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Process Evaluation of the 2010 and 2011 PowerShare® Program in Ohio

Final Report

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Executive Summary

Summary of Findings

The 2010-2011 PowerShare® Ohio program is a complex program whose delivery requires fast decision-making and tight coordination across Duke Energy's different divisions. The Duke Energy program management and staff appear to have all the challenges well in hand. Although there have been a number of staff changes in recent years, the program is running smoothly and has successfully made a number of improvements to streamline its processes. The Duke Energy PowerShare Ohio program managers and staff have also taken a very proactive stance in preparing the program for a number of upcoming changes, the most immediate of which is the move to the PJM Regional Transmission organization.

PowerShare Ohio customers have a high regard for the program and for their Duke Energy account managers in particular. The account managers play a key role in helping customers understand the program's benefits and its required commitments. The PowerShare program relies on accurate communication of information and the customers report that Duke Energy is doing a good job in communicating the program requirements and relaying the call for events. The majority of customers in Ohio have chosen the "Emergency Only" program. Because there were no emergency events in 2010 or 2011, customers interviewed were not able to provide feedback based upon their experience of an event call.

Recommendations

RECOMMENDATION: Duke Energy should consider providing a summary sheet for all PowerShare customers in the Midwest region that highlights the program's key components, and their company's specific commitment in their agreement. Duke Energy should also consider developing a process flow chart that illustrates the sequence of events during an event day, starting with the identification of event conditions, notification of customers, and the different paths to settlement should the customer choose to reduce load or buy through. Because events are relatively rare, this would provide a quick refresher for customers in preparation for an upcoming event season.

RECOMMENDATION: Duke Energy should obtain more data from customers on whether technical assistance with developing a curtailment plan and schedule would encourage more customers to participate in PowerShare Ohio. This may be accomplished informally by the Duke Energy account managers, or more formally with a telephone survey of customers whose main strategy is curtailment.

RECOMMENDATION: Duke Energy should consider the feasibility of offering a renewal system online. This may be an option that is only offered to experienced program participants, who have had the experience of responding to event calls and know whether their capacity commitment is achievable without modification. Due to the complexity of calculating baselines, an online renewal system should not be offered to customers who need to modify their capacity commitment. An online renewal system may be more convenient for customers by reducing paperwork and may also help reduce the workload of the account managers.

Introduction and Purpose of Study

This document presents the evaluation report for Duke Energy's PowerShare Program as it was administered in Ohio.

The evaluation was conducted by the TecMarket Works evaluation team. The survey instruments were developed by TecMarket Works. Yinsight (a TecMarket Works subcontractor) conducted the in-depth interviews with program management and program participants.

Summary Overview

Summary of the Evaluation

For this process evaluation, the evaluation team conducted in-depth interviews with six Duke Energy managers and program staff members at different levels of responsibility for the program. The evaluation team also conducted 15-minute interviews with 10 commercial and industrial customers who participated in the 2010 or 2011 PowerShare Ohio program. The findings from each of these sets of interviews will be discussed in turn.

Evaluation Objectives

This process evaluation of the 2010-2011 PowerShare Ohio program has several purposes. First, this process evaluation is intended to help identify areas where the program may be improved, drawing upon the insights of Duke Energy staff across different divisions and upon the insights of a sample of participating customers. Second, this report will document program operations for future reference, including ways in which the program has addressed and overcome past program challenges.

Researchable Issues

This participant survey addressed several research issues that were identified collaboratively by Duke Energy and the TecMarket Works team:

- Marketing: Are customers receiving all the information they need to make the decision of whether or not to participate? Do customers understand the incentive structure? Are there any improvements that could be made in the presentation of the program's benefits and requirements?
- Participation: Are there any improvements that could be made to the enrollment process? Are there any unknown barriers to participation for the customers?
- Events (these questions were included in the interview guide but not included in the interview due to the fact that no emergency events have been called in 2010 or 2011): Do customers find the notification system to be effective? Do customers find the proforma load profile that Duke Energy provides prior to each event to be useful? Were incentives paid in a timely manner?

Description of Program

PowerShare is a demand response program designed to reduce non-residential customers' energy use during periods of high energy prices or during periods when high energy usage would cause energy supplies across the transmission and distribution system to drop to near-critical levels. In both these situations, the PowerShare program allows Duke Energy to purchase capacity from their customers by paying their commercial and industrial customers to reduce their energy demand, thus increasing the available energy supply[1].

In Ohio, electricity customers are offered a choice of electric suppliers. Participation in the PowerShare emergency program is available to any customer, while participation in the PowerShare economic Call Option program is only available to customers who choose Duke Energy as their electricity supplier. At the time of these interviews in September of 2011, there was only one customer who was enrolled in Call Option economic program.

Program Participation

Program	Participation Count for 2010	Participation Count for 2011
PowerShare	67	75

[1] The Ohio regulatory commission also makes a distinction between curtailment-based versus generation-based demand response programs, so Duke Energy manages these resources separately.

Methodology

Overview of the Evaluation Approach

Management Interviews

TecMarket Works developed the interview protocol for the PowerShare Program management which was implemented in August and September of 2011. The full interview guide can be found in Appendix A: Program Manager Interview Instrument.

Participant Interviews

TecMarket Works developed a customer survey for the PowerShare Program participants, which was implemented in November of 2011.

The evaluation team attempted interviews with a census of PowerShare participants and were able to complete surveys with a sample of 10 participants in Ohio. These participants were surveyed by Yinsight. The survey can be found in Appendix B: Participant Survey Instrument. Because there were no emergency event calls in 2010 or 2011, questions in the survey that pertain to payment of incentives and verification of load reduction were not asked of the participants.

Data collection methods, sample sizes, and sampling methodology

- Data collection method: Questionnaires were administered via short telephone interviews with the contact person identified to receive PowerShare alerts on behalf of the company.
- Sample sizes: A sample size of 10 was selected by the evaluation team. This sample is not intended to be representative of the general PowerShare population.
- Sampling methodology: The sample was randomly selected from a list of current 2011 PowerShare Ohio participants.

Number of completes and sample disposition for each data collection effort

For this process evaluation, the evaluation team conducted in-depth interviews with six Duke Energy managers and program staff members at different levels of responsibility for the program. The evaluation team also conducted 15-minute interviews with 10 commercial and industrial customers who participated in the 2010 or 2011 PowerShare Ohio program. The findings from each of these sets of interviews will be discussed in turn.

Expected and achieved precision

Not applicable; this study did not include an impact evaluation.

Description of baseline assumptions, methods and data sources

Not applicable; this study did not include an impact evaluation.

Description of measures and selection of methods by measure(s) or market(s)

Not applicable; this study did not include an impact evaluation.

Use of TRM values and explanation if TRM values not used

Not applicable; this study did not include an impact evaluation.

Threats to validity, sources of bias and how those were addressed

No causal relationships were being investigated, so threats to validity is not a concern. Participants may have exhibited the social desirability bias when answering a question relating to the customer's main motive for participating in the PowerShare program, and when answering questions about satisfaction with the PowerShare program. To counter this bias, these questions used neutral wording. Note that because of the small sample size, there is no intention to generalize findings to a larger population. Prior to fielding, all survey questions were also independently reviewed by a third party evaluation advisory team working on behalf of the Ohio regulatory commission.

Evaluation Findings

PowerShare Program Objectives

The PowerShare Ohio program has multiple objectives and associated benefits. PowerShare gives commercial and industrial customers an opportunity to lower their energy cost by receiving capacity premium payments for providing Duke Energy additional energy capacity. Their participation also allows participants to have advance notice of periods of high energy prices and thus be able to make the best financial decision for their company. During periods of high energy prices, participants have the option of reducing load and receiving an event incentive for each kW reduced, to generate their own electricity and control their energy costs, or to "buy through" and pay for electricity to be delivered by Duke Energy at a real time market based price.

Duke Energy's demand response program portfolio also includes a residential component, the Power Manager® program. These demand response programs benefit all of Duke Energy's customers by avoiding the costs of building new power plants or purchasing peak energy in the market. This yields lower energy prices for all customers during peak demand periods, and allows Duke Energy customers to reduce their carbon footprint through curtailing energy use. On a wider scale, Duke Energy's demand response programs help to increase the reliability of the electricity transmission and distribution system, and to mitigate risk of blackouts.

PowerShare Ohio

In 2012, Duke Energy Ohio will be migrating from the MISO (Midwest Independent Transmission System Operator) energy market to the PJM energy market. PJM has a different set of requirements in order for demand response programs to be used for capacity. Duke Energy has been planning for the new requirements. For example, MISO provided Duke Energy with eight hours advance notice for emergency events and Duke Energy contracted with customers for 6 hours notice, but PJM will provide two hours' notice. Duke Energy instituted the change to a 90-minute advance notice period to be effective January 1, 2012. Another requirement that PJM makes is that customers must be willing to be exposed to 10 emergency events, instead of the five that MISO requires. Duke Energy has adopted this requirement in the 2011-2012 contracts.

Duke Energy staff reports that this change has not impacted the willingness of new participants to enroll in the PowerShare program. However, it is also true that emergency events are very rarely called by MISO.

A Duke Energy program manager reports that in the PJM energy market, other energy service providers may be competing with Duke Energy to provide demand response capacity from curtailment. In a situation where Duke Energy's avoided costs of generation is below the prices on the energy market, Ohio customers may be less likely to choose to participate in the Power Share Call Option program. The program manager reports that Duke Energy is currently considering their options for managing Power Share's curtailment resources in the PJM market.

PowerShare Operations

Marketing. The PowerShare program is promoted mainly by Duke Energy account managers. Account managers speak to large business customers on a one-to-one basis to determine whether they are suitable candidates for participating. All Duke Energy staff members who were interviewed unanimously agreed that PowerShare was not a program that could be accurately promoted with marketing collateral alone. Account managers need to have an in-depth conversation with the customer, strategizing on what that customer might be able to do to reduce load. For some customers this may entail reducing lighting or HVAC usage, for others this may entail turning off a production line, or turning on a generator.

