By almost a 2 to 1 margin redeemers are interested in buying and using CFLs more than non-redeemers, both now and in the future. Redeemers purchase, on average, about 11 CFLs. Non-redeemers purchase a little less than 6 bulbs. Eighty percent of the redeemers still want to buy more bulbs compared to 43.7% of non-redeemers.

3. **Redeemers install and use more bulbs.** Coupon redeemers have already installed 4.9 of the 6.45 bulbs that they said they purchased with their Duke Energy coupons, and 6.4 bulbs that they have obtained via sources other than through the coupon. This totals 11.3 bulbs installed in the homes of the redeemers. Non-redeemers have installed 5.2 bulbs on average, of the 5.7 bulbs that they have purchased through other means.

4. **Both groups want 6 more bulbs this year:** Both redeemers and non-redeemers want more bulbs. Both groups said that they will buy, on average, 6.1 more bulbs over the next 12 months if they can find them at a price below an average of $3.66 for non-redeemers and $2.95 for redeemers.

5. **Discount CFL are available in the market:** Both redeemers and non-redeemers have found ways to buy discounted CFLs. Nine percent of the redeemers have obtained a free bulb compared to 6% of the non-redeemers. This is essentially the same number from a statistical perspective. However, twenty-three percent of the redeemer have purchased CFLs at a discount price compared to most all of the non-redeemers. We do not know what kind of a discount was obtained or the price that was paid.

6. **Both groups use most of the bulbs they buy:** Redeemers have installed the bulbs they have purchased and want more. Redeemers have purchased 10.8 CFLs in the last 12 months, and have installed all of these bulbs in their homes. Likewise, non-redeemers have installed 5.2 of the 5.7 bulbs they have purchased. They also use the bulbs they buy. The very small fraction of the bulbs not used are typically stored for later use.

It is clear in this analysis that redeemers will take advantage of more Duke Energy coupons. If the Duke Energy coupon allows them to buy more bulbs by dropping the price so that it is within their price range, it is likely to be effective at moving these purchases without significantly increasing freeridership.

It is expected that if the redeemers obtain more bulbs, they will install them. However, because they have already installed the bulbs they have purchased, the remaining bulbs may go into lower hours-of-use sockets, or moved into storage. However, at this time they essentially have no CFL storage and they are looking for more bulbs to install. If Duke Energy is interested in achieving high savings quickly, it would be better to get the coupons in the hands of new future coupon redeemers who have not already redeemed the Duke Energy Coupons. New coupons to past coupon redeemers would achieve savings as well, but will eventually saturate these homes.

The following table reflects the results of the Duke Energy CFL survey that was used in the above analysis.

Table 1. Survey Responses

Valid number used for analysis	Have Used Duke Coupon	# CFLs Purchaed in last 12 months	Purchased with coupon	How many Duke bulbs installed	Bought more because of Duke	Non-Duke bulbs installed	At what price do CFLs become too expensive	If priced this way. now many would you buy next 12 months	Interested in buying more if below this cost
44	Yes	10.85	6.45	4.9	36.40%	6.4	$2.95	6.1	80%
16	No	5.7	N/A	N/A	N/A	5.2	$3.66	6.1	43.70%

Table 2. Redeemer Price Sensitivity

Percent of users who will buy a CFL at this price.	Coupon Users	Percent of users who will buy a CFL at this price.	Coupon Users	Percent of users who will buy a CFL at this price.	Coupon Users	Percent of users who will buy a CFL at this price.	Coupon Users
4%	$ 7.00	29%	$ 4.00	54%	$ 2.50	79%	$ 2.00
7%	$ 6.00	32%	$ 3.50	57%	$ 2.00	82%	$ 1.50
11%	$ 5.00	36%	$ 3.00	61%	$ 2.00	86%	$ 1.50
14%	$ 5.00	39%	$ 3.00	64%	$ 2.00	89%	$ 1.00
18%	$ 5.00	43%	$ 3.00	68%	$ 2.00	93%	$ 1.00
21%	$ 5.00	46%	$ 3.00	71%	$ 2.00	96%	$ 1.00
25%	$ 4.00	50%	$ 3.00	75%	$ 2.00	100%	$ 0.50

In future freerider assessments it will be very important to consider the influence of the coupon discount to the specific purchase and use conditions, including purchase intent relative to price sensitivity and the installation and bulb use conditions. Redeemers already have a pre-existing intent to buy. However, for this group, the intent to buy is controlled by price sensitivity, among possibly other conditions. Redeemers are looking for discounts to the retail price. If Duke Energy provides that incentive, then Duke Energy would be the primary cause of that purchase decision.

Ceasing or decreasing the incentive jeopardizes the program. However Duke Energy should initiate new customer offers that tap into non-price motivators or barriers (e.g. point of purchase displays, neighborhood handouts, school boosters). In addition, the program should consider targeting coupons more to non-box retailers, as well as offering non-price promotions to non-box retailers. The program should also consider limiting or decreasing incentives slightly for box retailers.

Appendix 1 – Detailed kWh Savings by Location and Wattage from Wal-Mart CFL Redeemer Survey.

Mean Savings kWh per Year By Wattage of Old Bulb and Bulb Location – Wal-Mart CFL Redeemer Survey																
Bulb Location	Wattage of Old Bulb															
	10.00	20.00	25.00	30.00	40.00	50.00	60.00	65.00	70.00	75.00	80.00	90.00	100.00	120.00	150.00	Total
attic													648.24			648.24
basement	1051.20				1033.68		907.24			1182.60		1121.28	1269.58			1139.07
bathroom		219.00		170.82	1053.56		1303.69			1426.87		560.64	1692.63	779.64		1258.01
bedroom				227.76	1367.04	893.52	1099.93		1314.00	1426.66	946.08	1681.92	1928.10			1262.90
ceiling											1892.16					1892.16
cellar										963.60						963.60
closet							770.88			662.48			3889.44			1254.51
den				170.82		1191.36	1841.55			2615.49			3025.12			2158.09
dining room					2440.63		1647.45		1314.00	2208.25			4472.86			2114.70
downstairs					1033.68		1541.76									1414.74
dressing room					1808.94		770.88									1549.43
entryway							1349.04	788.40								1268.95
family room				1024.92	1744.34		2489.02			2134.74			3154.77		4730.40	2627.60
game room							578.16						648.24			613.20
garage							2201.05			505.89			1592.00			1621.68
great room							1541.76						3241.20			2674.72
hallway					1389.01		2312.64			541.76	946.08		1742.15			1882.38
kitchen	1051.20		766.50	341.64	931.39		2129.40	1419.12	2628.00	3034.04			3489.77	1559.28		2292.99
lamp							1830.84						3241.20			2112.91
laundry					387.63		546.04			843.15			1379.83			919.08
living room	175.20	109.50		1195.74	1046.60	1787.04	1854.93		3504.00	2450.90			3693.18		3311.28	2386.62
loft													3889.44			3889.44
office					516.84		1498.93			1124.20			3270.67			2025.68
other							1614.03									1614.03
outside					2953.37		4951.42			883.30			6536.42		3784.32	4356.49
parlor					1162.89								324.12			743.51
porch				85.41	1593.59		3533.20			2409.00			3565.32			3154.43
shed							0.00									0.00
stairway							2505.36			1686.30			2592.96			2195.26
sunroom					1292.10		1734.48									1587.02
tv room					1550.52		2042.83			2890.80			3306.02			2435.28

Mean kWh per Year By Wattage of Old Bulb and Bulb Location continued – Wal-Mart CFL Redeemer Survey

Bulb Location	Wattage of Old Bulb															
	10.00	20.00	25.00	30.00	40.00	50.00	60.00	65.00	70.00	75.00	80.00	90.00	100.00	120.00	150.00	Total
utility							1284.80			120.45						1118.46
vanity					1808.94											1808.94
wall light							2312.64									2312.64
Total	759.20	175.20	766.50	504.70	1383.16	1489.20	1754.03	1314.00	2190.00	1856.74	1261.44	981.12	2731.30	1039.52	3784.32	1941.97

Appendix 2 – Program Surveys

Initial Lighting Logger Study – Premeasure Survey

Name: ______________________

____

Address: ______________________

____

Acct. # ______________________

PLEASE ANSWER THE QUESTIONS BELOW RELATED TO THE FALL 2007 LIGHTING LOGGER STUDY.
FILL IN THE CIRCLES COMPLETELY USING BLUE OR BLACK INK.

General Information About Your Home

To be able to group your responses, please respond to the following categories.

How would you best describe the type of home in which you live?

- Detached single-family
- Townhouse
- Condominium
- Apartment
- Manufactured home

In what year was your home built?

- Before 1959
- 1960 - 1979
- 1980 - 1989
- 1990 - 1997
- 1998 – 2000
- >=2001

What is the approximate square footage (heated area) of your home?

- <1,200
- 1,201 – 1,600
- 1,601 – 1,900
- 1,901 – 2,400
- 2,401 – 3,000
- >=3,001
- Don't know

How many people live in your home?

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- >=8

Type of heating system? Central furnace / Electric baseboard / Heat pump / Geo-thermal / Other

Type of cooling system? Central air / Window unit air conditioner / Heat pump / Geo-thermal / Other

Primary heating fuel? Electric / Gas / Other

Primary cooling fuel? Electric / Gas / Other

Do you own or rent your home? Own / Rent

Please state below the **number of hours**, on average, you use your lighting in the following rooms.

	# of Hours	# of Fixtures	Type of Fixtures in Room (table lamp, torchiere, chandelier, sensor, etc.)
Bathroom	______	______	______
Basement	______	______	______
Bedroom 1	______	______	______
2	______	______	______
3	______	______	______
4	______	______	______
Dining Room	______	______	______
Entryway	______	______	______
Hall	______	______	______
Kitchen	______	______	______
Family Room	______	______	______
Porch	______	______	______
Other	______	______	______
Other	______	______	______

Performance Ratings

In this section of the survey, we would like to understand how you have used Compact Flourescent Lightbulbs (CFL) you have purchased

0 1-2 3 4 5 6

7-11 12+

Did you receive coupons in the mail from Duke/GE/Wal-Mart for CFL bulbs? Yes No

How many CFLs did you purchase with the coupons received?

1 package = 3 bulbs

How many bulbs would you have purchased without the coupon?

How many CFL bulbs would you purchase if...

0 1-2 3 4 5 6
7-11 12+

They were the same price as a standard bulb? ☐ ☐ ☐ ☐ ☐
☐ ☐ ☐

They were $1.00 more than standard bulbs? ☐ ☐ ☐ ☐ ☐
☐ ☐ ☐

They were $2.00 more than standard bulbs? ☐ ☐ ☐ ☐ ☐
☐ ☐ ☐

They were $3.00 more than standard bulbs? ☐ ☐ ☐ ☐ ☐
☐ ☐ ☐

They were free but you had to mail in a rebate form
to get your money back? ☐ ☐ ☐ ☐ ☐
☐ ☐ ☐

Bulb installation

Of the bulbs you bought…

0 1-2 3 4 5 6
7-11 12+

How many did you install? ☐ ☐ ☐ ☐ ☐
☐ ☐ ☐

Did you replace a standard bulb with a CFL? ☐ Yes ☐ No ☐ No,
replaced a CFL

For each of those bulbs that you installed, what was the typical wattage of the bulb that was replaced?

☐ 25 ☐ 40 ☐ 60 ☐ 75 ☐ 100 or greater

Did you change the hours of use since installing the CFLs? ☐ Yes ☐ No

If you answered yes, how did your usage change ? ☐ Increased usage ☐ Decreased
usage

<1 1-2 3-4 5-9 10-
12 13-24

On average, about how many hours do you use each bulb? ☐ ☐ ☐ ☐
☐ ☐

Did you remove any of the CFLs you installed? ☐ Yes ☐ No

0 1-2 3 4 5 6
7-11 12+

If yes, how many did you remove? ☐ ☐ ☐ ☐ ☐
☐ ☐ ☐

Why did you remove them?

☐ Not bright enough ☐ Did not like the light ☐ Too slow to start ☐
Other

More
on Back☞

	1-2	3	4	5	6	7-11	12+
Of the CFLs that you purchased, how many did you store for a later time?	◘	◘	◘	◘	◘	◘	◘

Have you bought any CFLs for retail price after buying these CFLs through the Duke program?

◘ Yes ◘ No

	1-2	3	4	5	6	7-11	12+
If yes, how many did you purchase?	◘	◘	◘	◘	◘	◘	◘

	Very Satisfied	Somewhat Satisfied	Not at all Satisfied
Overall, how satisfied are you with the CFLs?	◘	◘	◘

Did you have any CFLs in your house before you bought these discounted CFLs?

◘ Yes ◘ No

	1-2	3	4	5	6	7-11	12+
If yes, how many?	◘	◘	◘	◘	◘	◘	◘

Were you aware of CFLs before you received your coupons?

◘ Yes ◘ No

If yes...

Were you planning to buy CFLs before you saw the promotion?

◘ Yes ◘ No

If yes...

Did the promotion lead you to buy more CFLs than you were planning?

◘ Yes ◘ No

	1-2	3	4	5	6	7-11	12+
If yes, how many more did you purchase?	◘	◘	◘	◘	◘	◘	◘

THANK YOU FOR YOUR RESPONSES

Wal-Mart CFL Redeemer Survey

Duke Energy®

Dear Customer,

Duke Energy is continuously trying to improv services for you. To help us improve the **Com Fluorescent Light bulb** program, we would li your input. Please let us know what you think the compact fluorescent light bulbs (CFLs) yo purchased through our coupon promotion. If y have any questions, please contact Amanda G 513-287-3177.

You will receive a check for $10 for your participation.

WE WOULD LIKE YOUR OPINION ABOUT OUR LIGHTBULB COUPON PROGRAM FOR COMPACT FLOURESCENT LIGHTBULBS (CFLs). FILL IN THE CIRCLES COMPLETELY USING BLUE OR BLACK INK.

Do you recall receiving Compact Fluorescent Light bulb coupons from Duke Energy, for use in Wal-Mart for GE bulbs ? ○ Yes ○ No

Did you give all of your coupons to someone else to use? ○ Yes ○ No

Did you use at least one coupon? ○ Yes – Continue this survey ○ No – Thank you. Please return survey.

How influential were the following in your decision to purchase CFL(s)?

Very Influential Somewhat Influential

Not at all Influential

The Coupon from Duke Energy ○ ○ ○

Wal-Mart Advertising ○ ○ ○

Displays and signs in Wal-Mart ○ ○ ○

Sales Associate at the store ○ ○ ○

GE Advertising ○ ○ ○

Other Advertising ○ ○ ○

Friends or Family ○ ○ ○

In this section of the survey, we would like to understand how you have used the CFL packs you purchased with the coupon?

0 1 2 3 4 5

6-10 11+

How many CFL packs did you purchase with the Duke Energy coupon? ○ ○ ○ ○ ○ ○

○ ○

How many CFL bulbs did you purchase in TOTAL? ○ ○ ○ ○ ○ ○

○ ○

How many CFL bulbs would you have bought without the coupon? ☐ ☐ ☐ ☐ ☐ ☐
☐ ☐

How many CFL bulbs have you since purchased without coupons ? ☐ ☐ ☐ ☐ ☐ ☐
☐ ☐

Of the bulb packs you bought with Duke Energy/ Wal-Mart coupons:

0 1 2 3 4 5
6-10 11+

How many CFLs are now installed? ☐ ☐ ☐ ☐ ☐ ☐
☐ ☐

Please write in WHERE the CFL went, WHAT it replaced, and HOW MUCH you use that light.

	WHERE	WHAT WAS REPLACED	HOW MUCH ITS USED (Each Day)
Example	Living Room	60W Floor Lamp	6 Hours Per Day (average)
Bulb 1	________	________	________
Bulb 2	________	________	________
Bulb 3	________	________	________
\ Bulb 4	________	________	________
Bulb 5	________	________	________
Bulb 6	________	________	________

Any More? Please summarize briefly below.

Did you change the hours of use since installing the CFLs? ☐ Yes ☐ No

If you answered yes, how did your usage change? ☐ Increased usage ☐ Decreased usage

Have you removed any of the CFLs you installed? ☐ Yes ☐ No

	1-2	3	4	5	6	7-11	12+
If yes, how many did you remove?	☐	☐	☐	☐	☐	☐	☐

Why did you remove them?____

Did you have any CFLs in your house before you bought these discounted CFLs? ☐ Yes ☐ No

	1-2	3	4	5	6	7-11	12+
If yes, about how many?	☐	☐	☐	☐	☐	☐	☐

	Very Satisfied	Somewhat Satisfied	Not at all Satisfied
Overall, how satisfied are you with the CFLs?	☐	☐	☐

How long have you been using CFL light bulbs ? ☐ Never purchased a CFL until now ☐ A year ago ☐ 2 to 3 years ago ☐ 4 or more years

	Often	Sometimes	Never
Do you use the Duke Energy Website?	☐	☐	☐

Have you added any electrical appliances to your home in the past year? ☐ Yes ☐ No

Are you aware of ENERGY STAR? ☐ Yes ☐ No

Do you look for the ENERGY STAR label when purchasing an appliance? ☐ Yes ☐ No

General Information About Your Home

How would you best describe the type of home in which you live?

- Detached single-family
- Townhouse
- Condominium
- Duplex/2-family
- Apartment
- Manufactured home
- Multi-Family (3 or more units)

In what year was your home built?

- Before 1959
- 1960 - 1979
- 1980 - 1989
- 1990 - 1997
- 1998 – 2000
- After 2001

What is the approximate square footage (heated area) of your home?

- Less than 1,200
- 1,201 – 1,600
- 1,601 – 1,900
- 1,901 – 2,400
- 2,401 – 3,000
- Greater than 3,000
- Don't know

Last year of schooling?

- Some high school
- Completed high school
- Some college
- Graduated college
- Some grad school
- Grad School degree

What range best describes your age group?

- 18 to 35
- 36 to 45
- 46 to 55
- 56 to 65
- 65 or over

What range best describes your household income?

- Less than $25,000
- $25,000 to $50,000
- $50,000 to $75,000
- Over $75,000

How many people live in your home?

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- more than 7

Do you own or rent your home?

- Own
- Rent

Type of heating system?

- Central furnace
- Electric baseboard
- Heat pump
- Geo-thermal
- Other

Type of cooling system?

- Central air
- Window/Room unit air conditioner
- Heat pump
- Geo-thermal
- Other
- No cooling system

Primary heating fuel?
- Electric
- Gas
- Other

Primary cooling fuel?
- Electric
- Gas
- Other

Thank you for your help with this study. Your $10.00 incentive check will be mailed within 6 – 8 weeks. Please verify your address on the front page of this survey.

- Yes, my address on the front page of this survey is correct
- No, please mail my check to:

____

____

____

HAVE A CHANCE TO PARTICIPATE IN THE DUKE ENERGY LIGHTING STUDY

Would you be interested in participating in a lighting study in January, 2008? A Duke Energy representative would place small lighting monitors on 4 or 5 light fixtures and will remain in place for 2 to 3 weeks. The monitors are smaller than the size of a bar of soap and help us measure how often lights are turned on and off during the week. The first 100 returned surveys indicating interest will be selected. Eligible customers that are selected will receive $50 for participating.