Enrollment. To qualify for PowerShare, nonresidential customers must be able to curtail a minimum of 100 kW and have an interval meter. Once a customer has decided to participate, a Duke Energy account manager assists the customer with the online enrollment process. If the customer does not have an interval meter that can be interrogated over a phone line, Duke Energy will arrange for the meter to be installed.

Customers in the Midwest participate on a year-to-year contract, running from fiscal year June 1st through May 31st. Duke Energy staff reports that every state in their service territory has seen increased participation, from both the perspective of number of companies and total capacity. A program manager reports that PowerShare Ohio has been exceeding the MW capacity goal set by SB 221. These capacity goals will increase every year through 2018 and Duke Energy is taking proactive steps to meet those increased goals. "*We continuously design the program to meet those objectives. We're planning and setting goals to get ahead and bank capacity for next year. As efficiency standards get higher, it's harder and harder to get those objectives. We are trying to meet the objectives earlier rather than later.*"

While the PowerShare program is meeting its capacity goals, it also faces a number of challenges in the coming years. A PowerShare program manager reports that in Ohio, transmission-served commercial and industrial customers have been able to opt-out of Duke Energy's energy efficiency offerings because they do not want to pay the EE rider. Ohio's regulatory commission requires that customers who wish to opt out must submit an application and demonstrate through measurement and verification practices that they have met the same reductions as the utility. These customers, who have opted out, include large customers who provide large blocks of load capacity, which may affect Duke Energy's ability to meet the aggressive capacity goals in SB 211.

In 2012, Duke Energy Ohio will be migrating from the MISO (Midwest Independent Transmission System Operator) energy market to the PJM energy market. PJM has a different set of requirements in order for demand response programs to be used for capacity. Duke Energy has been planning for the new requirements. For example, MISO provided Duke Energy with eight hours advance notice for emergency events and Duke Energy contracted with customers for 6 hours notice, but PJM will provide two hours' notice. Duke Energy instituted the change to a 90-minute advance notice period to be effective January 1, 2012. Another requirement that PJM makes is that customers must be willing to be exposed to 10 emergency events, instead of the five that MISO requires. Duke Energy has adopted this requirement in the 2011-2012 contracts.

A Duke Energy account manager reports that some customers see the 90-minute advance notice as the biggest barrier to enrollment. While OH has been meeting its MW goals, it is possible that the enrollment rate would be higher if more advance notice could be given.

Another challenge comes in the need to re-enroll customers on an annual basis. This is made more difficult by the fact that the enrollment period does not begin until January, and customers must be enrolled by March in order to participate in the event season. One PowerShare staff member suggested that increasing the length of the PowerShare Ohio agreement so that it is longer than one year would be of significant help with the effort to enroll new customers and maintain existing participation.

Economic vs. Emergency Events

PowerShare participants agree to be exposed to two types of events: emergency events and economic events. Emergency events are determined entirely by MISO. There were no emergency PowerShare events in 2010 or 2011. MISO calls an event when there is a critical shortage in energy supply or when unusual events threaten the reliability of the electrical grid.

Economic events are called by Duke Energy on days when high forecasted load coincides with high energy prices. During these times, Duke Energy can call an economic event and pay PowerShare participants a pre-arranged price that is lower than the energy market price. This benefits all Duke Energy customers by buffering them from unusually high and volatile prices on the energy market. Duke Energy managers report that they convene a meeting of stakeholders to discuss these considerations each time an economic event is considered.

PowerShare Call Option

Proforma baseline. Customers can select both the number of economic events their company is capable of meeting, as well as how much capacity to provide for each economic event. Customer's curtailment for demand response events is determined against their proforma baseline load shape, calculated based upon past energy usage. Customers can choose to reduce energy use through either setting a firm load level or reducing a fixed amount against their proforma baseline. A firm level reduction commitment is a commitment to reduce down to a specific kW usage (e.g. customers may commit to reduce energy usage to a firm level of 600 kW or below). A fixed level reduction commitment is a commitment to reduce a certain kW relative to the customer's load shape (e.g. customers may commit to reducing energy usage by a fixed 400 kW, against their proforma).

Two PowerShare staff members have both mentioned that customers seem to have difficulty understanding how their proforma differs from their peak load. Peak loads are calculated using a 15-min interval; proforma baselines may be much less than the 15-min peak. One staff member reports "*We have customers that signed up for [fixed] 2000 kW reduction, but when we run the proforma, it's only 1000 kW. They don't even have 2000 kW to give us.*"

The number of economic and emergency events is determined by the PowerShare option the customers agree to. All of these combinations are offered under the PowerShare Call Option umbrella, and all include an exposure to 10 emergency events. Duke Energy pays an annual capacity premium depending on the number of events and the curtailment capacity to which a

customer commits. This capacity premium is paid over 12 months and shows up as a line item labeled "PowerShare credit" on the customer's monthly bill. If customers respond to an event call by curtailing, they are paid an additional event incentive credited to their monthly bill after settlement.

Customers can choose to commit to the following Call Options, with an increase in the number of emergency events in 2011.

Table 1. PowerShare 2010 Options (under MISO)

Call Option Program	Number of Events	Capacity Premium Credit
0/5	5 emergency events only	$10/kW per year
5/5	5 economic events and 5 emergency events	$15/kW per year
10/5	10 economic events and 5 emergency events	$25/kW per year
15/5	15 economic events and 5 emergency events	$30/kW per year

Table 2. PowerShare 2011 Options (under MISO, but using PJM requirements)

Call Option Program	Number of Events	Capacity Premium Credit
0/10	10 emergency events only	$12/kW per year
5/10	5 economic events and 10 emergency events	$18/kW per year
10/10	10 economic events and 10 emergency events	$25/kW per year
15/10	15 economic events and 10 emergency events	$30/kW per year

In addition to Call Option, customers who choose Duke Energy as their energy provider may also sign up for a purely voluntary program called Quote Option. Prior to each event, Duke Energy agrees to provide Quote Option customers with a price per kWh, using the EPO website to accept bids. Because this is purely voluntary, customers are not paid any annual capacity premium credit but neither do they incur any penalties if they do not respond to an event call[2].

Event Calls

Duke Energy's Retail Energy Desk (RED) monitors several indicators to determine whether conditions may warrant an event. These indicators include a heat index (factoring in temperature and humidity) during the summer months, a load forecast and a peak forecast. If the load forecast is within 7% of the peak forecast, and energy market prices reach a certain threshold, then conditions may be ideal for considering an economic event.

To determine whether an economic event is called or not, the RED convenes a meeting of stakeholders. This group may include up to 20 different people, including account managers, account manager executives, production managers, production managers' supervisors, technical support staff and Duke Energy upper management. Customer needs and satisfaction are a

[2] At the time of these interviews in September of 2011, there were no Quote Option participants in Ohio.

concern, and account managers are sometimes reluctant to agree to a disruption of their customer's production capabilities. Other factors include how likely it would be for another event to be called in the near future. A Duke Energy staff member reports that some of the most difficult efforts to attain consensus occurred during a week in which every day could have been an event day and three economic events were called, "*but every one of those event days met the criteria.*"

In Ohio and the rest of the Midwest service territories, the PowerShare Call Option economic program is limited to a maximum of three event calls per week and no more than two consecutive days of events. The RED team attempts to target the three peak load days when every day of a week meets the criteria for an event. Emergency events, however, may be called by MISO without any constraints.

Initiating the event. Once the decision has been made to call an event, the Business Service Center enters information in a notification system developed by Varolii. Varolii contacts customers through a series of escalation rules for which method of communication to use. Notifications cease as soon as the customer responds. One improvement planned for the future is the addition of SMS texting as a notification method. Another improvement being planned is the capability to choose a preferred method of communication. In 2011, the Business Service Center has had to update customer contact information in Varolii manually. An enhancement being made for future event seasons is the development of a method to automatically update all Varolii records when Duke Energy account managers update their customers' contact information in Salesforce, a customer relationship management tool. All interviewees agreed that aside from the constant challenge of maintaining updated contact information, they are satisfied with Varolii's notification process and results.

EPO Curtailment module. For PowerShare, Duke Energy uses Schneider Electric's proprietary Energy Profiler Online (EPO) software system. Customer meter data and proformas are routinely imported in the system. Through EPO, the RED can update energy prices for events and the system also displays the customers' load compared to their proforma the day after the event. Settlement information is calculated in EPO after the final energy prices are provided by MISO and imported into the system. Although the MISO real time LMPs are available the day after an event, the total buy-through price includes other MISO charges such as the RSG[3]. Detailed settlement information is displayed in EPO for the customer after the buy-through price components are imported. The event credits/charges are exported to the Duke Energy billing system and appear on the customer's bill in the month following the PowerShare event(s).

Duke Energy has been working with Schneider Electric to improve the reporting capabilities of EPO. One Duke Energy manager reports that a new version has been developed and it will be launched and tested after the 2011 event season is over. The new version contains the ability to report event-specific information. The existing version of EPO allows Duke Energy to pull up reports on individual customers' load shed during events, but the new version allows aggregation across customers by event.

[3] The RSG (revenue sufficiency guarantee) compensates generators for their costs to produce energy in order to meet real time need. These costs are not known until generation is required, and MISO requires 6-7 days to settle those charges before passing them on to utilities.

Past evaluation studies have reported that Duke Energy staff had been unable to retrieve reports from EPO easily. This year, Duke Energy reports that several improvements have been made to EPO's reporting capabilities. PowerShare staff now has the ability to pull reports on load reduction by event, as well as by customer.