- Yes
- No

If yes, you may receive a follow-up phone call about this lighting study in early January.

THANK YOU FOR YOUR RESPONSES

Wal-Mart CFL Non-Redeemer Survey

Dear Customer,

Duke Energy is continuously trying to improve our services for you. To help us improve the **Compact Fluorescent Light bulb** program, also known as **CFL**, we would like your input. Please let us know what you think about the compact fluorescent light bulbs (CFLs). If you have any questions, please contact Amanda Goins, 513-287-3177.

You will receive a check for $10
for your participation.

WE WOULD LIKE YOUR OPINION ABOUT OUR LIGHTBULB COUPON PROGRAM AND COMPACT FLOURESCENT LIGHTBULBS (CFLs). FILL IN THE CIRCLES COMPLETELY USING BLUE OR BLACK INK.

Do you recall ever receiving Compact Fluorescent Light bulb coupons from Duke Energy, for use in Wal-Mart for GE bulbs ? ○ Yes ○ No

Did you use any of these coupons? ○ No – Continue this survey ○ **Yes – Thank you. Please return survey.**

Had you heard anything about the Compact Fluorescent Light bulb coupons from Duke Energy, for use in Wal-Mart for GE bulbs ? ○ **Yes** ○ **No – skip to section 2**

Why did you decide NOT to use these coupons?

○ Too much hassle ○ Do not use CFLs ○ Do not shop at Wal-Mart

○ Did not understand program ○ Thought there was a catch ○ Couldn't be bothered

○ Other ______________________________

Did the Compact Fluorescent Light bulb **coupons increase your awareness** of how you could save energy by using compact fluorescent light bulbs

○ Yes ○ No - I was aware of the energy savings already

○ Somewhat- I was already aware, but it did help me understand their benefits better

Did the Compact Fluorescent Light bulb coupons inspire you to purchase compact fluorescent light bulbs **without** using the coupon somewhere else?

○ No ○ Yes 1 2 3 4 5
6 More than 6

If Yes, How many did you buy without the coupon? ○ ○ ○ ○ ○ ○
○

How influential were the following in your decision to purchase CFL(s) without the coupon?

Very Influential Somewhat Influential Not at all
Influential

The Coupon from Duke Energy

Wal-Mart Advertising

Displays and signs in Wal-Mart

Sales Associate at the store

GE Advertising

Other Advertising

Friends or Family

Section 2:

In this section of the survey, we would like to understand how you use CFLs and other energy efficiency appliances?

0 1 2 3 4 5
6-10 11+

How many CFLs are in use in your house?

Very Satisfied Somewhat Satisfied Not at
all Satisfied

Overall, how satisfied are you with the CFLs?

How long have you been using CFL light bulbs ? Never 3 – 6 months 6 – 9 months

9 – 12 months 1 – 2 years ago 2 – 3 years ago More than 3

years ago

Have you added any electrical appliances to your home in the past year? Yes No

If Yes, is the appliance energy efficient? Yes No

Are you aware of ENERGY STAR? Yes No

Do you look for the ENERGY STAR label when purchasing an appliance? Yes No

Often Sometimes Never

Do you use the Duke Energy Website?

M
ore on
Back

Litho

Has Duke Energy influenced your decision to purchase energy efficient products? ☐ Yes ☐ No

Section 3: General Information About Your Home

How would you best describe the type of home in which you live?

☐ Detached single-family ☐ Mobile Home ☐ Condominium ☐ Duplex/2-family

☐ Multi-Family (3 or more units) ☐ Townhouse

In what year was your home built?

☐ Before 1959 ☐ 1960 - 1979 ☐ 1980 – 1989 ☐ 1990 - 1997

☐ 1998 – 2000 ☐ 2001-2007 ☐ Don't know

What is the approximate square footage (heated area) of your home?

☐ Less than 500 ☐ 500-999 ☐ 1,000-1,499 ☐ 1,500 – 1,999 ☐ 2,000 – 2,499 ☐ 2,500-2,999 ☐ 3,000-3,499 ☐ 3,500-3,999 ☐ 4,000 or more ☐ Don't know

Last year of schooling?

☐ Some high school ☐ Completed high school ☐ Some college

☐ Graduated college ☐ Some grad school ☐ Grad School degree

What range best describes your age group?

☐ 18 to 35 ☐ 36 to 45 ☐ 46 to 55

☐ 56 to 65 ☐ 65 or over

What range best describes your combined household income?

☐ Less than $25,000 ☐ $25,000 to $50,000

☐ $50,000 to $75,000 ☐ Over $75,000

How many people live in your home?

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ more than 7

Do you own or rent your home?

☐ Own ☐ Rent

Type of heating system?

◻ Central furnace ◻ Electric baseboard ◻ Heat pump ◻ Geo-thermal Heat Pump

◻ Hot water or steam boiler ◻ Other

Type of cooling system?

◻ Central air ◻ Window/Room unit air conditioner ◻ Heat pump ◻ Geo-thermal Heat Pump ◻ Other
◻ No cooling system

Primary heating fuel? ◻ Electric ◻ Gas ◻ Oil ◻ Propane ◻ Other

Primary cooling fuel? ◻ Electric ◻ Gas ◻ Other

Thank you for your help with this study. Your $10.00 incentive check will be mailed within 6 – 8 weeks. Please verify your address on the front page of this survey.

◻ Yes, my address on the front page of this survey is correct

◻ No, please mail my check to:

____

____

____

THANK YOU FOR YOUR RESPONSES

Litho

Wal-Mart In-Store Purchases Survey

Duke Energy®

Dear Customer,

Duke Energy is continuously trying to deliver improved services to you, our customer. We would like your input on the company's recent Wal-Mart **Compact Fluorescent Light bulb** coupon promotion. If you have any questions, please contact Amanda Goins, 513-287-3177.

You will receive a check for $10 for your participation.

WE WOULD LIKE YOUR OPINION ABOUT OUR COUPON PROGRAM FOR COMPACT FLOURESCENT LIGHTBULBS (CFLs). FILL IN THE CIRCLES COMPLETELY USING BLUE OR BLACK INK.

Section I Awareness of Advertising

Do you recall receiving Compact Fluorescent Light bulb coupons from Duke Energy, for use in Wal-Mart ? ○ Yes ○ No

Did you use at least one coupon? ○ Yes – Continue this survey ○ No – Please skip to section IV on the back

How influential were the following in your decision to purchase CFL(s)?

	Very Influential	Somewhat Influential	Not at all Influential
The Coupon from Duke Energy	○	○	○
Wal-Mart Advertising	○	○	○
Displays and signs in Wal-Mart	○	○	○
Sales Associate at the store	○	○	○
GE Advertising	○	○	○
Other Advertising	○	○	○

Friends or Family ◻ ◻ ◻

Section II Additional Purchases From Walmart

How often did you visit a Wal-Mart store before your recent visit to redeem the CFL coupon ?

◻ Never ◻ 1-2 visits a month ◻ 3-4 visits a month ◻ 5 or more visits a month

Did you purchase additional items on your visit to Wal-Mart ? ◻ Yes ◻ No

If yes, What was the estimated amount you spent on those additional items?

◻ < $10.00 ◻ $10.00-25.00 ◻ $26.00-50.00 ◻ >$50.00

Have you returned to Wal-Mart since redeeming the CFL coupon? ◻ Yes ◻ No

If yes, How often? ◻ 1-2 visits a month ◻ 3-4 visits a month ◻ 5 or more visits a month

Section III Use of CFL Packs

In this section of the survey, we would like to understand how you have used the CFL packs you purchased with the coupon?

	0	1	2	3	4	5	6-10	11+
How many CFL packs did you purchase with the Duke Energy coupon?	◻	◻	◻	◻	◻	◻	◻	◻
How many CFL bulbs did you purchase in TOTAL?	◻	◻	◻	◻	◻	◻	◻	◻
How many CFL bulbs would you have bought without the coupon?	◻	◻	◻	◻	◻	◻	◻	◻
How many CFL bulbs have you since purchased without coupons ?	◻	◻	◻	◻	◻	◻	◻	◻

Of the bulb packs you bought with Duke Energy/ Wal-Mart coupons:

	0	1	2	3	4	5	6-10	11+
How many CFLs are now installed?	◻	◻	◻	◻	◻	◻	◻	◻

More on the back ☞

Please write in WHERE the CFL went, WHAT it replaced, and HOW MUCH you use that light.

	WHERE	WHAT WAS REPLACED	HOW MUCH ITS USED (Each Day)
Example	Living Room	60W Floor Lamp	6 Hours Per Day (average)
Bulb 1	______	______	______
Bulb 2	______	______	______
Bulb 3	______	______	______
\ Bulb 4	______	______	______
Bulb 5	______	______	______
Bulb 6	______	______	______

Any More? Please summarize briefly below.

Did you change the hours of use since installing the CFLs? ☐ Yes ☐ No

If you answered yes, how did your usage change? ☐ Increased usage ☐ Decreased usage

Have you removed any of the CFLs you installed? ☐ Yes ☐ No

	1-2	3	4	5	6	7-11	12+
If yes, how many did you remove?	☐	☐	☐	☐	☐	☐	☐

Why did you remove them?______

Did you have any CFLs in your house before you bought these discounted CFLs? ☐ Yes ☐ No

1-2	3	4	5	6	7-11	12+

If yes, about how many? ◻ ◻ ◻ ◻ ◻ ◻ ◻

Very Satisfied Somewhat Satisfied Not at all Satisfied

Overall, how satisfied are you with the CFLs? ◻ ◻ ◻

How long have you been using CFL light bulbs ? ◻ Never purchased a CFL until now ◻ A year ago ◻ 2 to 3 years ago ◻ 4 or more years

Section IV Energy Star Awareness

Did you give all of your coupons to someone else to use? ◻ Yes ◻ No

Often Sometimes Never

Do you use the Duke Energy Website? ◻ ◻ ◻

Have you added any electrical appliances to your home in the past year? ◻ Yes ◻ No

Are you aware of ENERGY STAR? ◻ Yes ◻ No

Do you look for the ENERGY STAR label when purchasing an appliance? ◻ Yes ◻ No

Section V General Information About Your Home

How would you best describe the type of home in which you live?

- Detached single-family
- Townhouse
- Condominium
- Duplex/2-family
- Apartment
- Manufactured home
- Multi-Family (3 or more units)

In what year was your home built?

- Before 1959
- 1960 - 1979
- 1980 - 1989
- 1990 - 1997
- 1998 – 2000
- After 2001

What is the approximate square footage (heated area) of your home?

- Less than 1,200
- 1,201 – 1,600
- 1,601 – 1,900
- 1,901 – 2,400
- 2,401 – 3,000
- Greater than 3,000
- Don't know

Last year of schooling?

- Some high school
- Completed high school
- Some college
- Graduated college
- Some grad school
- Grad School degree

What range best describes your age group?

- *18 to 35*
- *36 to 45*
- *46 to 55*
- 56 to 65
- 65 or over

What range best describes your household income?

- Less than $25,000
- $25,000 to $50,000
- $50,000 to $75,000
- Over $75,000

How many people live in your home?

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- more than 7

Do you own or rent your home?

- Own
- Rent

Type of heating system?

- Central furnace
- Electric baseboard
- Heat pump
- Geo-thermal
- Other

Type of cooling system?

- Central air
- Window/Room unit air conditioner
- Heat pump
- Geo-thermal
- Other
- No cooling system

Primary heating fuel? ☐ Electric ☐ Gas ☐ Other

Primary cooling fuel? ☐ Electric ☐ Gas ☐ Other

Thank you for your help with this study. Your $10.00 incentive check will be mailed within 6 – 8 weeks. Please verify your address on the front page of this survey.

- Yes, my address on the front page of this survey is correct
- No, please mail my check to:

____

____

____

THANK YOU FOR YOUR RESPONSES

Appendix 3 – Logged Bulb Characteristics Overview (Initial and Final Studies)

Bulb Characteristics Summary – Initial Lighting Logger Study

Bulb Type	Brand	Wattage	Location	Fixture	Table %
Candle	GE	60	Bathroom	Wall	0.60%
CFL	GE	13	Bedroom 1	Table lamp	0.60%
		26	Family Room	Table lamp	1.30%
			Living Room	Floor lamp	0.60%
	Greenlite	14	Family Room	Table lamp	0.60%
	Marathon	13	Bathroom	Wall	0.60%
			Bedroom 1	Ceiling	0.60%
			Hall	Ceiling	0.60%
		23	Family Room	Table lamp	0.60%
	Mini Spiral	13	Living Room	Table lamp	0.60%
	Miser	15	Office	Ceiling	0.60%
	Niagra	23	Bedroom 3	End Table	0.60%
			Living Room	Table lamp	0.60%
	Nvision	14	Kitchen	Ceiling	0.60%
			Living Room	Table lamp	0.60%
		23	Office	Ceiling	0.60%
	WestH	23	Office	Table lamp	0.60%
Flourescent	GE	40	Kitchen	Ceiling	1.30%
			Laundry Room	Ceiling	0.60%
	Unknown	Unknown	Bathroom	Ceiling	0.60%
		40	Basement	Ceiling	1.30%
			Laundry Room	Ceiling	0.60%
Incandescent	Comm Serv	60	Family Room	Ceiling Fan	0.60%
	Do It	60	Bathroom	Wall	0.60%
	DuraMax	60	Family Room	Ceiling Fan	0.60%
		75	Kitchen	Ceiling	0.60%
	GE	100	Basement	Table lamp	0.60%
			Closet	Ceiling	0.60%
			Family Room	Table lamp	0.60%
			Front Porch	Ceiling	0.60%
			Kitchen	Ceiling Fan	0.60%
				Ceiling	0.60%
		30-70-100	Family Room	Table lamp	0.60%
		40	Basement	Ceiling Fan	0.60%
			Bathroom	Wall	1.90%
			Hall	Ceiling	0.60%
		50-100-150	Bedroom 1	Table lamp	1.30%
			Family Room	Table lamp	0.60%
			Living Room	Table lamp	0.60%
		50-75-100	Living Room	Table lamp	0.60%

		60	Bathroom	Wall	1.90%
			Bedroom 1	Ceiling	1.30%
				Table lamp	1.90%
			Bedroom 2	Table lamp	0.60%
			Dining Room	Ceiling Can	0.60%
			Entryway	Ceiling	0.60%
			Family Room	Table lamp	0.60%
			Hall	Ceiling	1.90%
			Kitchen	Ceiling Fan	1.30%
				Ceiling	1.90%
			Living Room	Table lamp	3.10%
			Office	Ceiling	0.60%
		75	Bedroom 1	Floor lamp	0.60%
				Table lamp	0.60%
			Family Room	Ceiling	0.60%
			Hall	Ceiling	1.30%
			Kitchen	Ceiling	0.60%
			Living Room	Floor lamp	0.60%
	Phillips	40	Bathroom	Wall	0.60%
			Kitchen	Ceiling Fan	0.60%
		60	Bathroom	Wall	0.60%
			Bedroom 1	Ceiling Fan	0.60%
			Kitchen	Ceiling Fan	0.60%
		65	Bathroom	Ceiling Can	0.60%
	Polaroid	60	Bedroom 2	Ceiling Fan	0.60%
	Sunbeam	60	Bedroom 1	Ceiling Fan	0.60%
	Supreme	60	Hall	Ceiling	0.60%
	Sylvania	100	Bathroom	Wall	0.60%
			Bedroom 1	Ceiling	0.60%
			Bedroom 2	Ceiling Fan	0.60%
		30-70-100	Bedroom 1	Table lamp	0.60%
		40	Bathroom	Wall	0.60%
			Hall	Ceiling	0.60%
			Living Room	Floor lamp	0.60%
		60	Bathroom	Wall	1.90%
			Bedroom 1	Ceiling Fan	0.60%
				Ceiling	0.60%
				Table lamp	0.60%
			Dining Room	Chandelier	0.60%
			Hall	Ceiling	0.60%
			Living Room	Table lamp	0.60%
		75	Basement	Ceiling	0.60%
			Family Room	Floor lamp	0.60%
			Kitchen	Ceiling	0.60%
			Living Room	Table lamp	1.90%
	Unknown	Unknown	Dining Room	Ceiling	0.60%
		100	Living Room	Floor lamp	0.60%
		25	Bathroom	Ceiling	0.60%
				Wall	1.30%
			Rear Entry	Ceiling	0.60%

		40	Bathroom	Wall	2.50%
			Bedroom 1	Ceiling Fan	0.60%
			Family Room	Floor lamp	0.60%
			Hall	Ceiling	0.60%
			Kitchen	Ceiling Fan	1.30%
			Living Room	Ceiling Fan	0.60%
		50-100-150	Bedroom 3	Floor lamp	0.60%
			Family Room	Table lamp	0.60%
		50	Entryway	Track	0.60%
		60	Basement	Can	0.60%
			Bathroom	Wall	0.60%
			Bathroom/Basement	Wall	0.60%
			Bedroom 1	Table lamp	1.30%
			Bedroom 2	Ceiling Fan	0.60%
			Kitchen	Ceiling Fan	0.60%
				Ceiling	1.30%
			Laundry Room	Ceiling	0.60%
			Living Room	Table lamp	0.60%
			Office	Ceiling Fan	0.60%
			Porch	Outdoor Wall	0.60%
		75	Bathroom	Wall	0.60%
			Entryway	Ceiling	0.60%
			Hall	Ceiling	0.60%
			Kitchen	Ceiling	0.60%
			Master Bedroom Closet	Ceiling	0.60%
	WestH	100	Bedroom 2	Track	0.60%
			Family Room	Floor lamp	0.60%
		40	Living Room	Table lamp	0.60%
		60	Bedroom 2	Ceiling Fan	0.60%
			Kitchen	Ceiling Fan	0.60%
			Living Room	Table lamp	0.60%
Flood	GE	65	Basement	Track	0.60%
		75	Bathroom	Ceiling	0.60%
	Miser	65	Basement	Ceiling Can	0.60%
	Sylvania	120	Kitchen	Ceiling Can	0.60%
		65	Basement	Ceiling Can	0.60%
	Unknown	65	Bathroom	Ceiling Can	0.60%
		75	Hall	Ceiling Can	0.60%

Bulb Characteristics Summary – Final Lighting Logger Study

Bulb Type	Brand	Wattage	Location	Fixture	Table %
CFL	GE	10	Bathroom	Wall Light	5%
		12-23-29	Family Room	Table Lamp	5%
			Living Room	Table Lamp	5%
		12-23-32	Living Room	Table Lamp	.5%
		13	Basement	Ceiling	.5%
			Bathroom	Ceiling	1.0%
				Wall Light	1.5%
			Bedroom 1	Ceiling Fan	1.0%
				Table Lamp	1 5%
			Bedroom 2	Ceiling Fan	.5%
			Closet	Ceiling	.5%
			Dining Room	Ceiling Fan	1 0%
				Ceiling	.5%
				Desk Lamp	.5%
			Family Room	Ceiling	.5%
				Floor	1.0%
				Table Lamp	2.0%
			Hall	Ceiling	5%
			Kitchen	Ceiling Fan	1.5%
				Ceiling	2.5%
				Table Lamp	.5%
			Laundry Room	Ceiling	5%
			Living Room	Floor	1.0%
				Table Lamp	2.0%
		15	Living Room	Can	5%
		20	Basement	Ceiling	.5%
			Bathroom	Wall Light	.5%
			Family Room	Table Lamp	1.0%
			Kitchen	Ceiling	.5%
				Under Cabinet	.5%
			Living Room	Table Lamp	.5%
		23	Bedroom 1	Floor	1.0%
				Table Lamp	.5%
			Family Room	Table Lamp	1.5%
			Kitchen	Ceiling	1.0%
			Living Room	Floor	1 0%
				Table Lamp	.5%
		26	Bathroom	Wall Light	1 0%
			Bedroom 1	Ceiling Fan	.5%
			Family Room	Floor	.5%
				Wall Light	1.0%

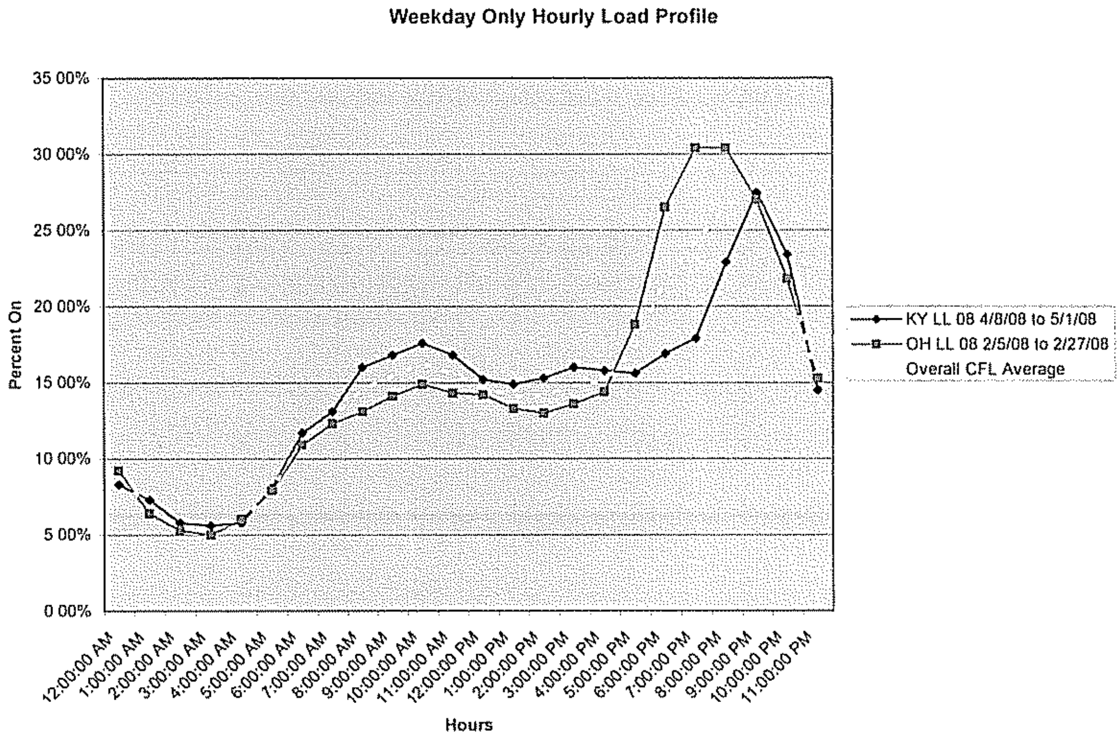
			Kitchen	Ceiling Fan	1.0%
			Living Room	Floor	1.5%
				Table Lamp	5%
			Office/Den	Table Lamp	.5%
		30	Bedroom 1	Torchier	.5%
		45	Living Room	Table Lamp	.5%
	Lights of America	25	Family Room	Table Lamp	.5%
	Nvison	14	Living Room	Table Lamp	5%
		23	Family Room	Table Lamp	.5%
			Living Room	Table Lamp	.5%
			Play Room	Ceiling	.5%
	Sylvania	13	Hall	Table Lamp	.5%
			Kitchen	Ceiling Fan	5%
		23	Bedroom 1	Table Lamp	.5%
	Unknown	13	Dining Room	Table Lamp	.5%
			Family Room	Table Lamp	.5%
Flood	Feit	60	Kitchen	Can	.5%
	GE	120	Kitchen	Ceiling	.5%
		75	Kitchen	Ceiling	.5%
	Sylvania	75	Family Room	Ceiling	.5%
	Unknown	50	Office/Den	Table Lamp	.5%
Fluorescent	GE	20	Kitchen	Under Cabinet	.5%
		40	Bathroom	Ceiling	5%
	Lights of America	25	Kitchen	Ceiling	.5%
	Phillips	15	Bathroom	Wall Light	.5%
		20	Kitchen	Under Cabinet	1.5%
		40	Bathroom	Ceiling	1.0%
			Kitchen	Ceiling	.5%
				Under Cabinet	1.0%
			Laundry Room	Ceiling	.5%
			Workout/Gym	Ceiling	.5%
	Sylvania	30	Laundry Room	Ceiling	.5%
		32	Kitchen	Ceiling	5%
	Unknown	15	Kitchen	Table Lamp	.5%
		60	Laundry Room	Ceiling	.5%
Incandescent	GE	100	Bathroom	Wall Light	.5%
			Bedroom 1	Table Lamp	.5%
			Dining Room	Ceiling Fan	.5%
			Family Room	Floor	.5%
			Hall	Ceiling	1.0%
			Kitchen	Ceiling Fan	.5%
				Ceiling	.5%
			Office/Den	Table Lamp	.5%
		150	Living Room	Table Lamp	1.0%
		25	Bathroom	Ceiling	.5%

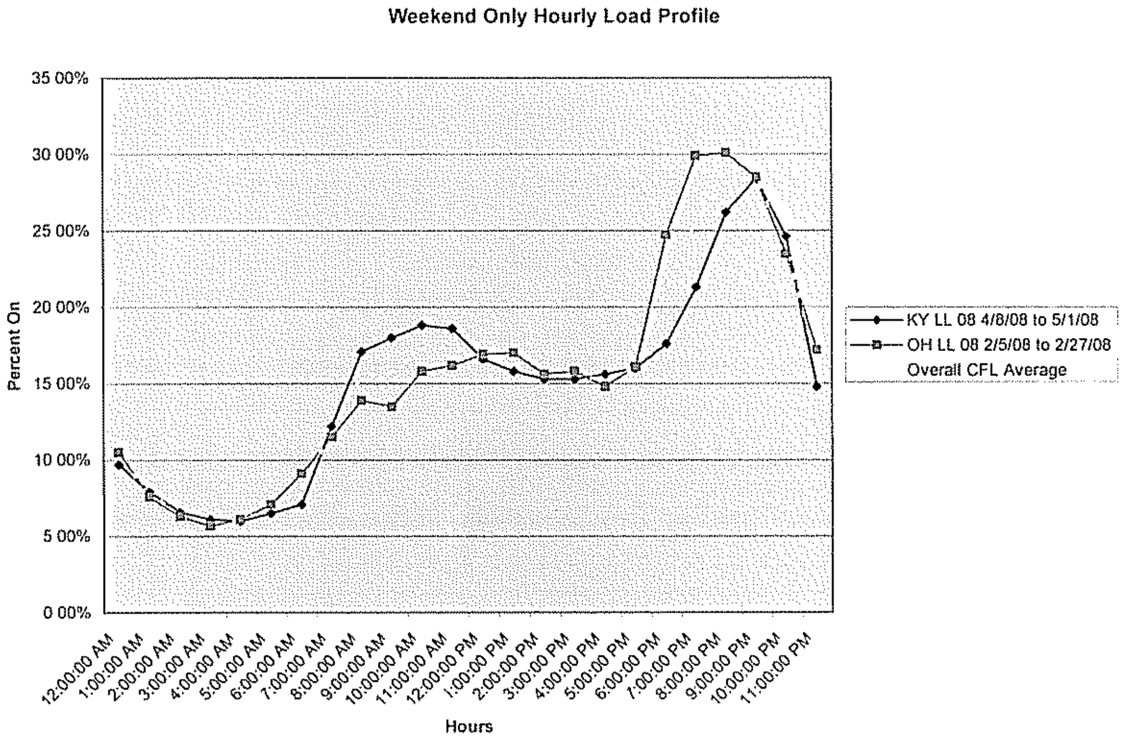
				Wall Light	2.0%
			Dining Room	Ceiling Fan	.5%
			Hall	Ceiling	.5%
			Kitchen	Table Lamp	.5%
		40	Bathroom	Track	.5%
				Wall Light	5.0%
			Bedroom 1	Wall Light	.5%
			Dining Room	Ceiling Fan	.5%
			Kitchen	Wall Light	.5%
		50-100-150	Bedroom 2	Table Lamp	.5%
			Family Room	Table Lamp	1.5%
			Living Room	Floor	.5%
				Table Lamp	.5%
				Wall Light	.5%
			Office/Den	Table Lamp	.5%
				Wall Light	.5%
		50	Bathroom	Wall Light	.5%
		60	Bathroom	Ceiling	.5%
				Wall Light	3.0%
			Bedroom 1	Ceiling	.5%
				Table Lamp	.5%
			Dining Room	Ceiling Fan	1.0%
			Family Room	Table Lamp	.5%
			Hall	Ceiling	.5%
			Laundry Room	Ceiling	.5%
			Living Room	Floor	.5%
				Table Lamp	.5%
			Office/Den	Table Lamp	.5%
		75	Bathroom	Wall Light	.5%
			Family Room	Table Lamp	.5%
			Kitchen	Ceiling Fan	.5%
			Living Room	Floor	.5%
				Table Lamp	1.0%
			Office/Den	Ceiling	.5%
	Halco	60	Bathroom	Wall Light	.5%
	Phillips	100	Kitchen	Ceiling	.5%
		40	Bathroom	Wall Light	.5%
			Hall	Ceiling	.5%
			Laundry Room	Ceiling	.5%
		60	Dining Room	Ceiling	.5%
			Hall	Ceiling	.5%
			Laundry Room	Ceiling	.5%
			Living Room	Wall Light	.5%
		75	Bathroom	Ceiling	.5%
			Laundry Room	Ceiling	.5%

	Satco	60	Bathroom	Wall Light	.5%
	Sylvania	40	Bathroom	Wall Light	.5%
		60	Bathroom	Wall Light	.5%
			Family Room	Floor	.5%
				Table Lamp	.5%
			Kitchen	Ceiling	.5%
			Living Room	Floor	.5%
	Unknown	40	Bathroom	Wall Light	.5%
		60	Office/Den	Ceiling Fan	.5%

Appendix 4 – OH and KY Hourly Lighting Logger Data

Lighting logger data from the OH study described in this report (the "final" lighting logger study) and a KY lighting logger study are compared in the graphs below. The graphs depict lighting logger data from 2/5/08 to 2/27/08 for Ohio, and from 4/6/08 to 5/1/08 for Kentucky. The average of the two data sets is also presented. Overall, for weekdays as well as weekends, the usage of Ohio and Kentucky customers has a similar load shape, with Kentucky customers having slightly more usage in the morning hours, and Ohio customers having more usage in the evening hours. Overall, customers have the least usage in the early morning hours, around 3:00am or 4:00am, and the most usage in the late evening hours, around 8:00pm or 9:00pm.





Weekend Only Hourly Load Profile
35 00%
30 00%
25 00%
20 00%
15 00%
10 00%
5 00%
0 00%
Percent On
12:00:00 AM
1:00:00 AM
2:00:00 AM
3:00:00 AM
4:00:00 AM
5:00:00 AM
6:00:00 AM
7:00:00 AM
8:00:00 AM
9:00:00 AM
10:00:00 AM
11:00:00 AM
12:00:00 PM
1:00:00 PM
2:00:00 PM
3:00:00 PM
4:00:00 PM
5:00:00 PM
6:00:00 PM
7:00:00 PM
8:00:00 PM
9:00:00 PM
10:00:00 PM
11:00:00 PM
Hours
KY LL 08 4/8/08 to 5/1/08
OH LL 08 2/5/08 to 2/27/08
Overall CFL Average

Appendix 5: Distributions of Initial and Final Populations

These findings are supported by a Kolmogorov-Smirnov Z test of the survey responses of the two logger study populations, which compared the responses of each population to similar questions on the surveys to determine whether the two populations are similar to one another, that is, come from similar distributions. Because participants self-select into the survey responses and logger studies, it is important to confirm that the samples are similar. The absolute, positive, and negative statistics display the largest differences between distributions in each sample. The "Asymp. Sig." values state whether this difference is significant. If the significance, or P values, are greater than .01, then we cannot reject the statement that the populations come from the same distribution.

Tables 7 and 8 show the first test, comparing the initial and final lighting logger study populations. The P values for this test are above .01, meaning that we cannot reject the statement that the populations come from the same distribution. P values for questions 8 through 11 are affected by the fact that the surveys were given before and after the implementation of the CFL program. Questions 8 through 11 also have the largest absolute difference values.

Table 7. K-S Z test for Initial and Final Lighting Logger Study Populations

		1	2	3	4	5	6	7	8
		What is the approximate square footage (heated area) of your home?	How many people live in your home?	Type of heating system?	Type of cooling system?	Primary heating fuel?	Primary cooling fuel?	Do you own or rent your home?	Do you recall receiving CFL bulb coupons from Duke Energy, for use in Wal-Mart GE bulbs?
Most Extreme Differences	Absolute	249	.238	.108	.124	.084	.082	.341	.475
	Positive	.249	.238	.013	.124	.000	.082	.341	.475
	Negative	-.125	-.148	-.108	-.033	-.084	.000	.000	.000
Kolmogorov-Smirnov Z		1 104	1 101	.498	578	.387	379	1.590	2.197
Asymp. Sig. (2-tailed)		.175	.177	.965	.892	.998	.999	.013	.000

Table 8. K-S Z test for Initial and Final Lighting Logger Study Populations continued

		9	10	11	12	13	14	15	16	17	18
		How many CFL bulbs did you purchase in total?	How many CFL bulbs would you have bought without the coupon?	How many CFLs are now installed?	Did you change the hours of use since installing the CFLs?	How many of the CFLs you installed have you removed?	How many CFL bulbs have you since purchased without coupons?	Overall, how satisfied are you with the CFLs?	How many CFLs did you have in your house before you bought these discounted CFLS?	In what year was your home built?	How would you best describe the type of home in which you live?
lost xtreme ifferences	Absolute	970	306	716	.070	.229	.203	241	.248	.243	.110
	Positive	.000	.000	.000	070	229	.000	.241	.031	.000	.110
	Negative	-.970	-.306	-.716	.000	.000	-.203	.000	-.248	-.243	-.091
Kolmogorov-Smirnov Z		4.211	1.253	2.869	.266	.650	.802	.889	.884	1.086	.504
Asymp. Sig. (2-tailed)		.000	.086	.000	1.000	.793	.540	.408	.416	.189	.961

Tables 9 and 10 show a K-S Z test comparing the entire survey population for each survey (not just the lighting logger participants). The results of this test show similar results to the first K-S Z test comparing the logger study participants only. Again, the P values are above .01, meaning we cannot reject the statement that the two populations are similar. The largest absolute differences between the populations are from questions 8 through 11.

Table 9. K-S Z test for Initial and Final CFL Program Survey Populations

		What is the approximate square footage (heated area) of your home?	How many people live in your home?	Type of heating system?	Type of cooling system?	Primary heating fuel?	Primary cooling fuel?	Do you own or rent your home?	Do you recall receiving CFL bulb coupons from Duke Energy, for use in Wal-Mart GE bulbs?
Most Extreme Differences	Absolute	175	.207	062	108	081	106	.242	.470
	Positive	175	207	.062	.108	.029	.106	242	.470
	Negative	-.063	-.094	-.018	-.029	-.081	.000	000	000
Kolmogorov-Smirnov Z		1.016	1.262	.379	667	.493	.655	1.498	2.872
Asymp. Sig. (2-tailed)		.254	.083	999	765	.968	.784	.023	.000

Table 10. K-S Z test for Initial and Final CFL Program Survey Populations continued

		How many CFL bulbs did you purchase in total?	How many CFL bulbs would you have bought without the coupon?	How many CFLs are now installed?	Did you change the hours of use since installing the CFLs?	How many of the CFLs you installed have you removed?	How many CFL bulbs have you since purchased without coupons?	Overall, how satisfied are you with the CFLs?	How many CFLs did you have in your house before you bought these discounted CFLS?	In what year was your home built?	How would you best describe the type of home in which you live?
ost xtreme ifferences	Absolute	968	.324	.715	073	240	.261	214	169	.215	.145
	Positive	000	028	000	073	240	.000	214	.169	000	.145
	Negative	- 968	- 324	- 715	000	- 008	-.261	000	-.144	- 215	-.023
Kolmogorov-Smirnov Z		5 402	1.643	3.499	.334	753	1.251	.937	.706	1 282	.895
Asymp. Sig. (2-tailed)		000	.009	000	1.000	.622	.087	.343	.701	.075	.400

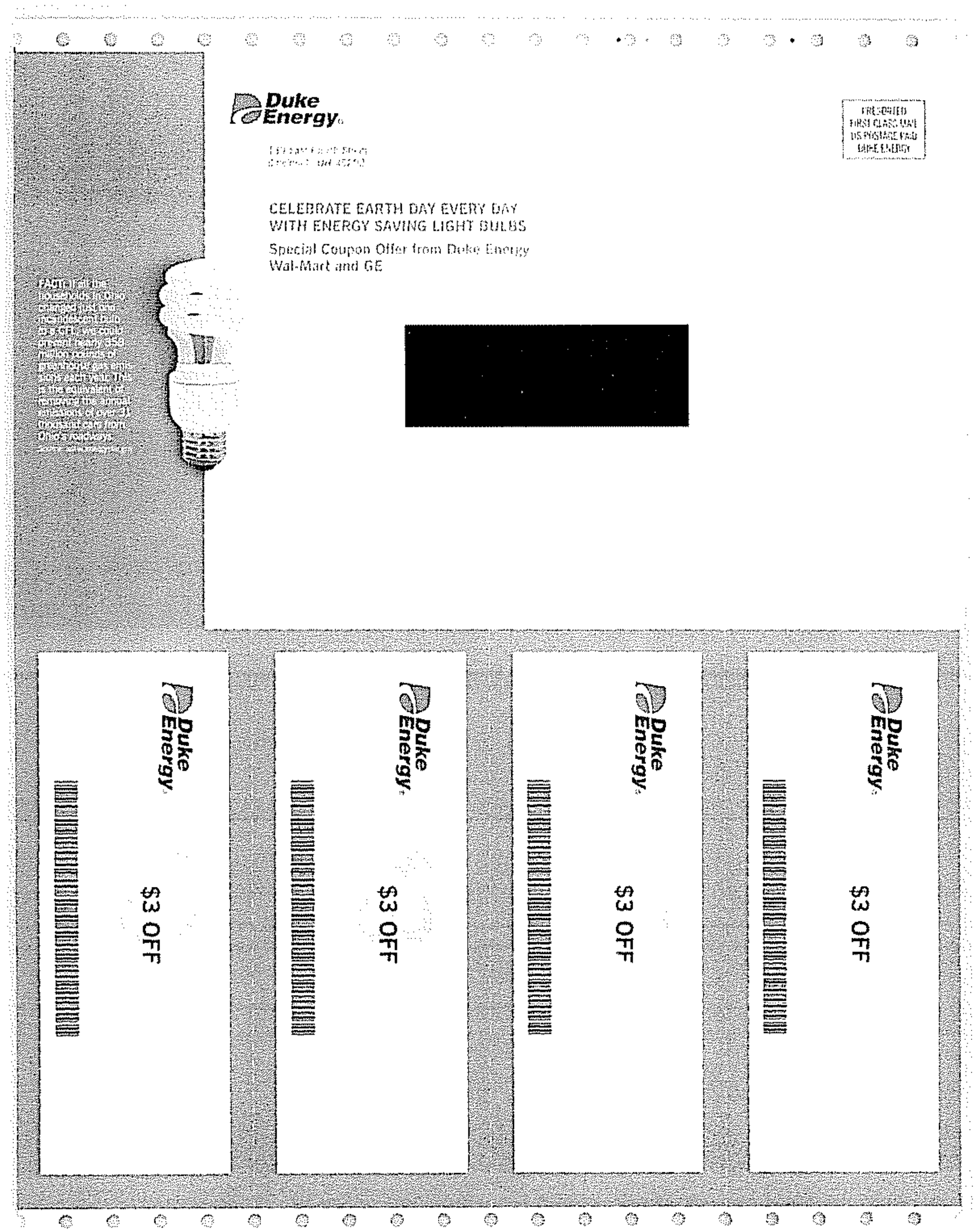
These findings are also supported by a K-S Z test of the lighting logger data for each population, which finds that we cannot reject the null hypothesis that the two populations come from the same distribution based on the p value greater than .05 (95% confidence).