Reducing Load

Customers can choose to reduce load in one of two ways: If customers do not have generation capability, they can curtail load by shifting production schedules or turning off equipment. If customers have generation capability, they could choose to generate their own electricity instead of using electricity purchased from Duke Energy. MISO has strict requirements for generation. In addition to RTO requirements, Duke Energy program managers report that recent EPA requirements[4] for use of diesel generators will also impact the ability of customers to use generation to reduce load, but that requirement is still being clarified.

Energy Pricing for Economic Events

In 2010, there were 5 economic event calls and no emergency event calls in the Midwest region. In 2011, there were 7 economic event calls in the Midwest and no emergency calls. PowerShare Ohio essentially acts as an emergency only program, due to the fact that most customers chose the Emergency Only option. The section below describes the Call Option economic and emergency offerings in Duke Energy's Midwest region, available to qualified Ohio customers.

Penalty for emergency events. Customers who do not reduce load in response to an emergency event face removal from the program. These removals are determined on a case-by-case basis. For the energy used during an emergency event, customers pay the real energy price plus a penalty. This penalty includes RSG fees from MISO and an administrative charge from Duke Energy. In addition, the customer forfeits the monthly premium for non-compliance during an emergency event.

Buy-through price for economic program. The PowerShare program is intended to buffer all customers from potentially volatile energy prices during peak periods. However, customers may decide for economic reasons to risk the volatility of the energy market and pay the buy-through price, rather than reduce load. Customers may choose to buy through for many reasons, including a need to operate equipment to meet production goals. The buy through price is calculated based upon the real time price of energy plus RSG fees and administrative fee from Duke Energy.

Duke Energy provides Call Option participants with an estimate of the buy through price on the morning of the event. This estimate is an hourly price, based on "day ahead" prices. Duke Energy does not update that estimate. Instead, customers can obtain the real time prices on the day of the event directly from MISO on their website. Although that real time price is posted

[4]EPA made the RICE NESHAP (Reciprocating Internal Combustion Engines National Emission Standards for Hazardous Air Pollutants) ruling in February of 2010, with a compliance deadline of May 3rd, 2013.

after the hour is over, this still allows customers to monitor the most current information. Customers can make an economic decision to buy through for all or part of the event.

Settlement

For economic events, Duke Energy provides advance notice to participants prior to 4:30 pm the day before. At that time, Duke Energy also provides customers with a pro forma load shape based upon their previous day's usage. That pro forma load shape is used as the baseline energy use for calculating settlements. The customer's energy use during the event call is reflected in the daily meter reading. Settlements for event incentives are done on a monthly basis. The accounts take approximately one week after an event to settle, largely because Duke Energy must wait 6-7 days for MISO to provide the actual price components for that day.

Management

Unlike past evaluations of this program, all Duke Energy staff now report that Duke Energy is providing them with enough time and resources to adequately manage the program. One manager reported that although monitoring conditions and running events took up the majority of time during the summer event season, management took advantage of the off season to plan for future program needs. While program operations during events is still time-constrained, Duke Energy managers now report that the reallocation of staff has been made since the last evaluation study. One PowerShare staff member reported that while his tasks were still very time constrained, it was because they were focused on providing a fast turnaround on event data so that customers could review their energy usage after events.

The biggest challenge reported by Duke Energy's retail energy staff is the need to schedule meetings for both PowerShare and Power Manager, which is Duke Energy's residential demand response program. Sometimes, the same system operations staff is required to attend both PowerShare and Power Manager meetings. One Duke Energy staff member says while they could all use more hours in the day on event days, "*Duke Energy has streamlined the process as much as anyone could*".

Past Recommendations

A number of recommendations were made during the evaluation of the 2009 PowerShare program. Program managers were asked to provide a response to each recommendation at that time, explaining what they planned to do if they adopted the recommendation, or why they did not feel a recommendation was appropriate. There have been no new circumstances that are affecting Duke Energy's response to those recommendations. Those recommendations and Duke Energy's responses are documented below.

Past Recommendation 1. Via cooperative interaction between Duke Energy and the Public Utility Commission of Ohio, focus efforts on automating and streamlining PowerShare Program structures and operations, including integration with Smart Grid and web-based customer impact potential screening initiatives.

> Duke Energy response: "While we have not engaged any effort with the PUCO around streamlining the program, Duke Energy has put forth several changes to streamline the program procedures. We have once again improved participation in PowerShare for

2011, without needing to get smaller customers. However, we have begun work on piloting Automated Demand Response in the DEO territory, which will help find more cost effective ways to engage smaller/commercial customers as well as give a good view toward the next generation of DR--and including potential impacts of Smart Grid."

Past Recommendation 2: Investigate the marketing and enrollment success of the BRMs and identify if there are performance variances and identify the cause of performance variances if found. Determine if additional training or coaching is needed to increase successful enrollment performance so that the program's cost effectiveness is maintained or improved. TecMarket Works is not concluding that there is a training or expertise issue with the BRMs, but is suggesting that this recommendation be explored to determine if this condition is an issue, or if the enrollment variance is a function of client assignments.

Duke Energy response: "We created a new brochure and revamped the training that was conducted with the Account Managers in December 2010. In addition, weekly conference calls were held to discuss progress and share best practices. The feedback from account managers was very favorable and we increased customer load on the program by over 20% in 2011."

Past Recommendation 3: Continue to work with the contracted support vendors to identify and implement streamlined communication approaches, and more automated analysis and reporting practices. Assess the ability of the operational practices for the PowerShare Program to be molded after other similar programs if that will lead to lower costs or smoother operations. If this is not the case, continue to work with the current technical support vendor to focus on the operational needs of the PowerShare Program and Duke Energy's specific operational needs rather than focusing on operational improvements that can be adapted by other clients. Work with the current vendor to determine their level of commitment and anticipated cost structure to help establish operational systems that require less labor and staff intensity in the longer term for the Duke Energy program. Discuss the costs and labor issues with the vendor to reach an agreement on the scope, focus, timing and intensity of the vendor support. This may require more intensive short term focus as operational systems are adjusted and deployed.

Duke Energy response: "We have been receiving improved service from the key vendor in our IT area thus far in 2011 and we are reaching solutions on several areas that will streamline our processes for reporting, etc."

Past Recommendation 4: Develop clear program materials to be shared with participants and BRMs that explain the tariff concept in a way that customers can understand what it is and why it is applied to the payments they receive for those events and contacts to which this condition applies. Train the BRMs in how to present and discuss this topic with the participant and potential participant in order to avoid price expectation confusion.

Duke Energy response: "We created a new brochure and revamped the training that was conducted in December 2010. The feedback from account managers was very favorable and we increased customer load on the program by over 20% in 2011."

Past Recommendation 5: Lead an effort across the Duke Energy PowerShare team to try to set common M&V and financial impact analysis and reporting metrics that can simplify the amount of time spent on individual stakeholder analysis and reporting requirements. Involve the Midwest Independent Transmission System Operators (MISO), the system operators, the commission staffs, the power planners and internal Duke Energy program and financial managers. Focus on establishing common reporting and analysis requirements that meet the needs of all key stakeholders.

> Duke Energy response: "There is a low probability of consolidating the reporting requirements between PJM, MISO, system operators, and power planners. Duke Energy has reviewed the reporting requirements and verified the need for different calculations. We have been implementing an improved event reporting process that should help with this activity."

Past Recommendation 6: Examine the meter-based load response conditions that occur after a load reduction event to determine if there are participants who experience increased demand changes because of the load call. If these conditions are found, consider moving these customers off the program, or adjusting their rate structure to an on-peak/off-peak rate. If these conditions are found to be problematic for a significant number of program participants, consider training BRMs to work with participants to identify strategies for screening these customers prior to an enrollment offer or help the participant identify strategies for minimizing load increases at the end of the control period.

> Duke Energy response: 'We are not aware of any customer issues on this front. If this actually occurred, we would work with the customer to make an appropriate adjustment to their billing demand. To our knowledge, we have not received any requests from customers on this issue."

Future Program Changes

Duke Energy is proactively identifying and anticipating future changes to the program. As described earlier, Duke Energy has adopted PJM requirements for demand response programs even though the migration to PJM will not occur until January 1, 2012. Duke Energy program managers reported that they will be increasing enrollment efforts over the next few years in anticipation of that future need.

Duke Energy is also pilot testing a concept for automated demand response PowerShare option that would be targeted to customers in commercial office building spaces. The pilot is currently being conducted in Ohio, and program staff are evaluating whether it would be appropriate for the other states in which Duke Energy offers a PowerShare program.

Another challenge that Duke Energy will be addressing in the coming years is a new EPA regulation that affects how frequently diesel generators can be used. PowerShare customers in the Midwest have mentioned these new regulations as an area of concern.

A Duke Energy staff member has suggested that one area in which the program may be improved would be to help customers develop a curtailment strategy: "how do you shut it off,

who shuts it off, how much load does it represent?" While the development of a curtailment plan and schedule is the customer's responsibility, customers may appreciate help in this area from Duke Energy. However, the same staff member explains that they currently must devote most of their resources to re-signing customers because they are on a year-to-year contract, and do not have resources to help customers develop these plans.

Participant Interview Results

Interviews were conducted with 10 Duke Energy Ohio PowerShare® customers who participated in the PowerShare Call Option 0/10 (emergency only) program in 2010 and 2011[5]. These customers come from a variety of sectors, including medical, educational, and manufacturing. Customers were asked to describe their experiences during the application process. These customers include those who are in their first year of participation to some who had been participating for several years.

These 10 companies do not constitute a statistically significant sample. The size of the sample does not support any conclusions that would generalize to the rest of the PowerShare participants. These interviews are intended as an opportunity to capture a few qualitative observations from PowerShare Ohio customers.

Enrollment

Aside from two customers who inherited management of their PowerShare programs, all customers credited Duke Energy account managers as being the one who first made them aware of the program and its benefits. This is to be expected, given that Duke Energy is marketing the program primarily through account managers.

Most of the customers interviewed participated primarily for economic reasons. Two of these customers also cited a secondary reason that involved contributing to their community: One reported, "It's right for the community. If Duke is thinking of a blackout, we run our generation [to help]". Another customer that was a higher education institution said they participated to demonstrate their role as a community leader.

Obtaining information about PowerShare

Customers unanimously lauded the excellent work of their account representatives in providing information about PowerShare, and for taking their time to walk them through the program when necessary. Most customers said that they did not need any additional information provided about program requirements and benefits. Only one customer reported that during enrollment discussions with their account manager, they would have liked more details on the incentive calculation. When asked to rate how easy it was for the customer to understand the incentive structure, the mean rating from 8 customers was 8.13 (with a standard deviation of 1.29), with "10" indicating "extremely easy" and "1" indicating "extremely difficult".

One PowerShare Ohio customer reported that they did contact Duke Energy after the enrollment process in order to obtain a refresher on program operations. This feedback echoes feedback provided by PowerShare Kentucky customers.

> RECOMMENDATION: Duke Energy should consider providing a summary sheet for all PowerShare customers in the Midwest region that highlights the program's key components, and their company's specific commitment in their agreement. Duke Energy should also consider developing a process flow chart that illustrates the sequence of

[5] Ohio is an electric energy choice state, and only customers who choose Duke Energy as their electricity provider qualify for the Call Option economic program.

events during an event day, starting with the identification of event conditions, notification of customers, and the different paths to settlement should the customer choose to reduce load or buy through.

In summary, the participant responses showed their information needs were met by their Duke Energy account managers.

Satisfaction Ratings

Table 3. Satisfaction with PowerShare Program Information (1 to 10 satisfaction scale)

OH	Ease of Application	Info Explaining Program	Technical Expertise of Duke Staff	Time for Duke Energy to Respond	Overall Satisfaction with Power Share	Overall Satisfaction with Duke Energy
Mean	8.86	8.70	9.00	8.90	8.67	8.85
st. dev.	0.64	0.87	0.97	0.80	0.82	0.95
N	7	10	10	10	9	10

Table 3 shows customers' satisfaction ratings with aspects of the program. Ratings were on a scale of 1 to 10, with 1 indicating "extremely dissatisfied" and 10 indicating "extremely satisfied." Customers were unanimous in their agreement that Duke Energy's account managers did an excellent job answer technical questions, addressing all of their concerns in detail, and even in helping them revise their proforma when it was clear that the proforma was not representative of the customer's energy use. These are reflected in the high satisfaction with the technical expertise of Duke Energy staff (9.00) and in their high satisfaction with the time it took for Duke Energy staff to respond to their concerns (8.90). Customers had moderately high satisfaction with the ease of applying for the program (8.86) and with the information they were provided explaining the program (8.70).

Overall, Duke Energy Ohio customers rated their satisfaction with the PowerShare program 8.67, and their satisfaction with Duke Energy overall higher at 8.85.

Participant Suggestions

Customers were asked to share thoughts on how Duke Energy might increase participation from companies such as theirs. Two customers indicated that more advance notice would make the program more attractive, with one specifying 24 hour advance notice. Two other customers indicated that the program would be more attractive if Duke Energy would share the maintenance costs of the generators. Another customer simply suggested higher incentives. One higher education customer had a suggestion that validated an earlier suggestion by a Duke Energy PowerShare staff member: "*I just think that if Duke could help provide audits with the directors to help identify possibilities that could be done to get to the threshold they need. With the reorganization, I didn't have an engineer this year on site that I could heavily depend on who knows the site. A lot of colleges are very resistant to shutting things off. I guess maybe helping identify [possibilities] would make it easier.*"

> RECOMMENDATION: Duke Energy should obtain more data from customers on whether technical assistance with developing a curtailment plan and schedule would encourage more customers to participate in PowerShare Ohio. This may be accomplished informally by the Duke Energy account managers, or more formally with a telephone survey of customers whose main strategy is curtailment.

One customer also suggested that the PowerShare contract renewal process might be implemented online, rather than requiring customers to fill out paperwork. This may be an opportunity to address an earlier suggestion by a staff member to streamline the re-enrollment process.

> RECOMMENDATION: Duke Energy should consider the feasibility of offering a renewal system online. This may be an option that is only offered to experienced program participants, who have had the experience of responding to event calls and know whether their capacity commitment is achievable without modification. Due to the complexity of calculating baselines, an online renewal system should not be offered to customers who need to modify their capacity commitment. An online renewal system may be more convenient for customers by reducing paperwork and may also help reduce the workload of the account managers.

Customers were also asked if they were interested in an automated demand response program. Duke Energy is currently pilot testing an automated demand response program in Ohio, targeted to office buildings. Three customers with generation capabilities indicated they would likely not want to participate but that they would be open to learning more information: One was an institute of higher learning, another was a flooring manufacturer, and the third was a facility management company. The other five customers who responded were not interested.

Summary

Duke Energy's PowerShare Ohio program is running well but has several challenges in the years ahead. Duke Energy is taking a proactive stance toward meeting these challenges. PowerShare Ohio participants are highly satisfied with the program, due to the clear information they are receiving about the program's requirements. However, participant satisfaction may change if emergency events are called, and Duke Energy may wish to remind customers of the financial benefits that they have accrued over previous years' participation, as well as remind customers of the important role they play in providing capacity to the Midwest region.

Although there have been no emergency events, Duke Energy offers the PowerShare Call Option across the Midwest. This allows Duke Energy to draw upon feedback of all PowerShare participants in the Midwest to constantly improve their program offering in Ohio.

Appendix A: Program Manager Interview Instrument

Interviewer: _____ Date of Interview: _____ Interview method: _____

Name: _____

Title: _____

Position description and general responsibilities:

_____

_____

_____

We are conducting this interview to obtain your opinions about and experiences with the PowerShare Program for the state of [insert state] **as it was implemented between the dates of** [insert start date of program period under evaluation] **and** [insert end date of program period]. **We'll talk about the Program and its objectives, your thoughts on improving the program and its participation rates. As you may know, due to regulatory requirements Duke Energy needs to conduct periodic evaluations whether they are needed or not. Today's interview will take about an hour to complete. May we begin?**

Program Overview

1. In your own words, please briefly describe the PowerShare **[State]** Program's objectives.
   Are there any objectives at the participant level? What are they?
   Are there any objectives at the state portfolio level?
   Are there any objectives at the company level, across all the PowerShare states?

2. In your own words please describe how the PowerShare Program works and go over its design, marketing and operational approaches. Walk us through the participatory steps starting with a customer who knows nothing about the program.

3. Please explain the different PowerShare options that are available to Duke Energy customers in the state of [insert state] along with their incentives.

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

5. Do you feel that Duke Energy has provided you with enough time and resources to adequately manage this program? Did you receive the support that you need to manage this program? What else is needed?

6. Please describe for me the roles and responsibilities of vendors that are supporting Duke Energy's PowerShare program in the state of [insert state]?

7. Are there any changes you would like to see in the vendors' roles or responsibilities that would improve the PowerShare program's operations?

Objectives

8. Have the PowerShare's objectives changed in the last year or so, and if so how? Why?

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

10. Since the program objectives were devised, have there been any changes in external influences (such as market conditions) or internal influences that have affected the PowerShare program's operations?

11. Should the current objectives be revised in any way because of these changes that developed since the program objectives were devised? What changes would you put into place, and how would it affect the objectives?

12. Are there any pre-existing conditions that are associated with the program in the state of [insert state] or the market that are not being addressed or that you think should have more attention? If yes, which conditions are they? How should these conditions be addressed? What should be changed? How do you think these changes will increase program participation or impacts?

Incentives

13. Do you think the incentives offered through the PowerShare Program are adequate enough to entice the C&I community to enroll in the program? Why or why not?

14. Do you think the customers understand the incentive levels and how they are calculated? Have there been any issues relating to the customers understanding the incentive approach or confusion over what they are paid? What can be done to minimize this confusion?

15. If Duke were able to change the incentive level for each event, how do you think this would impact PowerShare's ability to acquire power reductions? In other words, do you think customers have additional ability to shed load that could be tapped if the incentives were increased?

Marketing

16. What kinds of marketing, outreach and customer contact approaches do you use to make your customers aware of the program? Are there any changes to the program marketing that you think would increase participation?

17. Do you think the materials and information presented to the C&I community about the PowerShare Program provides a complete enough picture for them to understand the potential importance of the program to them and their operations and the incentive or participatory benefits of the program?

18. In the state of [insert state], are there specific customer types (business types) or market segments that you think Duke Energy should focus more effort on enrolling? What are they? How should PowerShare approach them with this program?

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

20. What are the key market or operational barriers that impede a more efficient program operation or limit obtainable impacts?

21. What market information, research or market assessments are you using to identify market or segment-level barriers, and develop more effective or targeted operational mechanisms?

Overall PowerShare Management

22. Describe the use of any internal or outside program advisors, technical groups or organizations that have in the past or are currently helping you think through the program's approach or methods. How often do you use these resources? What do you use them for?

23. Do you think there should be changes made to the structure of the participation options? *For instance, in Kentucky's 2007 evaluation of the program, a company can opt for "quote" or "call" participation. Being "call" involves mandatory interruption, but only 2 companies enrolled. 20 companies enrolled in the optional "quote" group – but only 1 participated in the single event in 2007.*

24. *(Midwest only: Duke OH and KY will be with PJM instead of MISO.)* Given the RTO changes for 2012, how will the PowerShare program need to adapt? What operational or administrative changes will be necessary due to the change in RTOs from MISO to PJM?