Table 11. K-S Z test for Initial and Final Lighting Logger Study Populations

		average hours per day
Most Extreme Differences	Absolute	135
	Positive	026
	Negative	- 135
Kolmogorov-Smirnov Z		1 245
Asymp. Sig. (2-tailed)		.090

Appendix 6: Wal-Mart CFL Coupon Mailer

Black boxes mark placement of address labels and barcodes.



SAVE TODAY AND TOMORROW WITH ENERGY SAVING LIGHT BULBS.

Duke Energy Celebrates Earth Month with Wal-Mart and GE
Duke Energy is proud to offer our customers special savings on the purchase of GE Energy Smart™ compact fluorescent light bulbs (CFLs). Today's CFLs produce high-quality, soft white light, are smaller than the CFLs of the past, and can be used in a variety of fixtures.

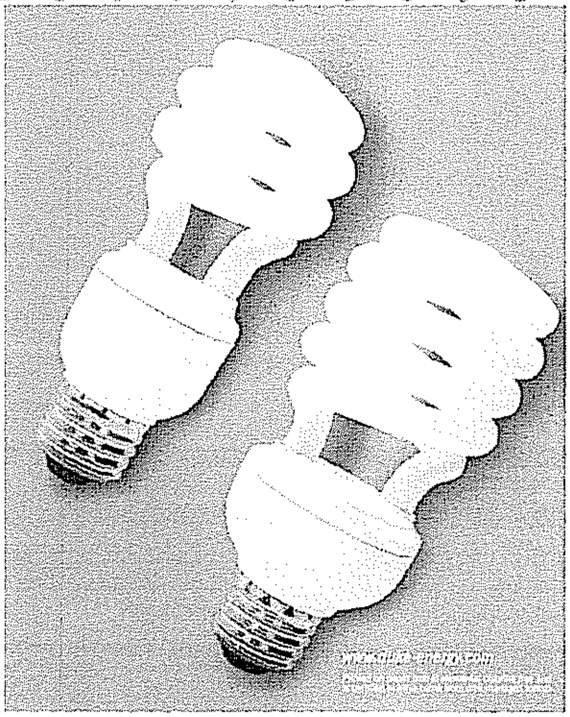
Save Money on Energy.
Now That's a Bright Idea
When you use CFL bulbs throughout your home, your savings will quickly add up and you'll be helping to conserve valuable energy resources. When you purchase and install a 3-pack of CFLs, you will:

- Save $47 to $74 on energy bills over the rated life of each bulb
- Use up to 75% less energy
- Change bulbs less frequently because CFLs last up to 10 times longer

See package for specific product ratings. Energy savings based on 10¢ per kWh.

Experience Savings Now With These Valuable Coupons
Visit Wal-Mart today and select a three-pack of GE Energy Smart™ light bulbs and start saving.

Duke Energy. GE WAL*MART



[redacted]

MANUFACTURER'S COUPON • EXPIRES 06.30.08
$3 OFF
ONE GE Energy Smart 13 Watt CFL 3-Pack
Redeemable at Wal-Mart ONLY

[redacted]

MANUFACTURER'S COUPON • EXPIRES 06.30.08
$3 OFF
ONE GE Energy Smart 13 Watt CFL 3-Pack
Redeemable at Wal-Mart ONLY

[redacted]

MANUFACTURER'S COUPON • EXPIRES 06.30.08
$3 OFF
ONE GE Energy Smart 20 Watt CFL 3-Pack
Redeemable at Wal-Mart ONLY

[redacted]

MANUFACTURER'S COUPON • EXPIRES 06.30.08
$3 OFF
ONE GE Energy Smart 26 Watt CFL 3-Pack
Redeemable at Wal-Mart ONLY

Appendix 7: CFL Program Interactions with Retailers

This is a chart of the interactions between the various campaigns and stores that a CFL promotion has occurred in so far (including and in addition to Wal-Mart).

A letter represents a distributor, and a number represents a subset of that distributor (web, other, mail, etc.).

Interactions	Number of customers
A1	275
B1	1683
B1 & A1	1
C1	326
C1 & A1	1
C1 & B1	9
D1 & B1	4573
D1 & A1	12
D1 & B1	47
D1 & C1	1
A2	101
A2 & B1	1
A2 & C1	2
A2 & D1	6
A3	36
A3 & B1	1
A3 & D1	1
A3 & A2 & D1	1
E1	6172
E1 & A1	27
E1 & B1	71
E1 & B1 & A1	2
E1 & C1	29
E1 & C1 & B1	3
E1 & D1	26
E1 & D1 & A1	2
E1 & D1 & B1	1
E1 & D1 & C1	2
D2	29528
D2 & A1	46
D2 & B1	162
D2 & B1 & A1	2
D2 & D1	120
D2 & A2	21
D2 & A3	10
D2 & E1	1870
D2 & E1 & A1	13

D2 & E1 & B1	28
D2 & E1 & B1 & A1	1
D2 & E1 & D1	27
D2 & E1 & D1 & B1	2
Total	45242

Appendix 8: Tables of Customer Characteristics Model Data

The following tables describe the customer characteristics that were appended to customer data for the Customer Characteristics model in Section 1. As previously stated, the model compared equal populations of CFL redeemers and other customers to determine the characteristics of customers more likely to participate in the promotion. The tables show the distribution of responses. In some cases, customer responses were grouped into ranges. Where applicable, the ranges are based on the characteristics of customers more likely to participate in the program (for example, "Age of head of household" is grouped into customers younger than 57 and customers 57 or older, with customers 57 or older more likely to participate). The tables included are for the 9 variables that were found to be significant in the model.

	0	1-750	751-1500	1501-2250	2251-3000	3001-3750	3751-4500	4501-5250	5251-6000	6001 and greater	Total
December Usage (Redeemers)	12	2581	2649	926	381	122	44	18	4	5	6742
	2%	38 3%	39 3%	13 7%	5 7%	1 8%	.7%	.3%	.1%	.1%	100 0%

	0	1-750	751-1500	1501-2250	2251-3000	3001-3750	3751-4500	4501-5250	5251-6000	6001 and greater	Total
December Usage (All)	50	5439	5097	1773	707	259	95	38	15	11	13484
	4%	40 3%	37 8%	13 1%	5 2%	1 9%	7%	3%	.1%	.1%	100 0%

	< 57	> = 57	Total
Age of head of household (Redeemers)	2762	3980	6742
	41 0%	59.0%	100 0%

	< 57	> = 57	Total
Age of head of household (All)	7443	6041	13484
	55.2%	44 8%	100.0%

	< 25,000	25,000 to 49,999	50,000 to 74,999	75,000 to 100,000	Over 100,000	Total
Family income (Redeemers)	887	1944	1537	1035	1339	6742
	13 2%	28 8%	22 8%	15.4%	19.9%	100.0%

	< 25,000	25,000 to 49,999	50,000 to 74,999	75,000 to 100,000	Over 100,000	Total
Family income (All)	2052	3764	2884	1956	2828	13484
	15.2%	27.9%	21.4%	14 5%	21 0%	100 0%

	Most likely to rent	Likely to rent	Least likely to rent	Likely homeowner	Most likely homeowner	Self reported homeowner	Total
Owner or renter probability (Redeemers)	76	470	94	198	333	5571	6742
	1.1%	7 0%	1 4%	2.9%	4 9%	82 6%	100.0%

	Most likely to rent	Likely to rent	Least likely to rent	Likely homeowner	Most likely homeowner	Self reported homeowner	Total
Owner or renter probability (All)	293	1548	238	385	548	10472	13484
	2.2%	11.5%	1.8%	2.9%	4.1%	77.7%	100.0%

	< = 6 years	Between 7 and 21	> 21 years	Total
Length of residence (Redeemers)	1651	2444	2647	6742
	24.5%	36.3%	39.3%	100.0%

	< = 6 years	Between 7 and 21	> 21 years	Total
Length of residence (All)	4051	5204	4229	13484
	30.0%	38 6%	31.4%	100.0%

	0	1	2	2	3	4	5	6	7	Total
Number of adults in household (Redeemer)	7	1225	1	2941	1495	687	271	89	26	6742
	1%	18.2%	0%	43 6%	22.2%	10.2%	4.0%	1 3%	.4%	100.0%

	0	1	2	2	3	4	5	6	7	8	Total
Number of adults in household (All)	16	3171	2	5930	2557	1174	453	144	34	3	13484
	.1%	23.5%	.0%	44 0%	19 0%	8 7%	3 4%	1.1%	3%	.0%	100.0%

	0	< = 50,000	51,000 to 100,000	101,000 to 250,000	251,000 to 500,000	501,000 to 750,000	751,000 to 1 million	> 1 million	Total
Sales price of home (Redeemer)	2250	1063	1334	1789	273	30	1	2	6742
	33 4%	15 8%	19.8%	26.5%	4 0%	.4%	0%	0%	100 0%

	0	< = 50,000	51,000 to 100,000	101,000 to 250,000	251,000 to 500,000	501,000 to 750,000	751,000 to 1 million	> 1 million	Total
Sales price of home (All)	4645	2012	2570	3576	591	71	10	9	13484
	34.4%	14 9%	19 1%	26 5%	4 4%	5%	1%	1%	100 0%

	1 = Most likely	2	3	4	5	6	7	8	9	10 = Least likely	Total
Internet Adoption score (Redeemer)	566 8.4%	497 7 4%	546 8.1%	547 8 1%	857 12.7%	738 10.9%	819 12.1%	862 12 8%	746 11 1%	564 8 4%	6742 100.0%

	1 = Most likely	2	3	4	5	6	7	8	9	10 = Least likely	Total
Internet Adoption score (All)	1379 10 2%	1195 8 9%	1250 9 3%	1251 9.3%	1820 13.5%	1578 11.7%	1546 11 5%	1440 10.7%	1129 8.4%	896 6.6%	13484 100.0%

	1 = Most likely	2	3	4	5	5	6	7	8	9	10 = Least likely	Total
Probability of revolving monthly payments *(Redeemers)*	562 8.3%	813 12.1%	624 9.3%	610 9.0%	1 .0%	586 8.7%	657 9 7%	676 10.0%	684 10.1%	819 12 1%	710 10.5%	6742 100.0%

	1 = Most likely	2	3	4	5	5	6	7	8	9	10 = Least likely	Total
Probability of *revolving* monthly payments (All)	1601 11 9%	1858 13.8%	1502 11.1%	1380 10.2%	3 .0%	1219 9.0%	1293 9 6%	1217 9.0%	1160 8.6%	1200 8 9%	1051 7 8%	13484 100.0%

Appendix F

Final Report

An Evaluation of the Kentucky Small Commercial and Industrial Incentive Program

Results of a Process and Impact Evaluation

July 16, 2007 – updated September 3, 2008

Prepared for

Duke Energy
139 East Fourth Street
Cincinnati, OH 45202

Prepared by:
Nick Hall, Johna Roth

TecMarket Works
165 West Netherwood Road, Suite A
Oregon, WI 53575
Voice: (608) 835-8855
Fax: (608) 835-9490
Mail@TecMarket.net

Pete Jacobs

AEC
2540 Frontier Ave
Boulder, CO 80301
Voice: (303) 444-4149
Fax: (608) 835-9490
pjacobs@archenergy.com

TECMARKET Works

Table of Contents

Executive Summary

About This Report

This report presents the updated results of a process and impact evaluation of Duke Energy's Small Commercial and Industrial Incentive Program as it operates in Kentucky. The initial evaluation was performed in 2007, and this version presents an update to the evaluation based on further research conducted in 2008. This was done to better evaluate the program after more participants have utilized the program's offerings.

This program provides incentives for commercial and industrial electric customers not on rate TT (Time-of-Day Rate for Service at Transmission Voltage). The incentives can be applied to new buildings or retrofits, and cover lighting, HVAC and Pumps/Motors. This report presents the results from a process and impact evaluation.

The first section provides the results from the process evaluation. The process evaluation employed in-depth interviews with program design, planning and implementation staff, and short interviews with program participants.

The second section provides findings from the impact evaluation efforts. The impact evaluation employed a tracking system review and an engineering review of lighting energy savings calculations.

Summary of Findings

An overview of the key findings identified through this evaluation is presented in this section.

Significant Process Evaluation Findings

Program Technologies

The equipment incentivized under the Kentucky C&I Program are selected by a panel of industry experts and reviewed regularly. This practice ensures that the most efficient technologies are covered and incentivized by the program.

Changes in technologies and incentives will bring on customer dissatisfaction, but are necessary as the technologies in the market become more efficient. When the technologies being offered are updated and certain equipment is no longer incentivized, there should be two to three month window for those technologies to remain on the list and be incentivized for those that provide receipts showing that the purchase was made before the equipment was removed from the program.

The Incentives

The incentives are altered according to the suggestions of the industry expert panel and are subject to change, resulting in some participant dissatisfaction when they change. However, this condition cannot be avoided. The incentives are not to exceed 50 percent of the incremental price of the energy efficient equipment. As a result, when changes to the incremental efficiency costs are observed, changes are required in the incentives accordingly.

The participants are generally happy with the level of the incentives, however some participants believe it takes too long for the incentives to be processed. At the current size of the program this is not a substantial problem, however, this issue should be addressed by the program's management. Incentives should be paid quickly to support strong participant satisfaction and encourage participation. If the program expands to serve more customers, it is recommended that additional efforts be implemented to reduce incentive payment durations. Participants report that incentives take from 4 to 8 weeks to obtain, so we recommend changes to the processing process be incorporated into the process to allow payments within two weeks of the receipt of the appropriate applications for non-inspected participants and 4 weeks for inspected participants. We understand that changes to the rebate process are underway. An outside contractor has been hired and beginning March 1, 2007, all checks should be delivered to the customers within 2-3 weeks provided that the applications are accurate and complete.

Program Satisfaction

The participants are satisfied with the program overall, and think it is a great program that provides an extra push to help customers make an energy efficient choice.

Significant Impact Findings

The gross energy and demand savings by measure estimated by this evaluation for the lighting measures studied are summarized in Table 1.

Table 1. Revised Lighting Measure Gross Savings

Fixture Type	kW/fixture	kWh/fixture
CFL-Hardwired (fixture & bulb	0.043	315
CFL-Screw-in (bulb only)	0.037	151
LED Exit Signs Electronic Fixtures (retrofit only)	0.031	149
T5 1 Lamp replacing T12 (retrofit only)	0.005	29
T5 HO High Bay 2L (retrofit only)	0.138	404
T5 HO High Bay 4L (retrofit only)	0.174	1384
T5 HO High Bay 6L (retrofit only)	0.074	222
T5 HO High Bay 8L (retrofit only)	-0.025	-167
T8 High-bay- 4 ft 4 lamp (retrofit only)	0.121	1184
T8 High-bay- 4 ft 6 lamp (retrofit only)	0.189	1331
T8 High-bay- 4 ft 8 lamp (retrofit only)	0.128	324
T8-2 ft 2 lamp (retrofit only)	0.004	34
T8-2 ft 3 lamp (retrofit only)	0.016	36
T8-4 ft 1 lamp (retrofit only)	0.011	44
T8-4 ft 2 lamp (retrofit only)	0.013	84
T8-4 ft 3 lamp (retrofit only)	0.020	116
T8-4 ft 4 lamp (retrofit only)	0.031	216

T8-8 ft 2 lamp (retrofit only)	0.014	63

Freeridership for this program was estimated at 40%. Using this freeridership estimate along with the effective useful life of the lighting measures installed under the program, the total gross and net first year and lifecycle impacts for the lighting component of the Kentucky C&I program are shown in Table 2.

Table 2. First Year and Lifecycle Gross and Net Savings for Lighting Component of Kentucky C&I Program

Parameter	KWh	kW
First year gross savings	9,994,049	1,509
First year net savings	5,996,429	905
Lifecycle gross savings	96,746,174	
Lifecycle net savings	58,047,705	

The impact analysis was confounded by several factors that could be improved in the future:

1. **Ambiguity in measure descriptions**. The lighting measure descriptions in the tracking system for T-8 fluorescent lamps were somewhat ambiguous. Although the lamp type, length and number of lamps per fixture were recorded, the lamp watts were not. Several styles of T-8 lamps with varying input watts are available, and adding a lamp wattage description will better define the specific type of the installed measure.
2. **Lack of building type information.** Lighting and HVAC measure savings calculations rely on an understanding of the building type. An additional field indicating the building type or customer SIC or NAICS code was included in the program tracking database, but the data were sparsely populated **Errors in lighting program tracking database internal algorithms.** The lighting program tracking database carried estimates of energy and demand savings that were in error. These errors were identified during the course of conducting the evaluation, and revised savings estimates based on the tracked fixture type, installation quantity, and self-reported operating hours were developed.

Introduction

This report presents the results of a process and impact evaluation of the Small Commercial and Industrial Incentive Program as it is provided in Kentucky. To conduct the process evaluation we interviewed program managers and program participants. To conduct the impact evaluation, we relied on an engineering analysis of information provided in the program tracking system.

Program Description

Duke Energy encourages its business customers to increase the energy efficiency of their facilities through their Commercial and Industrial Energy Efficiency Rebate Program. The equipment rebates provided through this program are available to Duke Energy's Kentucky commercial and industrial customers who are not in rate group TT (Time-of-Day Rate for Service at Transmission Voltage). Eligible products include lighting, HVAC and Motors/Pumps. The energy efficient equipment can be installed in new or existing facilities, however some of the lighting product rebates apply only to retrofit applications (this change to retrofit only application was made on 4/15/06). Customers may, depending on the size of the project, install the equipment themselves, however, those installations have to be inspected by Duke Energy before the rebate is awarded.

Evaluation Methodology

The study methodology consists of the following general parts:

1. In 2007, the process evaluation was performed, in which TecMarket Works surveyed 15 participants from a pool of available Kentucky customers, and an in-depth interview with the program manager. For the 2008 update, TecMarket Works performed 25 short surveys with participants in August of 2008 that focused on freeridership and satisfaction.
2. An impact analysis that combined a review of the program tracking system and an engineering review of the savings estimates from the lighting component of the program.

Process Evaluation

The process evaluation included a telephone interview with the Duke Energy program manager and interviews with program participants. The management interview focused on the design, planning, and implementation of the program and a review of the program's goals and objectives. This interview was conducted with Connie Rhodes, Duke Energy's Small Commercial and Industrial Program Manager. Interviews were also conducted with participants, these interviews focused on their participation experiences, satisfaction with the program, the operations of the program and other subjects presented in this report.

The interviews were conducted in January 2007. Both sets of interviews followed formal evaluation interview protocols. These protocols are provided in Appendix A and B of this report and allow the reader to examine the range and scope of the questions addressed during the interviews.

Ninety-six participant interviews were conducted with both Indiana (81) and Kentucky (N=15) participants. The low number of interviews with Kentucky participants is because of the small number of participants in that program, consistent with the current level of the budgeted offerings in that region. The Indiana interviews are discussed in this report in order to compare the two programs and to provide information on programs that are operated with a similar approach. While the two programs are not identical, the differences are minor from a process evaluation perspective. The participants interviewed were randomly selected from the following location/technology groups: Kentucky-HVAC, Kentucky-Lighting, Indiana-Lighting, Indiana-HVAC, and Indiana-Motors. Table 3 below presents the number of participants in each of the five groups, and indicates the number that were randomly targeted from each group. Due to the low numbers of customers in HVAC and Motors, we were unable to obtain the number of interviews planned due to refusals, closed businesses, and personnel changes.

Table 3. Interviewed Participants in the Small C&I Incentive Program

Program	Number of Participants	Target: Number of Interviews, n=100	Conducted: Number of Interviews, n=96	2008 Interviews Conducted for Update
Indiana HVAC	61	15	11	
Indiana Lighting	260	61	68	
Indiana Motors	7	5	2	
Kentucky HVAC	10	8	4	3
Kentucky Lighting	46	11	11	22

Energy Impact Evaluation

The impact evaluation used an engineering-based approach to estimate savings from the lighting component of the program. A review of the program tracking database revealed a problem with the tracking system savings estimates. The savings for each lighting measure were recalculated using the fixture watt savings estimates developed during program design, measure counts as recorded in the tracking system, coincidence factors assigned by building type, and customer self-reported operating hours.

The revised tracking system estimates were used to develop average per measure demand and energy savings for each measure installed under the program. Demand and energy savings were summed across all lighting measures to estimate first year program savings. Freeridership estimates were applied to the gross savings to estimate first year net impacts. Effective useful life (EUL) estimates were applied to each measure to estimate life cycle gross and net energy savings.

Section I: Process Interview Results

A total of ninety-six interviews were conducted with participants of the Small C&I Incentive Program, 15 of which were Kentucky customers. All of the interviewees took part in one or more program offerings. At the time of the evaluation, there was a small sample of Kentucky customers that had completed the full participation process for TecMarket Works to interview. The 2008 update provides more information on the program's operations as participation has increased. Twenty-five short surveys were conducted. The interviews focused on freeridership and satisfaction, and this section is updated where appropriate. Question about awareness of the program, understanding of the program, reasons for participating, etc., were not addressed in the short survey.

There are suggestions for improvement for the program discussed in this report; however, the program is meeting its objectives as it is currently operated. In summary, some participants would like to have energy audits made available through the program, or have more program-related contact with their vendors when program offerings are changed or when new technologies are added to the program. The program seems to be experiencing a slow but steady increase in participation. This may be due to marketing and participant networking, to higher energy costs increasing interests in the program, to the falling price of energy efficient technologies relative to the program incentive levels, or a combination of these reasons. The participant population, at this time, is too small to be able to define the exact cause of the increased interest. However, the program managers have noticed the increase. This increase has led to the program being able to process the program's budget allocations to participants. Additional participation will require additional program budgets.

Awareness and Understanding of the Program

All of the Kentucky customers contacted remembered participating in the program. Most of the customers found out about the Program through a brochure mailed by Duke Energy (40%), or from their contractor (33%). Other sources were Duke Energy's web site and word of mouth. Table 4 below presents the responses.

Table 4. Awareness of the Kentucky Small C&I Program

	Number	Percent
Remember Participating	15	100%
How Participants Discovered Program		
Duke brochure	6	40%
Contractor	5	33%
Duke web site	1	7%
Owner of business told me	1	7%
Owner of another business told me	1	7%
Don't recall	1	7%

Over half (60%) of the customers were able to make a participation decision based on the information they received when they first learned about the program, while the other 40 percent had to obtain further information about the program in order to decide to participate. Of the customers that had to find more information, five of them (83%) were able to have their questions answered by visiting the program web site, calling their contractor, or calling Duke Energy. One customer with further questions went to the web site to find more information about the program, but found the information there was too vague and confusing for a "lay person", yet decided to participate without a complete understanding of the program. The other customer with additional unanswered questions could not recall what the specific issue was.

Table 5. Understanding of the Kentucky Small C&I Program

	Number	Percent
The Program Information was Adequate	9	60%
Not adequate: went to web site	3	20%
Not adequate: called contractor	2	13%
Not adequate: called Duke	1	7%
Did you have Questions About the Program that were not Answered?		
Yes	2	13%
No	13	87%

Program Paperwork

The participants themselves filled out the application forms 60 percent of the time, while the others were filled out by their contractors. However, the participants were more likely to submit the forms (73%). All the participants indicated that the program's forms were easy to understand. This finding indicates that at this time, there does not seem to be an issue with the complexity or structure of the participation forms that acts as a barrier to participant understanding of the form's requirements.

Table 6. Participants' Reaction to the Small C&I Program Paperwork

	Number	Percent
Who Filled Out the Forms?		
Participant	9	60%
Contractor	6	40%
Who Submitted the Forms?		
Participant	11	73%
Contractor	4	27%
Were the Forms Easy to Understand?		
Yes	15	100%
No	0	0%

While a participant may understand a form, that does not mean that they are satisfied with its structure, function and use. To help get at satisfaction we asked participants about their satisfaction with the forms. Of the 15 participants interviewed 13 were able to address this question. These participants rated their satisfaction with the forms on a 1 to 10 scale, with 1 meaning very dissatisfied and 10 meaning very satisfied. The mean score from this question is 7.15 indicating acceptance, but some level of dissatisfaction among the participants. The median satisfaction score was 8. Satisfaction scores for this and other aspects of the Kentucky program are covered later in this report.

Program Incentives

We asked the participants about the program's incentives. First, we asked if participants had any problems receiving the incentive. Only three of the 15 (20%) indicated that they had problems. When we asked the participants to explain the problem, the following explanations were provided:

- Our two incentive checks were sent to our old address, one was returned to Duke, but they are now waiting for the second check to be returned before re-processing.
- Duke lost our paperwork.
- We did the remodeling in mid-2005 and put the new equipment in service in 2006. When filling out the application I put 2006 as our date of installation, however, the efficiency level changed in that period and I was no longer eligible to receive the incentive. If I would have put 2005 as the year on the installation I would have received the incentive.

Program Participation

Reasons for Participating

We asked the participants what their primary reason was for their participation decision. Thirty-three percent of the participants indicated that the primary reason for purchasing or upgrading their equipment was for the energy savings. Another 33 percent said the reason for the purchase was because of a remodeling project. Twenty-five percent of the participants indicated that the main reason for the purchase was because it was recommended by their contractor. The other reasons provided relate in one way or another to the project. These responses are presented in Figure 1 below.

We then asked the participants how important the incentive was in the decision to purchase a more energy efficient model. We asked if it was the primary reason, an important reason, one of the reasons but not the most important, one of the reasons but a minor one, or not a reason at all. Forty percent indicated that it was an important reason, and 33 percent indicated that it wasn't a reason at all.

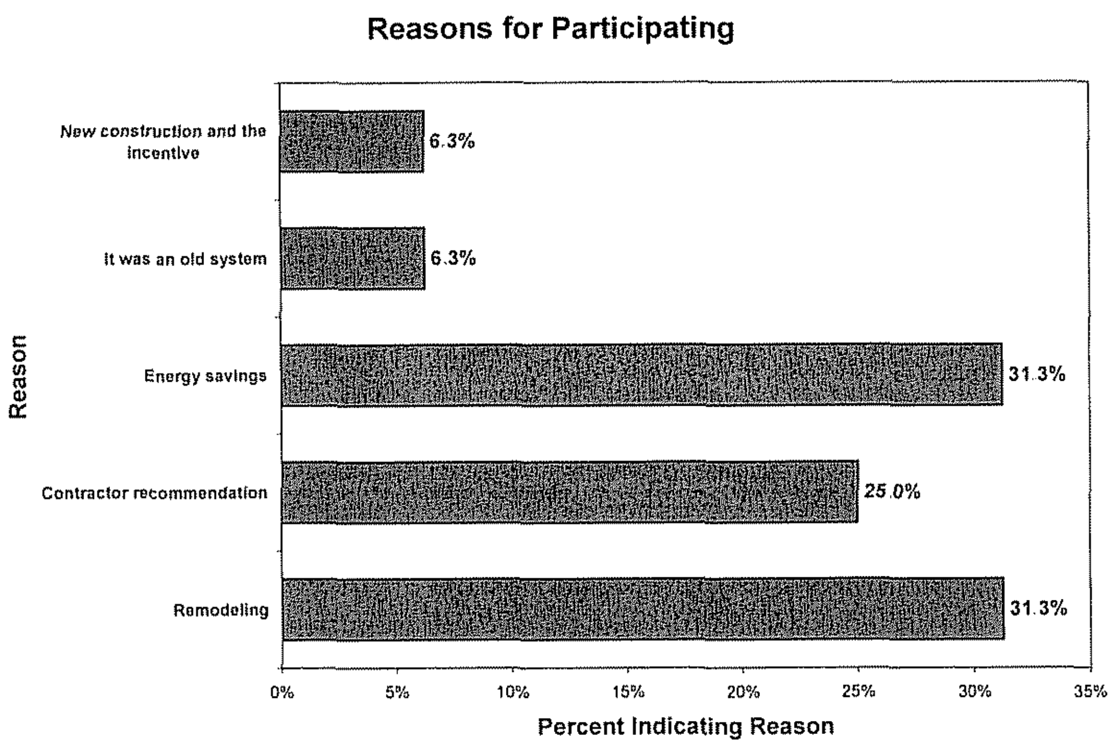


Figure 1. Reasons for Participation

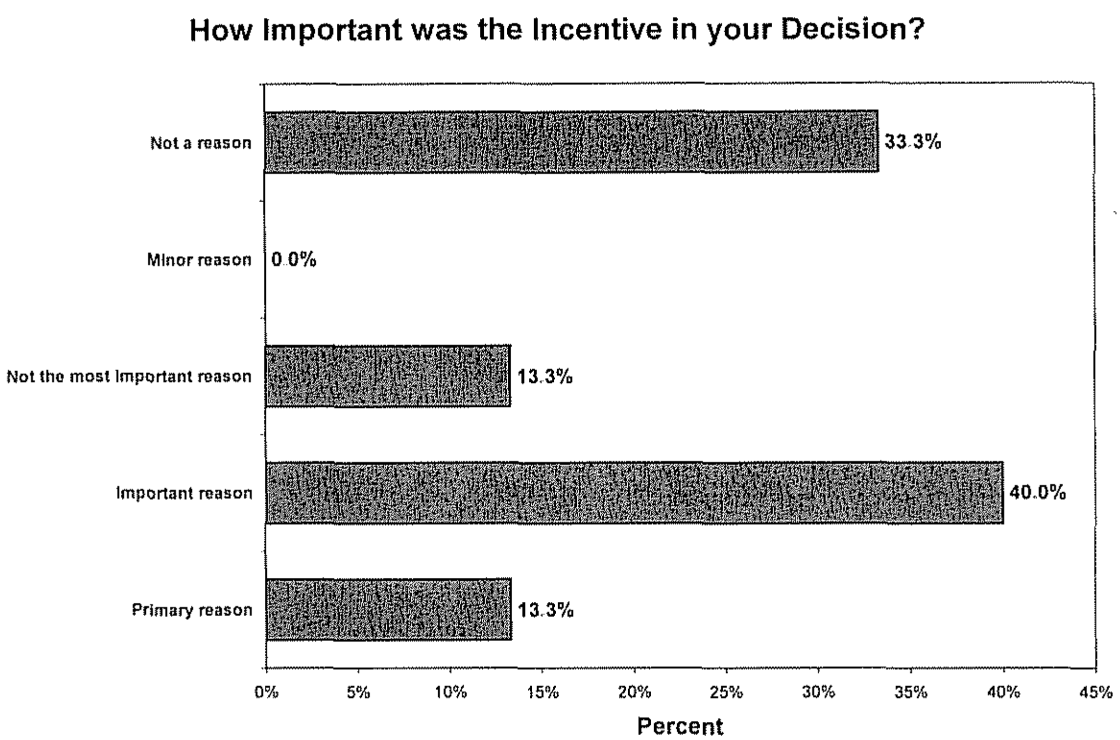


Figure 2. Importance of Incentive in Decision

The 2008 survey included the same questions; the following two figures compare the responses from 2007 to 2008. Figure 3 below shows how the reasons for participating have changed as the program has gained a stronger footing in Kentucky. A much lower percentage of the participants are stating that they are participating because of a contractor recommendation (2007=25%, 2008=4%), and a much higher percentage of participants are stating that they are participating to achieve energy savings (2007=31.3%, 2008=60%).

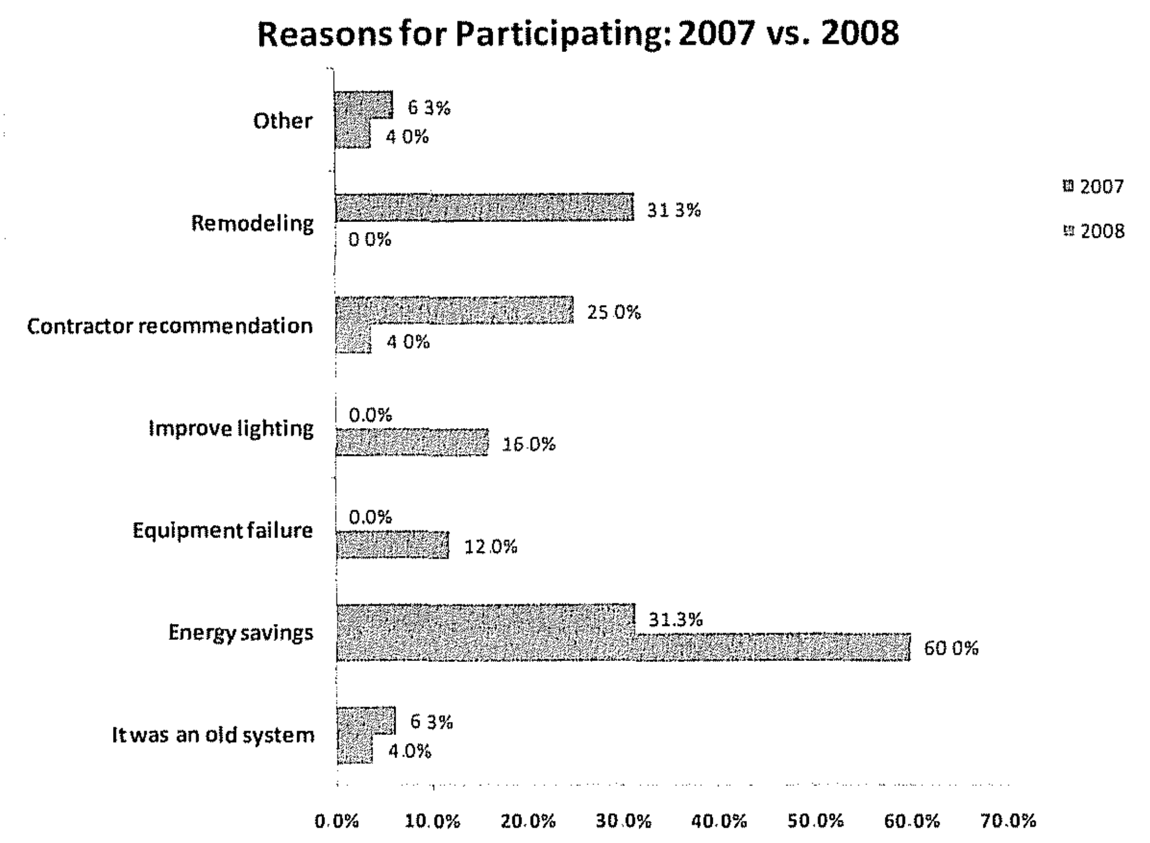


Figure 3. Reasons for Participation, 2007 versus 2008

Figure 4 below presents the importance of the incentive to the participants. A higher percentage of participants are citing the incentive as the "primary reason" or "important reason" as their reason to participate.