Event calls

25. How do you track, manage, and monitor or evaluate customer response to the event calls?

26. For customers who do not shed as much load as anticipated, do you know why customers did not shed enough load?

27. Can you describe for me a picture of how customers react to a call? How fast do they learn of a call, what determines what they can do, how fast can they react?

28. Given that PowerShare customers have different capabilities to react to an event depending upon their work volumes, production schedules, etc., how does PowerShare capture needed savings within the different customer conditions and capabilities in the market?

29. How do you know if they reached their load shifting objectives?

30. What is the quality control, tracking and accounting process for determining how well control and control strategies work at the customer level and at the program level?

31. Are there any market segments or customer types that the program is now serving that are not able to provide the load shed within the timelines and notification systems used today? What would you suggest should be done about this customer segment?

UPDATE ON CONSIDERATION OF PAST EVALUATION RECOMMENDATIONS

In the evaluation of the 2009 PowerShare program, there were a number of findings and associated recommendations. In this last part of our interview, I'd like to ask you for an update on what Duke's responses to the recommendations were. I understand that there has not been very much time since the recommendations were made, but we would like to document any plans for responding to the recommendations.

Recommendation 1

Via cooperative interaction between Duke Energy and the Public Utility Commission of Ohio, focus efforts on automating and streamlining PowerShare Program structures and operations, including integration with Smart Grid and web-based customer impact potential screening initiatives.

Recommendation 2

Investigate the marketing and enrollment success of the BRMs and identify if there are performance variances and identify the cause of performance variances if found. Determine if additional training or coaching is needed to increase successful enrollment performance so that the program's cost effectiveness is maintained or improved. TecMarket Works is not concluding that there is a training or expertise issue with the BRMs, but is suggesting that this recommendation be explored to determine if this condition is an issue, or if the enrollment variance is a function of client assignments.

Recommendation 3

Continue to work with the contracted support vendors to identify and implement streamlined communication approaches, and more automated analysis and reporting practices. Assess the ability of the operational practices for the PowerShare Program to be molded after other similar programs if that will lead to lower costs or smoother operations. If this is not the case, continue to work with the current technical support vendor to focus on the operational needs of the PowerShare Program and Duke Energy's specific operational needs rather than focusing on operational improvements that can be adapted by other clients. Work with the current vendor to determine their level of commitment and anticipated cost structure to help establish operational systems that require less labor and staff intensity in the longer term for the Duke Energy

program. Discuss the costs and labor issues with the vendor to reach an agreement on the scope, focus, timing and intensity of the vendor support. This may require more intensive short term focus as operational systems are adjusted and deployed.

Recommendation 4

Develop clear program materials to be shared with participants and BRMs that explain the tariff concept in a way that customers can understand what it is and why it is applied to the payments they receive for those events and contacts to which this condition applies. Train the BRMs in how to present and discuss this topic with the participant and potential participant in order to avoid price expectation confusion.

Recommendation 5

Lead an effort across the Duke Energy PowerShare team to try to set common M&V and financial impact analysis and reporting metrics that can simplify the amount of time spent on individual stakeholder analysis and reporting requirements. Involve the Midwest Independent Transmission System Operators (MISO), the system operators, the commission staffs, the power planners and internal Duke Energy program and financial managers. Focus on establishing common reporting and analysis requirements that meet the needs of all key stakeholders. Focus resources on establishing more automated analysis practices when possible. Consider the relative costs and benefits of multiple approaches, including hiring additional part-time, seasonal or full time reporting staff, contracting reporting requirements to skilled service suppliers, and automation options. Consider increasing the allowable overhead and administrative costs to implement the program and contract or hire additional analysis and reporting analysts and reporting staff if these other efforts are not successful or cost effective.

Recommendation 6

Examine the meter-based load response conditions that occur after a load reduction event to determine if there are participants who experience increased demand changes because of the load call. If these conditions are found, consider moving these customers off the program, or adjusting their rate structure to an on-peak/off-peak rate. If these conditions are found to be problematic for a significant number of program participants, consider training BRMs to work with participants to identify strategies for screening these customers prior to an enrollment offer or help the participant identify strategies for minimizing load increases at the end of the control period.

32. Overall, what about the PowerShare Program works well and why?

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

34. In what ways can the PowerShare Program's operations be improved?

35. If you could change any part of the program what would you change and why?

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

Appendix B: Participant Survey Instrument

Name: _____
Company: _____
Title: _____

Hello, my name is _____. I am calling on behalf of Duke Energy to conduct a customer satisfaction interview about the PowerShare program. May I speak with _____ please?

If person talking, proceed. If person is called to the phone reintroduce.
If not free to talk, ask when would be a good time to call and schedule the call-back:

Call 1:	Date: _____,	Time: _____ ❑AM or ❑PM
Call back 2:	Date: _____,	Time: _____ ❑AM or ❑PM
Call back 3:	Date: _____,	Time: _____ ❑AM or ❑PM

❑ Contact dropped after third attempt.

We need your help. Duke Energy has given us your name as someone who might be able to share some of your experiences with the PowerShare Program. We are not selling anything. We would like to conduct a short interview that will take about 15-20 minutes and all your answers will be kept confidential. This information will enable Duke to make improvements to the program and the application process. Would you be able to help us?

Establishing Questions

ES-0. Would you please tell me what your company does, and what your role is in your company? _____

ES-1. Our records indicate that your company participated in the PowerShare Program. Do you recall participating in this program?

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

1a. **"PowerShare is Duke Energy's demand-response program developed to reward your business for adjusting energy consumption levels during peak time periods."**

Do you remember participating in this program?

1. ❑ Yes, *[Go to ES-2].*
2. ❑ No,

99. ❑ DK/NS

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

ES-2. *If 2010 only participant, skip this question.* In which option or options did your company enroll?

Kentucky: 2011-2012

- ❑ 0 Economic/10 Emergency
- ❑ 5 Economic/10 Emergency
- ❑ 10 Economic/10 Emergency
- ❑ QuoteOption

Ohio: 2011-2012

- ❑ 0 Economic/10 Emergency
- ❑ 5 Economic/10 Emergency
- ❑ 10 Economic/10 Emergency
- ❑ 15 Economic/10 Emergency
- ❑ QuoteOption

Southeast:

a) ❑ Mandatory Curtailment Option
b) ❑ Voluntary Curtailment Option
c) ❑ Generator Option
d) ❑ Call Option

Information-Gathering Phase

INFO-1. How did you become aware of the PowerShare Program?

a) ❑ Duke Energy sent me a brochure
b) ❑ A Duke Energy representative told me about it
c) ❑ Duke Energy website.
d) ❑ I saw an ad in _____
e) ❑ Other _____
f) ❑ DK/NS

INFO-2. At the time you became aware of the program and were considering whether or not to participate, did you do any additional investigation to confirm the program's participation requirements and program benefits, or was the information you had enough for you to make a participation decision?

a) ❑ The information received was adequate
b) ❑ Didn't need to confirm/ already knew about it
c) ❑ Went to the program or Duke Energy web site
d) ❑ Called or emailed a Duke Energy contact
e) ❑ Other: _____
f) ❑ DK/NS

If c, d, e, f, g:

INFO-3. Were you able to get the information you needed about the program's participation requirements and benefits?

1. ❑ Yes 2. ❑ No 99. ❑ DK/NS

INFO-4. While you were deciding whether or not you wanted to participate, did you have additional questions for Duke Energy that were not answered?

1. No (continue to INFO-5)
2. Yes (continue to INFO-4a)

INFO-4a. Were you able to get the answers you needed?

1. No
2. Yes

INFO-4b. What were you asking about?

_____

_____

INFO- 5: Would you please rate for me how easy it was for you to understand the PowerShare incentive structure on a scale of 1 to 10, with one being extremely difficult and 10 being extremely easy?

1 2 3 4 5 6 7 8 9 10

[If rating was less than 8:] What could Duke Energy do to make the incentive structure easier for customers to understand?

_____

_____

Decision Making

DM-1. What was the primary reason that you decided to participate? [If the customer participated in more than one option:] Why did your company choose to participate in each of these options?

_____

_____

_____

Participation in an Event

EV-1. Can you tell me, how many PowerShare events has your business been asked to respond to this year?

_____

EV-2a. How were you notified of the event?

_____

EV-2b. How do you prefer to be notified about future events?

_____

EV-3. Did you decide to reduce energy use for every event, or did you decide to decline one or more events?

EV-3a. [If customer did reduce] On the occasions you chose to reduce, why did you choose to?

_____

_____

EV-3b. [If customer did reduce] Do you think you would have been able to reduce more? Why or why not?

_____

_____

EV-3c. [If customer declined to reduce] Why did you decline to reduce energy usage?

_____

_____

Forecasted Loads

EV-4 As you know, Duke Energy provides a forecasted load pattern to you the day before an event to help in your decision making process. Do you review that load shape....

1. Before participating in a Curtailment Event? Never, Rarely, Sometimes, Always
2. During or immediately after a Curtailment Event? Never, Rarely, Sometimes, Always
3. Sometime after a Curtailment Event but before the bill comes? Never, Rarely, Sometimes Always
4. After the monthly bill comes? Never, Rarely, Sometimes, Always

EV-5 I'd like to ask how achievable your targeted level of load reduction is. Would you say the targeted level of load reduction you currently have with Duke Energy is ....

1. Much less than you can provide
2. Less than you can provide
3. About right for your company
4. More than you want to provide
5. Much more than you want to provide
6. Don't know.

Automated Demand Response

EV-6. How interested would you be in using an automated method to curtail load that would respond to a signal from Duke Energy about a curtailment event? In this type of structure Duke Energy would send a signal to a piece of control equipment installed at your site, such as on an HVAC compressor, fan, temperature set-point unit or equipment control system that would automatically make an adjustment that would reduce energy use for that piece of equipment at that time. The incentive would then be based on the energy that would be saved from the equipment being automatically controlled by the Duke Energy signal. The customer would not have to make any adjustments themselves because it would have automatically occurred at the time the signal was sent. Would you be:

1. Not at all interested in this approach,
2. Slightly interested
3. Somewhat interested
4. Very interested

EV-6a. If not at all interested: What are your concerns about this type of an approach?

_____

EV-6b. If interested (2-4 above) What are the primary reasons that you would be interested in this type of a control approach?

_____

Improvements

Impr-1. One of the objectives that the PowerShare program would like to see over the next year is increased participation of businesses like yours. Can you think of things that the program can do to help increase participation or help increase interest from people like yourself?

a. ❑ Increase general advertising
b. ❑ Increase advertising in trade media
c. ❑ Present the program in trade or associated meetings
d. ❑ Offer larger incentives
e. ❑ Offer incentives on other items/include other items
f. ❑ Have program staff call small C&I customers
g. ❑ Make the process more streamlined for customers
h. ❑ Make the process more streamlined for contractors
i. ❑ Increase number of events
j. ❑ Decrease number of events
k. ❑ Offer participation with events during certain months
l. ❑ Other: _____

Impr-2. At any time during your application process, did you need to contact Duke Energy to obtain information, or ask about progress on the application, or to obtain any other help, assistance or information?

1. ❑ Yes 2. ❑ No 99. ❑ DK/NS

If yes, Impr 2-a. Were your questions or needs effectively handled by the Duke Energy?

1. ❑ Yes 2. ❑ No 99. ❑ DK/NS

Impr 2b. How might this be improved?

_____

_____

Aggregation of Accounts (Carolinas Only)

Impr-3. How interested would you be in aggregating your accounts together, for PowerShare purposes only, in order to optimize load curtailment strategies across several Duke Energy accounts? Would you be:

a. Not at all interested
b. Slightly interested
c. Somewhat interested
d. Very interested

Impr-4. Overall, what about the PowerShare Program works well and why?

_____

_____

Impr-5. What doesn't work well and why?

_____

_____

Impr-6. Do you review your proforma loads prior to events?

If so, do you find them useful?

Satisfaction

We would like to ask you a few questions about your satisfaction with the program. For these questions we would like you to rate your satisfaction using a 1 to 10 scale where a 1 means that you are very dissatisfied with the program and a 10 means that you are very satisfied.

How would you rate your satisfaction with:

Sat-1. The incentive levels provided by the program

1 2 3 4 5 6 7 8 9 10
If score is 8 or less ask: What could have been done to make this better?

Sat-2. The ease of applying for the program

1 2 3 4 5 6 7 8 9 10
If score is 8 or less ask: What could have been done to make this better?

Sat-3. The time window in which you were required to reduce your load

1 2 3 4 5 6 7 8 9 10
If score is 8 or less ask: What could have been done to make this better?

Sat-4. Duke Energy's method for confirming how much load you reduced?

1 2 3 4 5 6 7 8 9 10
If score is 8 or less ask: What could have been done to make this better?

Sat-5. The time it took for you to receive your incentive

1 2 3 4 5 6 7 8 9 10
If score is 8 or less ask: What could have been done to make this better?

Sat-6. The amount of your incentive

1 2 3 4 5 6 7 8 9 10
If score is 8 or less ask: What could have been done to make this better?

Sat-7. The technical expertise of Duke Energy staff

1 2 3 4 5 6 7 8 9 10
If score is 8 or less ask: What could have been done to make this better?

Sat-8. The time it took for Duke Energy staff to respond to any questions or address any issues.

1 2 3 4 5 6 7 8 9 10

If score is 8 or less ask: What could have been done to make this better?

_____

Sat 9. The information you were provided explaining the program

1 2 3 4 5 6 7 8 9 10

If score is 8 or less ask: What could have been done to make this better?

_____

Sat 10. Considering all aspects of the program, how would you rate your overall satisfaction with the PowerShare Program?

1 2 3 4 5 6 7 8 9 10

Sat-10a. If score is 8 or less ask: What could have been done to make your experience better, or have we already covered it?

_____

_____

Sat 11. How would you rate your overall satisfaction with Duke Energy?

1 2 3 4 5 6 7 8 9 10

Sat-11a.If score is 8 or less ask: Why are you less than satisfied with Duke Energy?

_____

_____

Sat-12. Are there any other thoughts or comments you would like to share with Duke management about the PowerShare program that we have not discussed already?

_____

_____

TecMarket Business Center
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Oregon, WI 53575

Memorandum

To: Ashlie Ossege and Rose Stoeckle, Duke Energy
From: Michael Ozog, Integral Analytics
Date: August 30, 2011
Subject: PowerShare M&V Review

This memo presents my review of the impact evaluation approach used by Duke Energy to determine the impacts associated with the PowerShare program. The approach used by Duke Energy consists of the estimation of an M&V baseline load shape (MVB) for each customer, based upon non-event data. The load shed by the customer during an event is estimated by using the MVB to simulate what the customer's load during the event period would be if there was no event. This is compared to the actual load curve of the customer to determine the amount of load shed. The MVB load is needed for settlement, regulatory reporting purposes, and/or to verify that pledged reduction levels are achieved. The details of the MVC are discussed below.

The development of the MVB consists of the following steps:

1) Collecting and processing interval load data from customer meters and designation of event days and quiet periods (the quiet periods are identified by the customer).

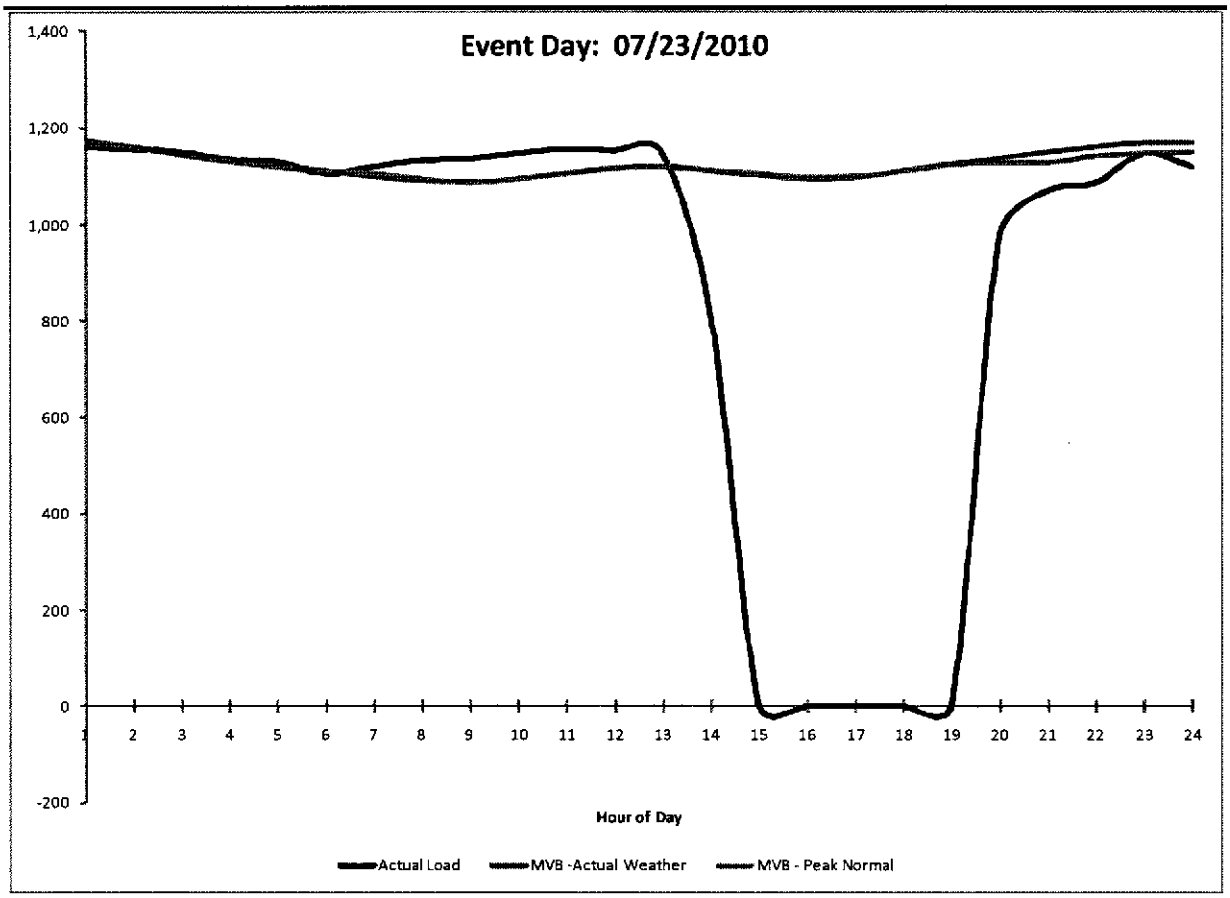
2) Estimation of a statistical model that relates hourly energy consumption to:
   - A Fourier transform of hour of the day
   - A Fourier transform of hour of the week
   - Temperature Humidity Index
   - Monthly intercepts, if appropriate
   - Interactions between the variables

   Data from event days and quiet periods are not included in the data used to estimate the model.

3) To determine what the customer's load would be during an event period had there been no event, the values for the independent variables during an event period are used within the statistical model developed in the second step. The statistical model is also used to determine the customer's load during a system peak day by using the peak day weather conditions rather than the actual event day weather conditions.

4) The load curtailed by the customer is then estimated by taking the difference between the load curve simulated by the statistical model for both actual event day and system peak day weather conditions and the customer's actual load curve during the event period in question.

A graphical example of this approach is presented in the figure below.