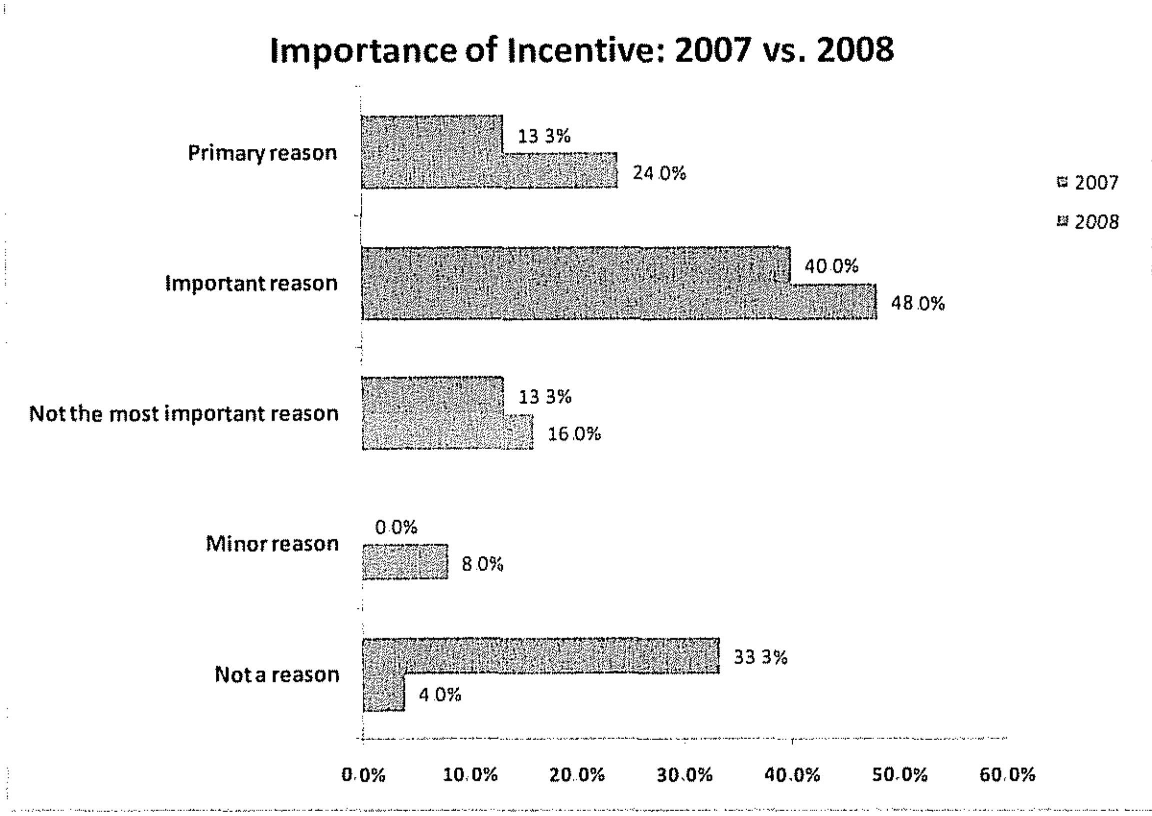


Figure 4. Importance of Incentive, 2007 versus 2008

Other reasons given for the participants deciding to go with the more energy efficient options include:

- Had to fit existing space, and this option fit
- Energy efficient model is cheaper to run
- EPACT credit
- Improved lighting quality
- It makes sense to go as efficient as feasible on new projects
- The lights put out the lumens we wanted, and were high quality
- It was recommended by our contractor

Other Actions (Spillover)

We asked the participants if they had taken any other energy efficiency actions as a result of their experiences with the program. Twenty percent indicated that they had taken other steps towards more energy efficient operations that were in some way influenced by their participation. These included:

- Chalking, sealing and weatherstripping
- replacing lights with energy efficient bulbs
- putting in skylights

- working with other programs, such as KEEPS

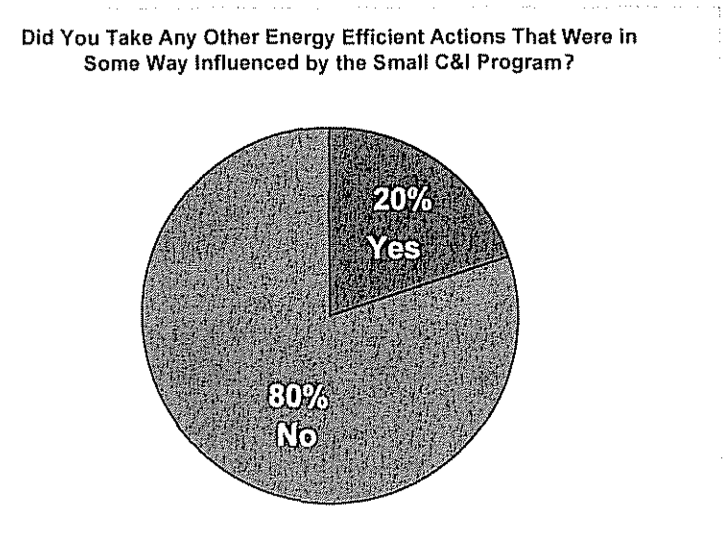


Figure 5. Participants Taking Other Energy Efficiency Actions

In the 2008 update, nine out of 24 (38%) of the respondents indicated that they have made other energy efficient upgrades at their facilities.

- installed high efficiency boilers
- installed inverter drives on motors
- changed out fire exit signs
- installed motion sensor devices, energy efficient lighting and urinals
- redid compressors and refrigerant compressors
- in the process of a performance contract
- installed new windows in the building
- installed soft start motors

Figure 6 below presents the responses to freeridership and spillover questions in both the initial evaluation done in 2007 and the update done in 2008.

Spillover increased since the initial evaluation. In 2007's evaluation, only 20% of participants indicated that they took additional energy efficient actions that were in some way influenced by the Small C&I program. In the 2008 update, that percentage almost doubled to 38%.

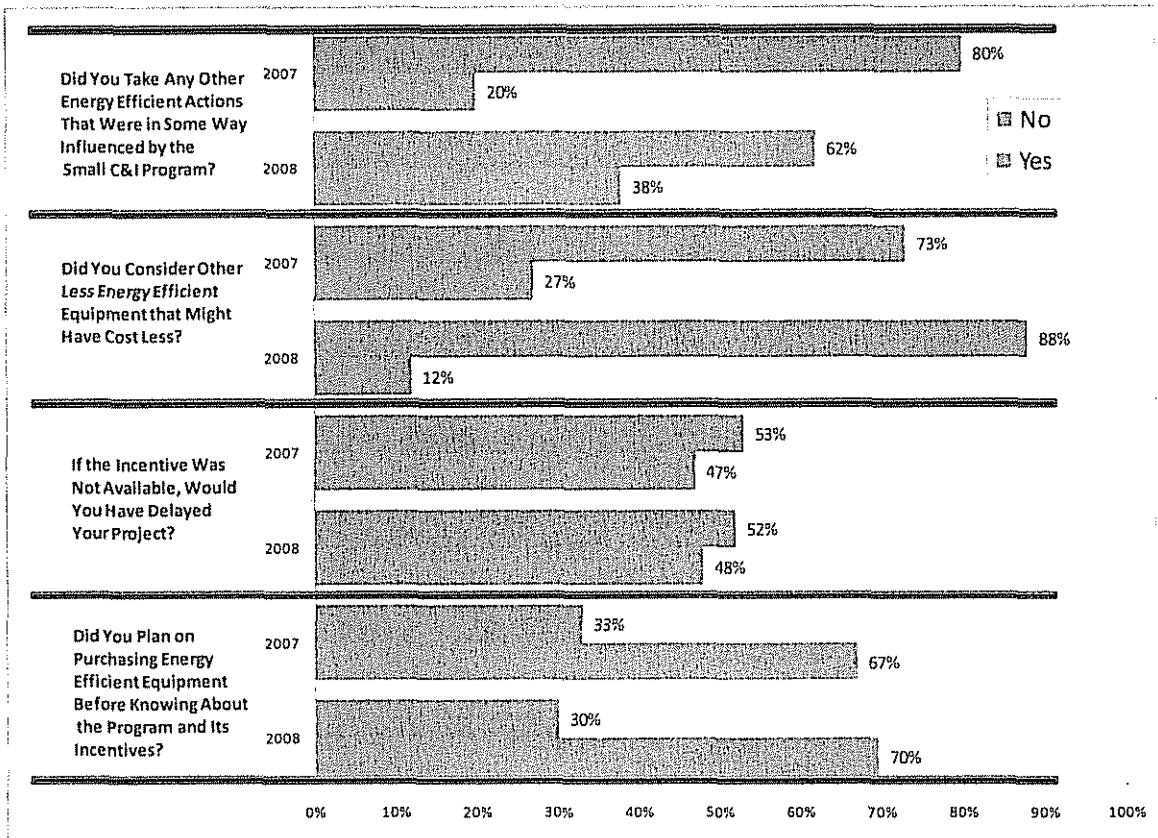


Figure 6. Freeridership and Spillover questions: 2007 versus 2008

Freeridership

Participants were asked a series of questions about why they participated, their intentions before discovering the program, what they would have done if the program were not offered, etc. These and other questions in this section determine the levels of free-ridership with the Kentucky program.

We asked the participants the following question: "*Did you originally plan on purchasing the exact same efficiency level in the equipment you purchased before you knew that there was an incentive offered by Duke Energy?*" The responses to this question indicate that the program is not the motivating factor for these participants to make an energy efficient choice. Most (67%) of the participants said that they had already planned on purchasing the exact same efficiency level before they knew about the program. The responses from the 2008 update survey revealed that 70% (statistically no different from the previous survey) of the participants had already planned on purchasing the same efficiency level. While we are not suggesting that the freerider rate is 67 or 70 percent because even for many of these, the program influenced the timing of the installation in a way that captured program-induced savings, (this is discussed in more detail in the impact section of this report) this suggests that there is a need to focus additional attention on ways to reduce the level of freeridership. See Figure 7 below.

The next question asked: "*In your decision process, did you search for or consider other less energy efficient equipment that might have cost less*?". The responses to this question confirmed the responses of the previous question, as 73 percent did not consider less energy efficient equipment, indicating that a significant majority of the participants had intended to buy the energy efficient models regardless of the program's objectives (see Figure 8 below). This level increased to 88% in the 2008 update survey (see Figure 6 on page 14.

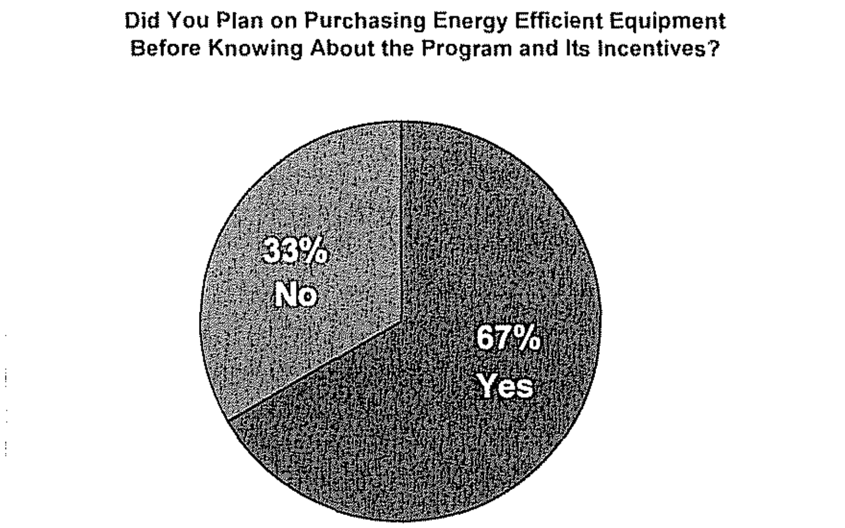


Figure 7. Intended Efficiency Levels Before the Program

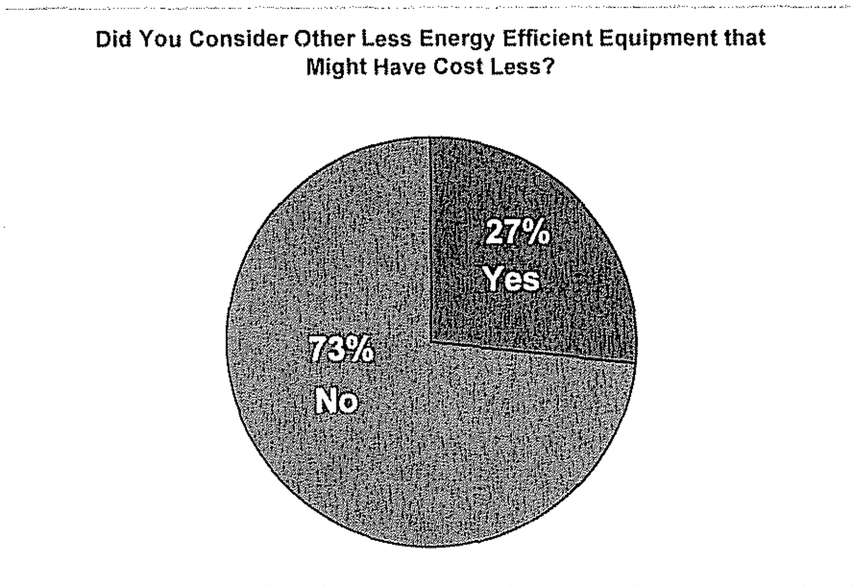


Figure 8. ***Participants Searching for Less Energy Efficient Options***

We also asked the participants if they would have delayed their purchase if the incentives offered through the program would not have been available. The responses to this question reduce the level of free-ridership slightly, because half (47%, or 48% in 2008) said that the project would have been delayed if the incentive was unavailable, meaning that the incentive pushed several participants forward with their energy efficient project creating savings earlier than what would have otherwise have been achieved. Likewise, some of the participants indicated that they would have never implemented their project without the incentive, or that it would have been delayed indefinitely. The length of delay varied from less than one year to indefinitely (see Figure 9 and Table 7 below).

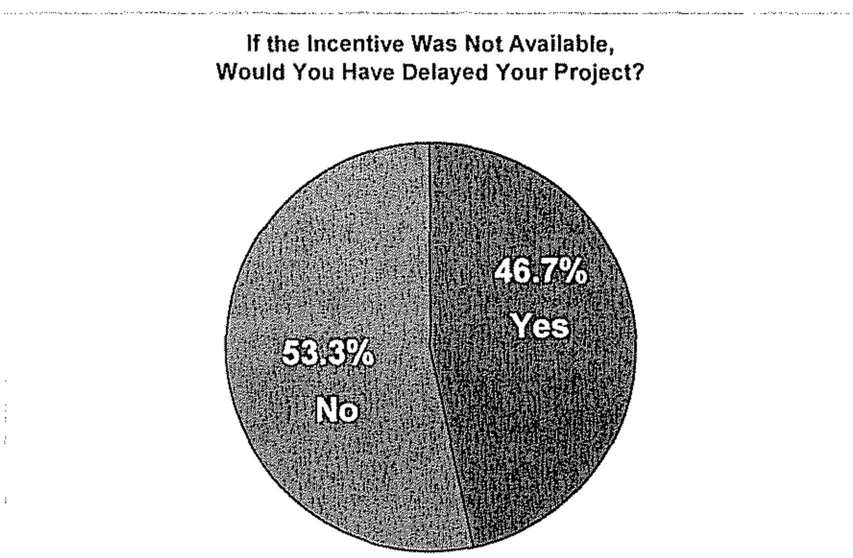


Figure 9. Effects of Incentive on Timing of Project

Table 7. Length of Delay of Project if Incentive Was Not Available

n=	Length of Delay
1	Less than a year
1	1-2 year
2	Don't Know
2	Indefinitely
1	Wouldn't Have Done Project

Calculation of Freeridership

Because the sampling frame within Kentucky alone was not large enough to calculate freerider levels exclusively for Kentucky programs as a stand alone program, we combined the freerider question results from the Kentucky participants with the participants from the Indiana Small Commercial Program evaluation. The Kentucky and Indiana programs are operated in the same way, using the same technologies and rebate levels, and are managed by the same program staff. Together, the two evaluations provided 85 participants who were able to answer the freerider questions to support the analysis.

For the 2008 update, we are using only Kentucky respondents. There were 15 in 2007, and 25 in 2008, for a total of 40 participants to drive the freeridership estimates for the 2008 update.

In calculating freeridership levels we used a per-participant calculation of the influence of the program on their decision to make the change, on the role the incentive played in the decision to go to the high efficiency model, and the amount of delay that would have occurred to the upgrade without the incentive. We informed this analysis by the responses to the questions on whether or not the participant searched or considered equipment of lower efficiency and the reason for upgrading to the high efficiency equipment. As in all freerider analysis this process requires the application of professional judgment because typically from 20 to 40 percent of the participants give responses that are not consistently logical. For example, customers will say that they that they originally planned on buying the same level of efficiency, and then respond that the incentive was important to their decision to go to the energy efficient model. In cases where the responses appear contradictory we gave a partial credit to the program for helping to speed the project forward when the incentive was important in that timing. For these reasons the approach for estimating freeridership is controversial within the evaluation community, with many top-of-the-field evaluation professionals agreeing that it is an inexact and problematic science. However, the use of a partial credit is a standard practice in the freerider estimation process and is used in all evaluation approaches.

Using this approach we provided the following credits based on the responses received:

Type of participant	Credit provided to	Number of	2008 Update:

	the program for driving the energy efficient decision	respondents in group	Number of respondents in group
Before hearing about the program did not originally plan on going with the energy efficient equipment and the rebate was a reason for the decision.	100	33	12
Had originally planned on the same efficiency level, but the rebate was a reason and the project would have been delayed without it	75	9	9
Not sure if they considered the same equipment at first, but the rebate was a reason for going forward with the project with or without a delay	75	8	4
Did not originally plan on the energy efficient equipment before hearing about the program incentive, but said the incentive had no effect on their final decision	50	2	0
Had originally planned on going with the same equipment, but said the incentive was a reason for the choice, but did not speed the project forward	25	15	9
Planned on the same equipment, the incentive had no effect, did not speed the project.	0	29	6
Calculated freerider level	2007 Average freeridership = .50 2008 Average freeridership = .40	N=85	N=40

Using the distributions presented above, the average freerider rate for this program was 0.50 when evaluated in 2007, but as dropped to 0.40 when evaluated for the 2008 update. This means that it is estimated that about 40% of the energy saved would have been saved even if the program had not provided the incentives to the participants. While the field of evaluation has no reliable approach for estimating freeridership, our professional judgment suggests that the rate for this program is in the .3 to .5 range and can be assumed to be from 35 to 45 percent as currently implemented. Within the field of evaluation, freerider rates for these types of programs range from a low of 25 to 30 percent for programs with enrollment screeners that refuse participation to customers who say they are going to take the same actions, to a high of 60 to 65 percent for programs that allow open enrollment. Duke Energy's program holds a position on the lower side of this range indicating an effective program that helps reduce freeridership. However this rate indicates that there remains a need to educate both customers and equipment contractors and trade allies that the program's incentives are to be provided only to the customers that will not take the energy efficient choice without the incentive.

We also point out that the above freerider estimate is not adjusted to account for spillover. As with most purchase decisions, the decisions that are considered to be successful or correctly made are often repeated by the same decision makers. For example, if a participant has two facilities and takes the action because of the program in one of the facilities, that same individual is likely to take the same action in the second facility with or without the program. Thus, program spillover, or the replications of actions taken via the program, often offset the freerider rate and act to increase the net energy impacts associated with a program. When we asked participants what additional actions they took at their facilities because of the information provided by the program, about 38 percent of the respondents indicated that they took one or more actions (see Other Actions – Spillover section of this report). While the calculation of the savings from the other program-influenced actions is beyond the scope of this study, these actions act to increase the savings from the program. As a result, while the freerider rate for this program is estimated at 0.40, the net rate, once the freerider rate is adjusted for spillover, appears to be in the .15 to .25 percent range. Again, this estimate is beyond the scope of this study and would require an assessment of the level of energy savings achieved from the reported spillover to estimate more precisely.