Assessment of Approach

The technical approach used by Duke Energy in how they develop the MVB and estimate event load effects appears to be very reasonable and defensible. The model specification as stated includes the key determinates of energy usage, so there is little likelihood of any bias in the results from omitted variables. One particularly noteworthy feature is that they use an extensive history to estimate the model, rather than relying on only a handful of days as is common in many utilities which use less rigorous approaches (i.e., approaches that compare average usages from a pre-event period, for example, rather than conducting a multivariate regression model, as Duke Energy is doing).

One suggestion is that Duke Energy should consider estimating the MVB over all available data, including data from event and quiet periods. The model can include indicator variables for these periods, and in the case of event periods, the coefficients on these variables would indicate the load impacts. This eliminates step four above, and further allows for hypothesis testing of the results (i.e., determining whether or not those impacts are statistically significant). The indicator variables for events can be interactive with weather conditions, and this will allow the estimate of the load effect under peak day conditions.

Overall, based on our review, Duke Energy's impact evaluation is a very complete and innovative approach, and in theory at least, should result in accurate estimates of event impacts.

Final Report

Evaluation of Duke Energy's Low Income Refrigerator Replacement Program In Ohio

An Impact Evaluation

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

December 20, 2011

Submitted by

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TECMARKET Works

TABLE OF CONTENTS

Executive Summary

Key Findings and Recommendations

The key findings and recommendations identified through this evaluation are presented below.

Impact Evaluation

1. Average annual consumption of old and new refrigerators was 1,576 kWh and 394 kWh respectively, an average savings of 1,182 kWh.
2. A total of 569[1] refrigerators were replaced for a total program savings of 672,671 kWh.
3. Only 6% of old refrigerators were replaced with a 15 cubic foot model.
4. Average cubic footage of old vs. new models was very close, 18.92 vs. 19.3 cubic feet.
5. In special cases, a refrigerator with a bad seal may be replaced at the discretion of the auditor even if the meter wattage is below the program requirement. There were four such exceptions made in Ohio. In descending order, these units consumed 1304 kWh, 1243 kWh, 475 kWh, and 471 kWh. These installations, especially the latter two, should be reviewed by Duke Energy to assure that protocols that provide energy savings are being followed by all auditors.
6. Units were replaced only after an inspection of the old unit and a participant-specific offer by the program to have it replaced. Most participants were made aware of the Refrigerator Replacement Program offerings only after they had applied for another low income program (such as the weatherization program) and were subsequently informed that they were eligible for the Refrigerator Replacement Program as well. Survey data indicates that participants were not considering replacing their units at the time of the program offering. Hence, program freeridership is set at zero percent.

Engineering Impact Estimates: Key Findings

Table 1. Summary of Program Savings by Measure

Measure	Participation Count	Verified Per unit kWh impact	Gross Verified kWh Impact	Gross Verified kW Savings	Verified Per unit kW Savings
Frigidaire: 15 cubic feet	29	1,132	32,836	5.1	0.175
Frigidaire: 18 cubic feet	230	1,211	278,482	43.0	0.187
Frigidaire: 21 cubic feet	253	1,164	294,481	45.3	0.179
Whirlpool: 15 cubic feet	5	1,093	5,465	0.8	0.169
Whirlpool: 18 cubic feet	24	1,180	28,329	4.4	0.182
Whirlpool: 21 cubic feet	28	1,181	33,078	5.1	0.182
TOTAL	**569**	**1,182 [1]**	**672,671**	**104**	**0.182[2]**

[1]total gross kwh impact divided by 569 participants

[2]total gross kW savings divided by 569 participants

[1] The number of participants for the impact evalution is based upon the base rates and stipulated agreement program, and from the Energy Efficiency Portfolio program.

Introduction and Purpose of Study

Summary Overview

This document presents the evaluation report for Duke Energy's Low Income Refrigerator Replacement Program as it was administered in Ohio.

Summary of the Evaluation

The evaluation was conducted by TecMarket Works and BuildingMetrics.

The impacts are based on engineering analysis of the data collected through the use of a power meter installed directly to refrigerators in customers' homes. This report is structured to provide energy impact estimations per unit as well as total program savings. The impact tables reporting total savings are based on the savings identified from the 569 participants that replaced a refrigerator. Note that these savings do not include spillover or market effects savings from taking the old refrigerator off the secondary market.

Evaluation Objectives

This evaluation's objective is to determine the savings achieved by Duke Energy's Low Income Refrigerator Replacement Program through the replacement of customers' old, inefficient refrigerators with newer, more efficient, Energy Star qualified refrigerators.

Researchable Issues

- In special cases, a refrigerator with a bad seal may be replaced at the discretion of the auditor even if the meter wattage is below the program requirement. There were four such exceptions made in Ohio. In descending order, these units consumed 1304 kWh, 1243 kWh, 475 kWh, and 471 kWh. These installations, especially the latter two, should be reviewed by Duke Energy to assure that the minimum energy-saving-focused protocols are being followed by all auditors. However, in view that there were only two units with already low levels of consumption, this is not a serious issue for the program as a whole.

Description of Program

The Low Income Refrigerator Replacement Program's purpose is to replace the old, inefficient refrigerators of Duke Energy's low income customers with newer, more efficient, Energy Star qualified refrigerators. To determine if an old refrigerator is inefficient enough to be eligible for replacement, all units were tested in the customers' homes using a power meter installed directly to the refrigerator. If a refrigerator is found to be eligible, it is replaced at no charge to the customer. Old units are removed at the time of the delivery of the new unit and are 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.

Program Participation

Engineering estimates are based on the data from all 569 participants that replaced a refrigerator through the Low Income Refrigerator Replacement Program from January 2010 through June 2011.

Program	Participation Count for 2010 through June 2011
Low Income Refrigerator Replacement	569

Methodology

Overview of the Evaluation Approach

This impact evaluation is based on engineering estimates using in-situ monitored data collected from customers' homes.

Study Methodology

Power meters were installed directly to the old refrigerators in the customers' homes. Impact estimations were calculated by subtracting the new refrigerator's energy consumption, provided by the manufacturer, from the energy consumed by the customer's existing refrigerator as measured by the power meter.

Data collection methods, sample sizes, and sampling methodology

Power meters were installed directly to the refrigerators in the customers' homes. Low income homes were targeted. There were 569 participants in Ohio. All participants' units were pre-metered.

Number of completes and sample disposition for each data collection effort

Data was collected from the power meters that were installed directly to the refrigerators in all 569 of the customers' homes.

Expected and achieved precision

Not applicable. A census of participants was used in the study.

Description of baseline assumptions, methods and data sources

The existing (replaced) refrigerator is the baseline. Baseline energy consumption is obtained from in-situ metering.

Description of measures and selection of methods by measure(s) or market(s)

The low income residential market was targeted. Six refrigerator models were available as replacements. They can be seen in the table below.

Brand	Model Number	Size (Cubic ft.)	Energy Usage (kWh)
Frigidaire	FFHT1513LW	15	355
Frigidaire	FFHT1826LW	18	383
Frigidaire	FFHT2126LW	21	408
Whirlpool	ET5WSEXVQ	15	354
Whirlpool	ET8WTEXVQ	18	388
Whirlpool	ET1FTEXVQ	21	416

Use of TRM values and explanation if TRM values not used

The TRM uses a dual baseline approach to calculate lifecycle savings. The remaining useful life of the existing unit is deemed to be eight years. As a result, savings for the first eight years

calculated against the existing unit. Savings for the remaining nine years of the 17 year effective useful life of the new refrigerator are calculated against a new baseline unit. In this case we are deeming the effective useful life to be eight years.

Demand reduction was estimated as a function of energy savings as outlined in the following formula taken from the TRM:

$$\Delta kW = (\Delta kWh/8760) * TAF * LSAF$$

Where TAF (Temperature Adjustment Factor) is deemed at 1.3 and LSAF (Load Shape Adjustment Factor) is deemed at 1.074 for an existing unit and 1.18 for a new unit.

Threats to validity, sources of bias and how those were addressed

The baseline energy consumption is based on in-situ monitoring over a two-hour period. The monitoring period was selected to obtain a number of operating cycles. In-situ monitoring accounts for the location and condition of the refrigerator in terms of refrigerant charge, door gaskets, and so on. The doors remained closed during the test. The two hour test results were extrapolated to annual kWh usage. There is a potential engineering bias in the in-situ testing and extrapolation procedure, but this is expected to underestimate baseline use relative to a longer-period in-situ test that includes door openings, food loading, and so on. As a result, the actual achieved savings may be larger than the evaluated savings.

Snapback and Persistence

Both persistence and technical degradation are included in the calculation of a refrigerator's effective useful life shown in Appendix C: DSMore Table.

The theoretical additional energy and capacity used by customers that may occur from implementing an energy efficiency product, often called "snapback" if it occurs, by design will be captured in the impact evaluation through the billing analysis approach (due to be completed in 2012 after sufficient time has passed since the new refrigerator was installed).

The billing analysis approach will use actual energy use between the pre and post condition compared to what would occur without the program (control). All market or program effects conditions, including snapback, will be accounted for with this evaluation method. Further, there is little to no literature or snapback analysis within the evaluation industry that has been able to identify a snapback condition. The so-called snapback that has recently been referenced in the press has been the impact of normal electric demand growth that shows up in all customers as new products, services, and technologies are acquired and used. However, as noted above, any snapback that does occur would be captured in the evaluation design because of the use of pre and post billing analysis.

Evaluation Findings

Impact Evaluation

There were 569 refrigerators replaced through the Low Income Refrigerator Replacement program in Ohio from January 2010 to June 2011. All units were tested in the customers' homes using a power meter installed directly to the refrigerator. The meters collected energy consumption data for a minimum of two hours, allowing enough time for the unit to stabilize and cycle. Two hours has been shown to be sufficient time to determine a poorly operating unit that needs to be replaced.[2,3] Three sizes and two brands of replacement units were available: 15, 18, or 21 cubic foot Frigidaire or Whirlpool Energy Star top-freezer models. In Ohio, 90% of replacements were Frigidaire and 10% were Whirlpool. Of the 569 units replaced, 6% were 15 cubic feet, 45% were 18 cubic feet, and 49% were 21 cubic feet. A breakdown of the individual numbers can be seen in Table 2.