Contact with Duke Energy

Almost half of the participants had to contact Duke Energy at some point during their participation experience. Of the participants that contacted Duke Energy for program information or clarification, 43 percent did not think their questions or needs were handled effectively by Duke Energy. However, a review of the comments indicates that the problem may not rest in the communication approach, but with the processes used for processing rebates. Never-the-less, this data indicates that it may be necessary to monitor the communications between Duke Energy and the program participant to determine if there is a communication issue that needs to be addressed. Because of the small sample size and the nature of the comments, these data should not be considered conclusive of an issue that needs to be resolved, yet when 43 percent of interviewees indicate that they do not think Duke Energy handled their issues effectively there is cause for concern over why these were not handled effectively.

Often times vendors would call in and ask for exceptions to be made to the rules for different measures (different configurations, different technologies) and they would get very frustrated with managers when they were told that this is a prescriptive, not a customized program. There was a lot of frustration with the "first come- first served" but program managers have since implemented a "reservation" process driven by the number of applications we received and the amount of the incentives.

	Number	Percent

Participant Contacted Duke		
Yes	7	47%
No	8	53%
Were your Questions Effectively Handled?		
Yes	4	57%
No	3	43%

The reasons for their dissatisfaction with the responses are:

- Duke answered my questions with vague responses
- The incentive should be sent within a month, takes too long now
- Still waiting for my incentive check, takes too long, it's a mess
- It would be better if the incentive check was sent within 2 months, it takes too long
- Duke needs to fully explain the reasons for changes in efficiency levels

Increasing Participation

We asked the participants for ways in which Duke Energy could increase interest and participation in the program. The most popular response received centered around a suggestion to increase the incentive levels. Thirty-nine percent of the participants provided this response. Fifteen percent had other suggestions including:

- Provide energy audits through the program
- Eliminate $50,000 cap so you get bigger projects
- Provide potential customers with objective case studies to support claims
- Decrease the amount of paperwork involved, speed up the process, takes too long

The program manager interviewed in this study suggested that increasing the marketing efforts would result in an increase the levels of participation. This is something that should be assessed to identify cost effective ways to market the program. For example, other programs use bill inserts to their commercial customers, presentations and discussions with trade ally groups, presentations and discussions with contractors and business partners, advertising or public service announcements in trade journals, case stories in business publications, journals, industry newsletters, industry awards ceremonies, etc. etc. Duke Energy should explore these potential avenues to see which marketing efforts are cost effective and can be developed within the programs management and marketing budgets.

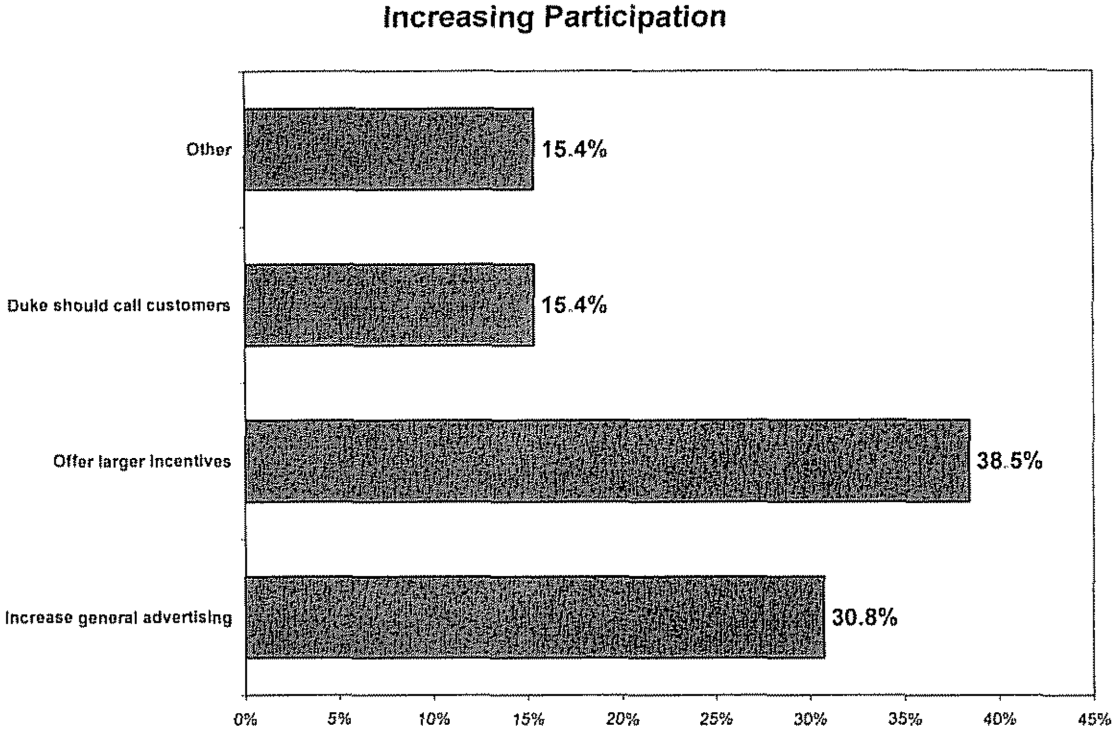


Figure 10. Suggestions for Increasing Participation

Program Satisfaction

We asked the participants about their satisfaction with various program components. We asked them to rate their satisfaction on a 10-point scale with 1 meaning they were very dissatisfied and 10 meaning they were very satisfied. If a participant scored any of the aspects with a score of 8 or lower, we asked the participant how that aspect could be improved. The program overall received an average score of 7.42 and a median score of 8. This indicates that the program has some areas in which at least half the participants are, to some degree, dissatisfied with some component of the program. Dissatisfaction with a program impacts the level of support that participants can provide to the program. This in-turn impacts the most effective information dissemination method by which word of the program spreads in a market – peer-networking. If 50 percent of the participants in some way are dissatisfied with a program, that program cannot be expected to ever have strong demand. Each of the program aspects that contractors voice some level of dissatisfaction with are discussed below. The contractors' satisfaction scores are provided in Figure 11.

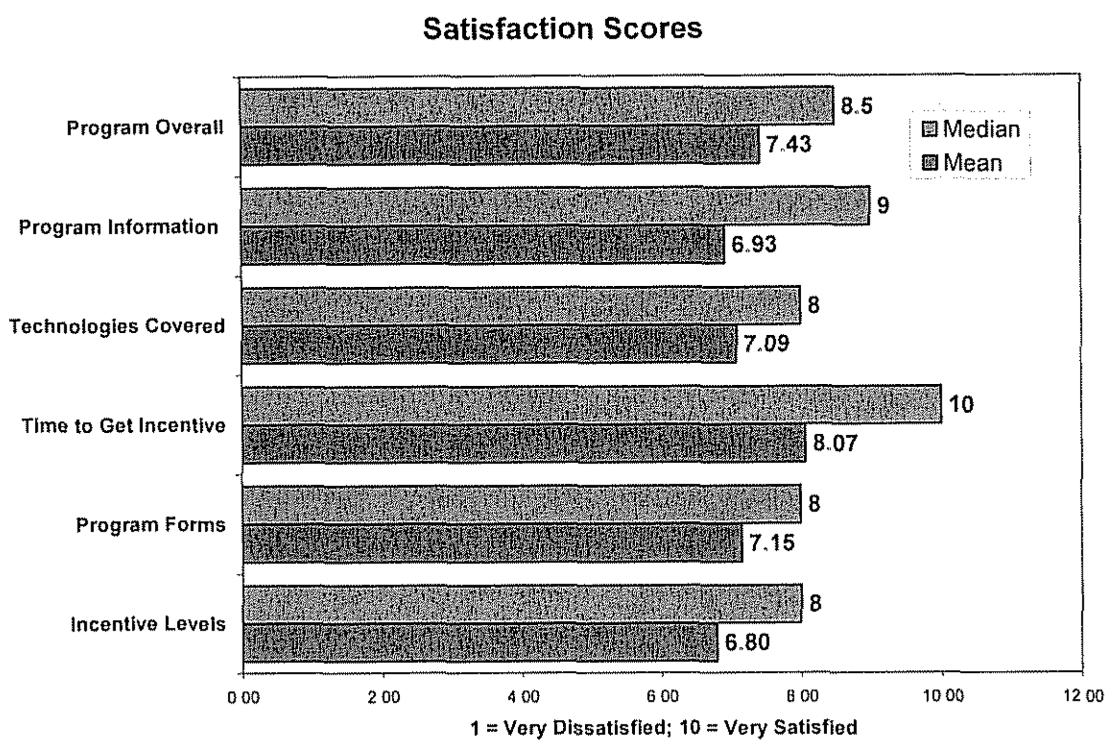


Figure 11. Program Satisfaction Scores

Incentive Levels

The incentive levels are set by a panel of industry experts and are limited to rebate no more than 50 percent of the incremental equipment cost difference between the standard efficiency model and the high efficiency model. This differential is set by policy. When prices change, the advisors review the typical equipment cost and the appropriate changes to the incentives are made so that the 50 percent level is maintained.

The median satisfaction score for the incentive levels is 8, meaning that half of the respondents scored their satisfaction with the incentive levels at 8 or above and the other half scored less than eight. However, the mean score for the incentive levels is 6.80. This data means that while most participants scored the incentive level higher, a few were significantly dissatisfied with the incentive to provide a significantly lower score. This somewhat low mean-score can be explained by the participants' comments on how to improve satisfaction with the incentive amount. These comments are:

- remove the $50,000 incentive cap so more energy can be saved
- the incentive was cut in half from the time we viewed the web site [and decided to participate] and the time we talked to someone [about the rebate amount]
- the incentives decreased to covering 25 percent of added cost [rather than 50 percent]
- they [incentives] were cut in the middle of the project
- too much program hassle for the amount of money we received

- too much time to participate and too little incentive
- my installation no longer qualified because it was installed in 2005, but instead started in 2006 [even thought our participation decision was made in 2005]. The program changed in the middle of our process

While a few participants indicated that the incentive levels are too low compared to the effort it takes to be a participant, others participants stated that they were dissatisfied because of the changes that took place during the time of their participation (see above comments).

Program Forms

Satisfaction with the program forms received a median score of 8, and a mean score of 7.14. These scores indicate that while the forms were not an issue for most of the participants, for a few the forms presented challenges. The reasons given for the scores 8 or lower are below.

- some of it was confusing to me, had to ask the electrician to get some of the answers
- they are not written for the lay person to understand
- more explanations are needed for the technologies covered and the participation and incentive requirements
- I had to resend the forms, the first copies I sent were lost by Duke

Time to Get Incentive

Over half (53%) of the participants gave the time it took to receive the incentive check from the time they submitted with the forms with a 10, indicating very strong satisfaction with the time to get paid. The mean score provided by the participants is 8.07, also a good score. However, the distance between the 10 score and the mean score is almost a full two points, indicating that there is some significant level of dissatisfaction with a subset of the participants. Those that gave a score of 8 or lower provided the following comments:

- it should only take 2-3 weeks to get the check
- they need to send us the incentive within a month
- I am still waiting for the payment, it's a mess
- Payment in less than 2 months would be better

While most customers are very satisfied with the payment periods, the frequency of these comments in relationship to the small sample size suggests that there is a need to monitor these periods to determine if there is a process issue. The small sample size of this study precludes definitive conclusions, but the fact that there are a several participants who are not receiving payments in what they consider to be a reasonable period suggest that attention be placed into determining if there is a process issue and if so, how it can be solved.

Technologies Covered

The technologies covered by the program are determined by a panel of industry experts, and the participants seem satisfied with the options available. The changes in technologies that are rebated are needed in order to keep the participants moving towards increasing efficiency. However, given the current estimate of 50 percent free ridership, it is likely that the number and/or type of appliances and equipment incented should be reviewed and updated once more.

Participants scored their satisfaction with the technologies covered by the program with a mean score of 7.09 and a median score of 8. These are reasonable technology satisfaction scores. It is not unusual to find some level of dissatisfaction with the technologies or with the program's conditions relating to the technologies. However, one of the responses is more about the efficiency level change than the technology itself. Two of the low scores were provided by participants who felt that their equipment should have been covered by the program, and in one case, the exact model and efficiency was covered in 2005 when she purchased it, but not covered when she installed it. This goes back to the issue of timing, which is discussed earlier in this report. While this participant is not talking about changes in the incentive level, but rather the dropping of a covered technology from a decision that was made when the technology was covered. These conditions damage the reputation of the programs if they are not well structured with plenty of advanced notice provided to match the business decision cycle. Other comments received included:

- include more lights - some were the same fixtures but not included (T8 was limited to 6 bulbs, they needed 8-bulb)

Program Information

The level of satisfaction with the program information provided received a low mean satisfaction score of 6.93, however, this aspect also received a high median score of 9, again indicating that most participants were very satisfied and a few participants were not satisfied. Comments received include:

- keep the web site's program language simple
- materials are too complicated for the general public

What Works

The program's web site is a good tool that allows customers to see what technologies are covered by the program and identify the incentives levels at the time the examination is made. The web site has the most up-to-date information available on the program and is the least expensive method of providing the information to a large number of customers. As a result, the program should continue to encourage customers to visit the site to learn more about the program and current program offerings. Expanded use of the web site can help eliminate the problem of incentive and technology changes. That is, the web site can be structured to post the changes months before they become active. At the same time the program promotional materials should instruct customers to check the web site for the most up-to-date information on what technologies are covered and the incentive levels.

Another effective promotional approach rests in the technology vendors and contractors that can tell their customers about the program. If the vendors and contractors are kept current on program operations they can pass the information on to their customers. Vendors and contractors need to be encouraged to check the web site for current information when they deal with their customers. To help ensure that the vendors are keeping up with the program's operations and changes, they are required to apply to Duke Energy to be listed as a program vendor every 18 months and become exposed to the program's current information. They are also encouraged to help the customers with the applications to help reduce application error rates. This information, provided by the program manager, linked to the participant comments may indicate that the application forms may need to be adjusted to help the "typical" customer deal with the application process. Discussions with the program manager indicate that vendors and contractors are able to provide more accurate application forms because they are used to dealing with the equipment and are more familiar with the application terminology.

We asked the participants to tell us what they thought worked well, and provided them an opportunity to say what they liked most about the program. Their responses are listed below:

- it's an effective tool for helping to install more costly equipment that will save businesses money in the long run (3 responses)
- the program helps shorten the payback period (2 responses)
- the program provides an extra push to make the right choice, it gave us confidence that it would work and save us money
- it provided us with a financial incentive in exchange for Duke getting energy savings
- gave us another incentive to save energy (3 responses)
- gives us money-back on our upgrades

What Doesn't Work

We also asked the participants what they thought did not work well. We received about half as many responses to this question than to the question of what worked well. The following responses were provided by participants:

- the incentive cap is too low (2 responses)
- [not] getting the incentive check as promised by Duke
- not enough people know about the program
- nobody would give me accurate incentive information, I spent 5 hours of my time to get a $34 incentive check
- the decrease in the incentives did not help

- too much paperwork required from us

We also asked the program manager what changes are needed to the program operations and management. The managers noted that the program is working reasonably well for the available resources and staff time. The manager noted that the program was managed and staffed by two people and that the staffing was recently reduced to a single individual, however, a subcontractor has been hired to assist Duke Energy with the program.

Program Satisfaction 2008 Update

For the 2008 update, we asked the participants to rate their satisfaction on a 10-point scale with 1 meaning they were very dissatisfied and 10 meaning they were very satisfied. If a participant scored any of the aspects with a score of 7 or lower, we asked the participant how that aspect could be improved.

Figure 12 below shows the mean satisfaction scores for various aspects of the program from the 2007 evaluation and the 2008 update. The mean satisfaction score for every aspect of the program discussed has increased, including overall program satisfaction.

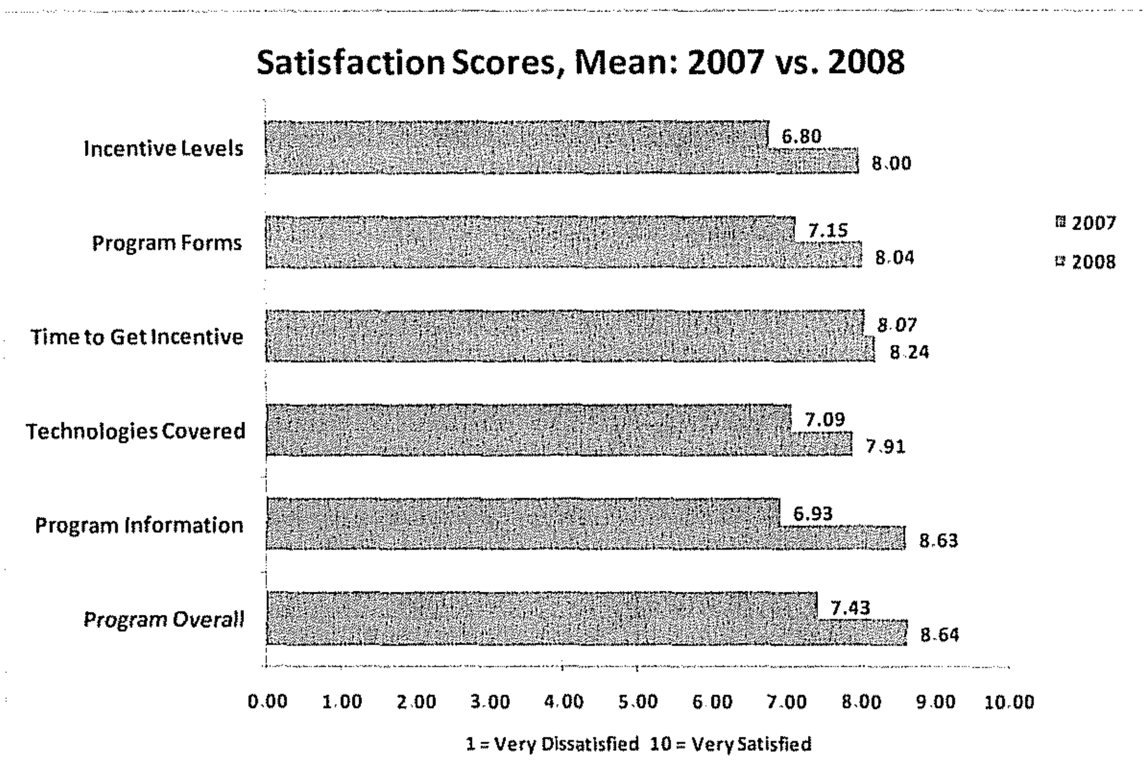


Figure 12. Mean Satisfaction Scores, 2007 versus 2008

Duke Energy Kentucky
1697-A Monmouth Street
Newport, Kentucky 41071

KY.P.S.C. Electric No. 2
Fourth Revised Sheet No. 78
Cancels and Supersedes
Third Revised Sheet No. 78

RIDER DSMR

DEMAND SIDE MANAGEMENT RATE

The Demand Side Management Rate (DSMR) shall be determined in accordance with the provisions of Rider DSM, Demand Side Management Cost Recovery Rider, *Sheet No. 75 of this Tariff.*

The DSMR to be applied to residential customer bills beginning with the January 2009 revenue month is $0 002036 per kilowatt-hour

Beginning with the November 2008 revenue month, a Home Energy Assistance Program (HEA) charge of $0.10 will be applied monthly to residential customer bills through September 2011.

The DSMR to be applied to non-residential distribution service customer bills beginning with the January 2009 revenue month is $0 000512 per kilowatt-hour.

The DSMR to be applied for transmission service customer bills beginning with the January 2009 revenue month is $0 000047 per kilowatt-hour

Issued by authority of the Kentucky Public Service Commission in Case No. dated

Issued: Effective:

Issued by Sandra P. Meyer, President

Duke Energy Kentucky
1697-A Monmouth Street
Newport, Kentucky 41071

RIDER DSMR

DEMAND SIDE MANAGEMENT RATE

The Demand Side Management Rate (DSMR) shall be determined in accordance with the provisions of Rider DSM, Demand Side Management Cost Recovery Rider, Sheet No. 61 of this Tariff.

The DSMR to be applied to residential customer bills beginning with the January 2009 revenue month is $0.066904 per hundred cubic feet.

Beginning with the November 2008 revenue month, a Home Energy Assistance Program (HEA) charge of $0.10 will be applied monthly to residential customer bills through September 2011.

The DSMR to be applied to non-residential service customer bills beginning with the January 2009 revenue month is $0.00 per hundred cubic feet.

Appendix I
Kentucky DSM Rider

Comparison of Revenue Requirement to Rider Recovery

Residential Programs	(1) Projected Program Costs 7/2007 to 6/2008 (A)	(2) Projected Lost Revenues 7/2007 to 6/2008 (A)	(3) Projected Shared Savings 7/2007 to 6/2008 (A)	(4) Program Expenditure: 7/07 through 6/08 (B)	(5) Program Expenditures (C) Gas	(6) Program Expenditures (C) Electric	(7) Lost Revenues 7/07 through 6/08 (B)	(8) Shared Savings 7/07 through 6/08 (B)	(9) 2007 Reconciliation Gas (D)	(10) 2007 Reconciliation Electric (E)	(11) Rider Collection (F) Gas	(12) Rider Collection (F) Electric	(13) (Over)/Under Collection Gas (G)	(14) (Over)/Under Collection Electric (H)
Res. Conservation & Energy Education	$ 499,800	$ 16,525	$ (3,499)	$ 334,533.90	$ 210,421	$ 124,113	$ 15,049	$ 39,588			NA	NA	NA	NA
Refrigerator Replacement	$ 100,000	$ 6,145	$ 300	$ 86,642.58		$ 86,643	$ 7,704	$ (77)						
Residential Home Energy House Call	$ 150,000	$ 49,810	$ 35,700	$ 120,904.77	$ 76,049	$ 44,856	$ (1,763)	$ (61,954)			NA	NA	NA	NA
Res. Comprehensive Energy Education	$ 81,500	$ -	$ -	$ 48,446.05	$ 30,472	$ 17,974		$ -			NA	NA	NA	NA
Payment Plus	$ 150,000	$ -	$ -	$ 144,671.03		$ 144,671	$	$						
Power Manager	$ 875,000	$	$ 174,000	$ 468,224.59		$ 468,225	$	$ 166,632						
Program Development Funds	$ 140,000	$ -	$ -	$ 165,960.55	$ 104,389	$ 61,572	$ -	$ -			NA	NA	NA	NA
Energy Star Products	$ 243,000	$ 690,225	$ 63,450	$ 166,224.89	$ 104,555	$ 61,670	$ 501,222	$ 24,016			NA	NA	NA	NA
Energy Efficiency Website	$ 31,110	$ 26,781	$ 2,955	$ 11,189.61	$ 7,038	$ 4,152	$ 4,937	$ 5,898			NA	NA	NA	NA
Personalized Energy Report Pilot Program	$ 153,000	$ 121,547	$ 73,134	$ (6,000.00)	$ (3,774)	$ (2,226)	$	$			NA	NA	NA	NA
Home Energy Assistance Pilot Program (I)	$ -	$	$ -	$ -	$ -	$	$	$ -			$ -	$	NA	NA
Revenues collected except for HEA											$ (3,651,561)	$ 795,562		
Total	$ 2,423,410	$ 911,033	$ 346,040	$ 1,540,798	$ 529,150	$ 1,011,648	$ 527,149	$ 174,104	$ (1,456,207)	$ (867,891)	$ (3,651,561)	$ 795,562	$ 2,724,504	$ 49,448

(A) Amounts identified in report filed on November 15, 2007.
(B) Actual program expenditures, lost revenues, and shared savings for the period July 1, 2007 through June 30, 2008 and lost revenues for this period and from prior period DSM measure installations.
(C) Allocation of program expenditures to gas and electric. Uses 62.9% gas based upon saturation of gas space heating.
(D) Recovery allowed in accordance with the Commission's Order in Case No. 2004-00389.
(E) Recovery allowed in accordance with the Commission's Order in Case No. 2004-00389.
(F) Revenues collected through the DSM Rider between July 1, 2007 and June 30, 2008.
(G) Column (5) + Column (9) - Column(11).
(H) Column (6) + Column (7) + Column (8) + Column (10) - Column(12).
(I) Revenues and expenses for the Home Energy Assistance Pilot Program. This was reinstated September 2008, but no revenues or expenses for this report period.

Commercial Programs	(1) Projected Program Costs 7/2007 to 6/2008 (A)	(2) Projected Lost Revenues 7/2007 to 6/2008 (A)	(3) Projected Shared Savings 7/2007 to 6/2008 (A)	(4) Program Expenditure: 7/07 through 6/08 (B)	(5) Lost Revenues 7/07 through 6/08 (B)	(6) Shared Savings 7/07 through 6/08 (B)	(7) 2007 Reconciliation (C)	(8) Rider Collection (D)	(9) ((Over)/Under Collection (E)
High Efficiency Program									
Lighting	$ 209,520	$ 308,352	$ 10,698		$ 388,727	$ 740,833			
HVAC	$ 142,760	$ 29,247	$ 14,588		$ 2,073	$ -			
Motors	$ 100,678	$ 21,031	$ 25,718		$ 151	$ 153			
Other	$ 450,814	$ 298,836	$ 448,830	$	$ -	$ -			
Total for High Efficiency Program	$ 903,772	$ 657,466	$ 499,834	$ 441,956	$ 390,951	$ 740,986	$ 860,878	$ 2,619,408	$ (925,623)
PowerShare®	$ 265,000	$ -	$ 107,641	$ 95,436	$ -	$ 4,308	$ 13,287	$ 350,453	$ (241,730)

(A) Amounts identified in report filed on November 15, 2007.
(B) Actual program expenditures, lost revenues, and shared savings for the period July 1, 2007 through June 30, 2008 and lost revenues for this period and from prior period DSM measure installations.
(C) Recovery allowed in accordance with the Commission's Order in Case No. 2004-00389.
(D) Revenues collected through the DSM Rider between July 1, 2007 and June 30, 2008.
(E) Column (4) + Column (5) + Column (6) + Column (7) - Column (8)

Appendix I

2009 Projected Program Costs, Lost Revenues, and Shared Savings

Residential Program Summary

	Costs	Lost Revenues	Shared Savings	Total	Allocation of Costs Electric	Gas	Electric Costs	Budget (Costs, Lost Revenues, & Shared Savings) Electric	Gas Costs
Residential - Current Programs/Measures									
Residential Conservation & Energy Education	$ 499,800	$ 16,525	$ (3,499)	$ 512,826	37.1%	62.9%	$ 185,426	$ 198,452	$ 314,374
Refrigerator Replacement	$ 100,000	$ 6,145	$ 300	$ 106,445	100.0%	0.0%	$ 100,000	$ 106,445	$ -
Home Energy House Call	$ 150,000	$ 49,810	$ 35,700	$ 235,510	37.1%	62.9%	$ 55,650	$ 141,160	$ 94,350
Residential Comprehensive Energy Education	$ 81,500	$ -	$ -	$ 81,500	37.1%	62.9%	$ 30,237	$ 30,237	$ 51,264
Home Energy Assistance Plus (continuing)	$ 150,000	$ -	$ -	$ 150,000	37.1%	62.9%	$ 55,650	$ 55,650	$ 94,350
Power Manager	$ 875,000	$ -	$ 174,000	$ 1,049,000	100.0%	0.0%	$ 875,000	$ 1,049,000	$ -
Program Development Funds	$ 140,000	$ -	$ -	$ 140,000	37.1%	62.9%	$ 51,940	$ 51,940	$ 88,060
Energy Star Products	$ 243,000	$ 690,225	$ 63,450	$ 996,675	100.0%	0.0%	$ 243,000	$ 996,675	$ -
CFL's (Compact Fluorescent Lights)									
Torchieres (Floor lamps)									
Energy Efficiency Web Site	$ 31,110	$ 26,781	$ 2,955	$ 60,846	37.1%	62.9%	$ 11,542	$ 41,278	$ 19,568
Personalized Energy Report Pilot Program	$ 153,000	$ 121,547	$ 73,134	$ 347,681	37.1%	62.9%	$ 56,763	$ 251,444	$ 96,237
Total Costs, Net Lost Revenues, Shared Savings	$ 2,423,410	$ 911,033	$ 346,040	$ 3,680,483			$ 1,665,207	$ 2,922,280	$ 758,203
Home Energy Assistance Pilot Program	$ 247,369							$ 143,120	$ 104,249

C&I DSM Program Summary

High Efficiency Program	Costs	Lost Revenues	Shared Savings	Total	Allocations Electric	Gas	Electric Costs	Budget (Costs, Lost Revenues, & Shared Savings) Electric	Gas
Lighting	$ 104,760	$ 273,388	$ 5,349	$ 383,497	100.0%	0.0%	$ 104,760	$ 383,497	NA
HVAC	$ 71,380	$ 15,925	$ 7,294	$ 94,598	100.0%	0.0%	$ 71,380	$ 94,598	NA
Motors	$ 50,339	$ 10,610	$ 12,859	$ 73,808	100.0%	0.0%	$ 50,339	$ 73,808	NA
Other	$ 225,407	$ 149,418	$ 224,415	$ 599,240	100.0%	0.0%	$ 225,407	$ 599,240	NA
Total for the High Efficiency Program	$ 451,885	$ 449,341	$ 249,916	$ 1,151,143			$ 451,885	$ 1,151,143	

High Efficiency School Incentive Program	Costs	Lost Revenues	Shared Savings	Total	Allocations Electric	Gas	Electric Costs	Budget (Costs, Lost Revenues, & Shared Savings) Electric	Gas
Lighting	$ 104,760	$ 34,963	$ 5,349	$ 145,072	100.0%	0.0%	$ 104,760	$ 145,072	NA
HVAC	$ 71,380	$ 13,323	$ 7,294	$ 91,996	100.0%	0.0%	$ 71,380	$ 91,996	NA
Motors	$ 50,339	$ 10,421	$ 12,859	$ 73,619	100.0%	0.0%	$ 50,339	$ 73,619	NA
Other	$ 225,407	$ 149,418	$ 224,415	$ 599,240	100.0%	0.0%	$ 225,407	$ 599,240	NA
Total for the High Efficiency School Incentive Program	$ 451,885	$ 208,125	$ 249,916	$ 909,927			$ 451,885	$ 909,927	

	Costs	Lost Revenues	Shared Savings	Total	Allocations Electric	Gas	Electric Costs	Budget (Costs, Lost Revenues, & Shared Savings) Electric	Gas
PowerShare® Program	$ 265,000		$ 107,641	$ 372,641	100.0%	0.0%	$ 265,000	$ 372,641	NA
Total C&I DSM Program	$ 1,168,771	$ 657,466	$ 607,474	$ 2,433,710				$ 2,433,710	
Total Program	$ 3,592,181	$ 1,568,499	$ 953,514	$ 6,114,193					

Duke Energy Kentucky
Demand Side Management Cost Recovery Rider (DSMR)
Summary of Calculations for 2006 Programs

January, 2008 through December, 2008

	Program Costs (A)
Electric Rider DSM	
Residential Rate RS	$ 2,922,280
Distribution Level Rates Part A DS, DP, DT, GS-FL, EH & SP	$ 2,061,069
Transmission Level Rates & Distribution Level Rates Part B	$ 372,641
Gas Rider DSM	
Residential Rate RS	$ 758,203

(A) See Appendix I, page 2 of 5

Duke Energy Kentucky
Demand Side Management Cost Recovery Rider (DSMR)
Summary of Billing Determinants

Year	2009
Projected Annual Electric Sales kWH	
Rates RS	1,460,230,000
Rates DS, DP, DT, GS-FL, EH, & SP	2,362,842,000
Rates DS, DP, DT, GS-FL, EH, SP, & TT	2,559,959,000
Projected Annual Gas Sales CCF	
Rate RS	53,671,760

Appendix I

Duke Energy Kentucky
Demand Side Management Cost Recovery Rider (DSMR)
Summary of Calculations

January, 2009 through December, 2009

Rate Schedule Riders	True-Up Amount (A)	Expected Program Costs (B)	Total DSM Revenue Requirements	Estimated Billing Determinants (C)		DSM Cost Recovery Rider (DSMR)	
Electric Rider DSM							
Residential Rate RS	$ 51,411	$ 2,922,280	$ 2,973,691	1,460,230,000	kWh	$ 0.002036	$/kWh
Distribution Level Rates Part A DS, DP, DT, GS-FL, EH & SP	$ (962,370)	$ 2,061,069	$ 1,098,699	2,362,842,000	kWh	$ 0.000465	$/kWh
Transmission Level Rates & Distribution Level Rates Part B TT	$ (251,327)	$ 372,641	$ 121,314	2,559,959,000	kWh	$ 0.000047	$/kWh
Distribution Level Rates Total DS, DP, DT, GS-FL, EH & SP						$ 0.000512	$/kWh
Gas Rider DSM							
Residential Rate RS	$ 2,832,667	$ 758,203	$ 3,590,870	53,671,760	CCF	$ 0.066904	$/CCF
Total Rider Recovery			$ 7,784,574				
Customer Charge for HEA Program							
Electric No.4			Annual Revenues	Number of Customers		Monthly Customer Charge	
Residential Rate RS			$ 143,120	119,267		$ 0.10	
Gas No. 5							
Residential Rate RS			$ 104,249	86,874		$ 0.10	
Total Customer Charge Revenues			$ 247,369				
Total Recovery			$ 8,031,943				

(A) (Over)/Under of Appendix J page 1multiplied by 1.0397 for 2008 for the average three-month commercial paper rate to include interest on over or under-recovery.
(B) Appendix I, page 2.
(C) Appendix I, page 4.

Appendix I

Reconciliation of Lost revenues and Shared Savings Based Upon Impact Evaluation Studies

Applicable Programs	Case 2006-00426 As Filed & Adjusted Lost Revenues	Shared Savings	New Values Lost Revenues	Shared Savings	Increase (Decrease) in values Lost Revenues	Shared Savings	Comments
Residential Conservation and Energy Education	$ 3,931.00	$ (1,885.00)					No new values
Refrigerator Replacement	$ 1,932.00	$ 143.00	$ -	$ -			No new values
Residential Home Energy House Call	$ 15,426.00	$ 34,926.00	$ 6,969	$ 4,022	$ (8,457)	$ (30,904)	Based upon evaluation
Power Manager	$ -	$ 215,573	$ -	$ -			No new values
Energy Star Products	$ 95,594.00	$ 72,908	$ -	$ -			No new values
Energy Efficiency Website	$ 45,936.00	$ 72,630.00	$ -	$ -			No new values
Personal Energy Report (PER)			$ -	$ -			No new values
C&I High Efficiency Incentive (for Businesses and Schools)			$ -	$ -			No new values
Lighting	$ 49,461.00	$ 79,233	$ -	$ -			No new values
HVAC	$ 1,221.00	$ 3,476	$ -	$ -			No new values
Motors			$ -	$ -			No new values
PowerShare							

Applicable Programs	Case 2007-00369 As Filed Lost Revenues	Shared Savings	New Values Lost Revenues	Shared Savings	Increase (Decrease) in values Lost Revenues	Shared Savings	Comments
Residential Conservation and Energy Education	$ 7,107	$ (1,710)	$ -	$ -			No new values
Refrigerator Replacement	$ 2,840	$ 123	$ -	$ -			Based upon evaluation
Residential Home Energy House Call	$ 25,180	$ 39,446	$ 11,466.63	$ 4,626.07	$ (13,713)	$ (34,820)	No new values
Power Manager		$ 164,569	$ -	$ -			No new values
Energy Star Products	$ 366,355	$ 134,399	$ -	$ -			No new values
Energy Efficiency Website	$ 1,448	$ 1,086	$ -	$ -			No new values
Personal Energy Report (PER)	$ -	$ -	$ -	$ -			No new values
C&I High Efficiency Incentive (for Businesses and Schools)			$ -	$ -			No new values
Lighting	$ 174,459	$ 115,659	$ -	$ -			No new values
HVAC	$ 2,173	$ 1,038	$ -	$ -			No new values
Motors	$ 136	$ 95	$ -	$ -			No new values
PowerShare	$ -	$ 5,569	$ -	$ -			No new values

Lost Revenues and Shared Savings for Appendix K Page 1 of 6

	Reconciliation of 2006 & 2007 Increase (Decrease) in values Lost Revenues	Shared Savings	Case No. 2008-00 Lost Revenues	Shared Savings	Total Lost Revenues	Total Shared Savings
Residential Conservation and Energy Education	$ -	$ -	$ 15,049	$ 39,588	$ 15,049	$ 39,588
Refrigerator Replacement	$ -	$ -	$ 7,704	$ (77)	$ 7,704	$ (77)
Residential Home Energy House Call	$ (22,170)	$ (65,724)	$ 20,407	$ 3,770	$ (1,763)	$ (61,954)
Power Manager	$ -	$ -		$ 166,632	$ -	$ 166,632
Energy Star Products	$ -	$ -	$ 501,222	$ 24,016	$ 501,222	$ 24,016
Energy Efficiency Website	$ -	$ -	$ 4,937	$ 5,898	$ 4,937	$ 5,898
Personal Energy Report (PER)	$ -	$ -	$ -	$ -	$ -	$ -
C&I High Efficiency Incentive (for Businesses and Schools)						
Lighting	$ -	$ -	$ 388,727	$ 740,833	$ 388,727	$ 740,833
HVAC	$ -	$ -	$ 2,073	$ -	$ 2,073	$ -
Motors	$ -	$ -	$ 151	$ 153	$ 151	$ 153
PowerShare	$ -	$ -	$ -	$ 4,308	$ -	$ 4,308