In general, the size of the customer's existing refrigerator and that of the unit chosen to replace it are as close as possible while still being restricted to the three available sizes. The average size of a replacement unit is 19.3 cubic feet while the average size of the replaced units was 18.92 cubic feet. A detailed comparison of refrigerator sizes and their replacements can be seen in Table 3.

Table 2. Replacement Unit Size and Brand Prevalence

Size of new unit	Count Frigidaire	Count Whirlpool	TOTAL
15 cubic feet	29	5	34
18 cubic feet	230	24	254
21 cubic feet	253	28	281
TOTAL	512	57	**569**

Table 3. Average Replaced Unit Size by Size and Brand of Replacement

Size of new unit	Frigidaire	Whirlpool	AVERAGE
15 cubic feet	15.14	15.00	15.12
18 cubic feet	17.80	18.00	17.81
21 cubic feet	20.37	21.82	20.52
AVERAGE	18.88	19.30	**18.99**

The power meter installed on the unit calculates the annual kWh consumption based on the watts used over the period of the test. If the refrigerator was calculated by the meter to consume over 1,315 kWh per year, it is eligible to be replaced at no charge to the customer. If a unit shows abnormally high peak wattage during the test, 325 watts or higher, this indicates that it was in defrost mode. In this case, the kWh per year must equal 1,565 kWh or more to be replaced. In special cases, a refrigerator with a bad seal may be replaced at the discretion of the auditor even

[2] Mapp, Jim. "Selection of High Usage Refrigerators and Freezers," Wisconsin Energy Bureau. April 16, 1998.
[3] Mapp, J., R Morgan, and K Schroder (2001). *Low-Income Refrigerator Replacement -- Selection Criteria for High Usage Refrigerator Replacement*, August 21 – 24, 2001, Salt Lake City. International Energy Program Evaluation Conference.

if the meter wattage is below the program requirement. There were four such exceptions made in Ohio. In descending order, these units consumed 1304 kWh, 1243 kWh, 475 kWh, and 471 kWh. These installations, especially the latter two, should be reviewed by Duke Energy to assure that the replacement protocols, which focus on making sure all units provide savings, are being followed by all auditors.

Table 4. Annual kWh Consumed by Replaced Refrigerators

Size Replaced	Quantity	Average kWh/yr
12 cubic feet	1	1,418
13 cubic feet	1	2,133
14 cubic feet	24	1,626
15 cubic feet	29	1,503
16 cubic feet	19	1,560
17 cubic feet	23	1,594
18 cubic feet	225	1,562
19 cubic feet	16	1,500
20 cubic feet	28	1,701
21 cubic feet	141	1,547
22 cubic feet	36	1,634
23 cubic feet	1	1,572
24 cubic feet	7	1,627
25 cubic feet	12	1,733
26 cubic feet	6	1,768
TOTAL/AVG.	569	1,576

From Table 4, the average annual kWh consumed by replaced units was 1,576 kWh compared to the average annual kWh used by the replacement units of 394 kWh. This provides an average annual savings of 1,182 kWh per unit and results in a total savings of 672,671kWh across the entire program in Ohio. Savings per unit ranged from a minimum of 55 kWh to a maximum of 3,110 kWh. The manufacturer provided energy guides associated with the replacement units can be seen in Appendix B: Energy Guides. A breakdown of the energy savings by unit size and brand can be seen in Table 5. Per-unit savings can be found in Table 6. Program kW reduction can be seem in Table 7 and Table 8.

Table 5. Total Program kWh Savings by Unit Size and Brand

New Refrigerator Size	Frigidaire	Whirlpool	TOTAL
15 cubic feet	32,836	5,465	38,301
18 cubic feet	278,482	28,329	306,811
21 cubic feet	294,481	33,078	327,559
TOTAL	605,799	66,872	**672,671**

Table 6. Per-Unit kWh Savings by Unit Size and Brand

New Refrigerator Size	Frigidaire	Whirlpool	TOTAL
15 cubic feet	1,132	1,093	1,127
18 cubic feet	1,211	1,180	1,208
21 cubic feet	1,164	1,181	1,166
Savings Per Unit	1,183	1,173	**1,182**

Table 7. Total Program kW Reduction by Unit Size and Brand

New Refrigerator Size	Frigidaire	Whirlpool	TOTAL
15 cubic feet	5.1	0.8	6
18 cubic feet	43.0	4.4	47
21 cubic feet	45.3	5.1	50
TOTAL	93	10	**104**

Table 8. Per-Unit kW Reduction by Unit Size and Brand

New Refrigerator Size	Frigidaire	Whirlpool	TOTAL
15 cubic feet	0.175	0.169	0.174
18 cubic feet	0.187	0.182	0.186
21 cubic feet	0.179	0.182	0.179
Reduction per unit	0.182	0.181	**0.182**

Appendix A: Required Savings Tables

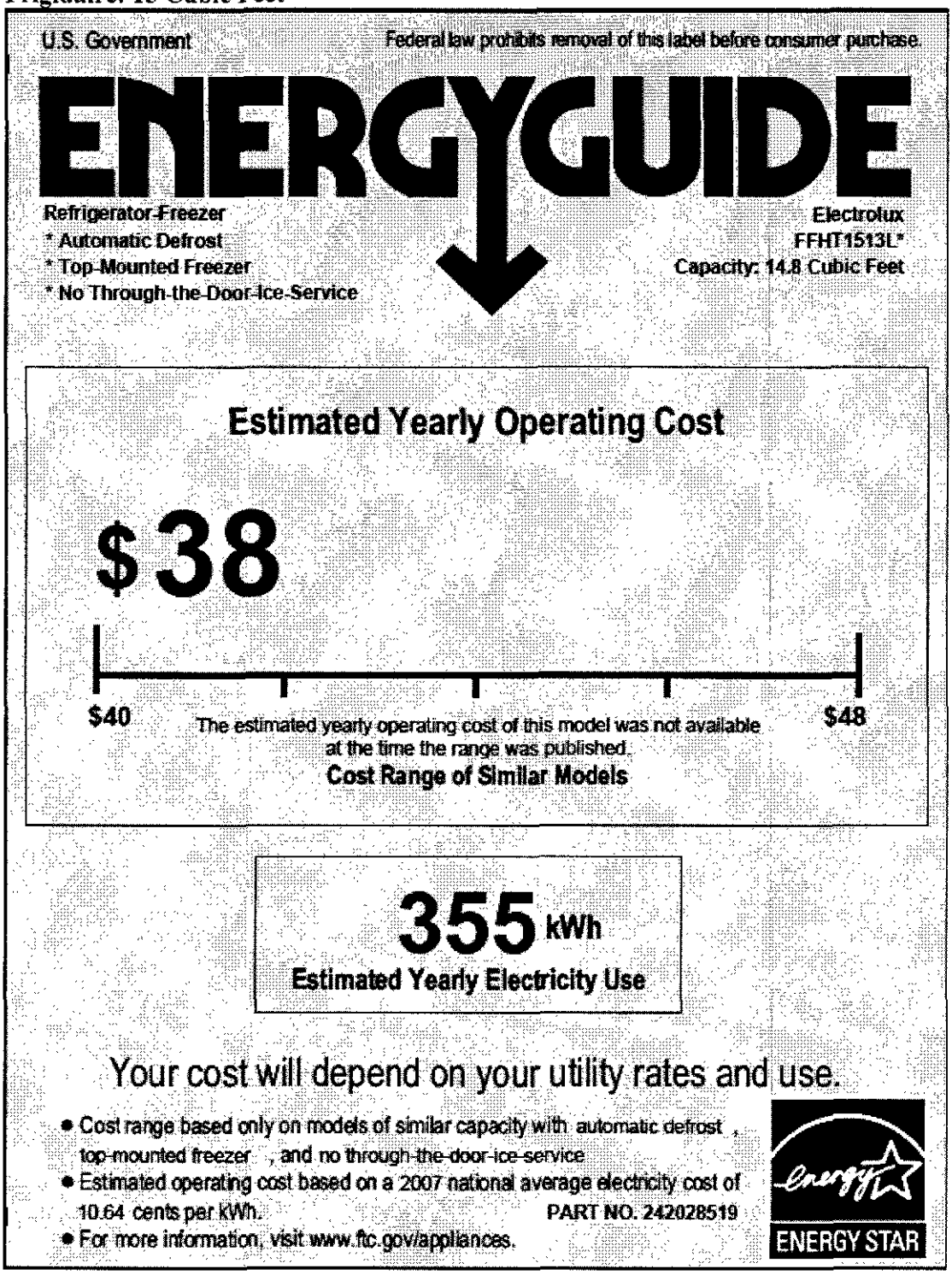
The required table showing measure-level participation counts and savings for each program is below.

Measure	Participation Count	Verified Per unit kWh impact	Gross Verified kWh Impact	Gross Verified kW Savings	Verified Per unit kW Savings
Frigidaire: 15 cubic feet	29	1,132	32,836	5.1	0.175
Frigidaire: 18 cubic feet	230	1,211	278,482	43.0	0.187
Frigidaire: 21 cubic feet	253	1,164	294,481	45.3	0.179
Whirlpool: 15 cubic feet	5	1,093	5,465	0.8	0.169
Whirlpool: 18 cubic feet	24	1,180	28,329	4.4	0.182
Whirlpool: 21 cubic feet	28	1,181	33,078	5.1	0.182
TOTAL	**569**	**1,182** [1]	**672,671**	**104**	**0.182**[2]

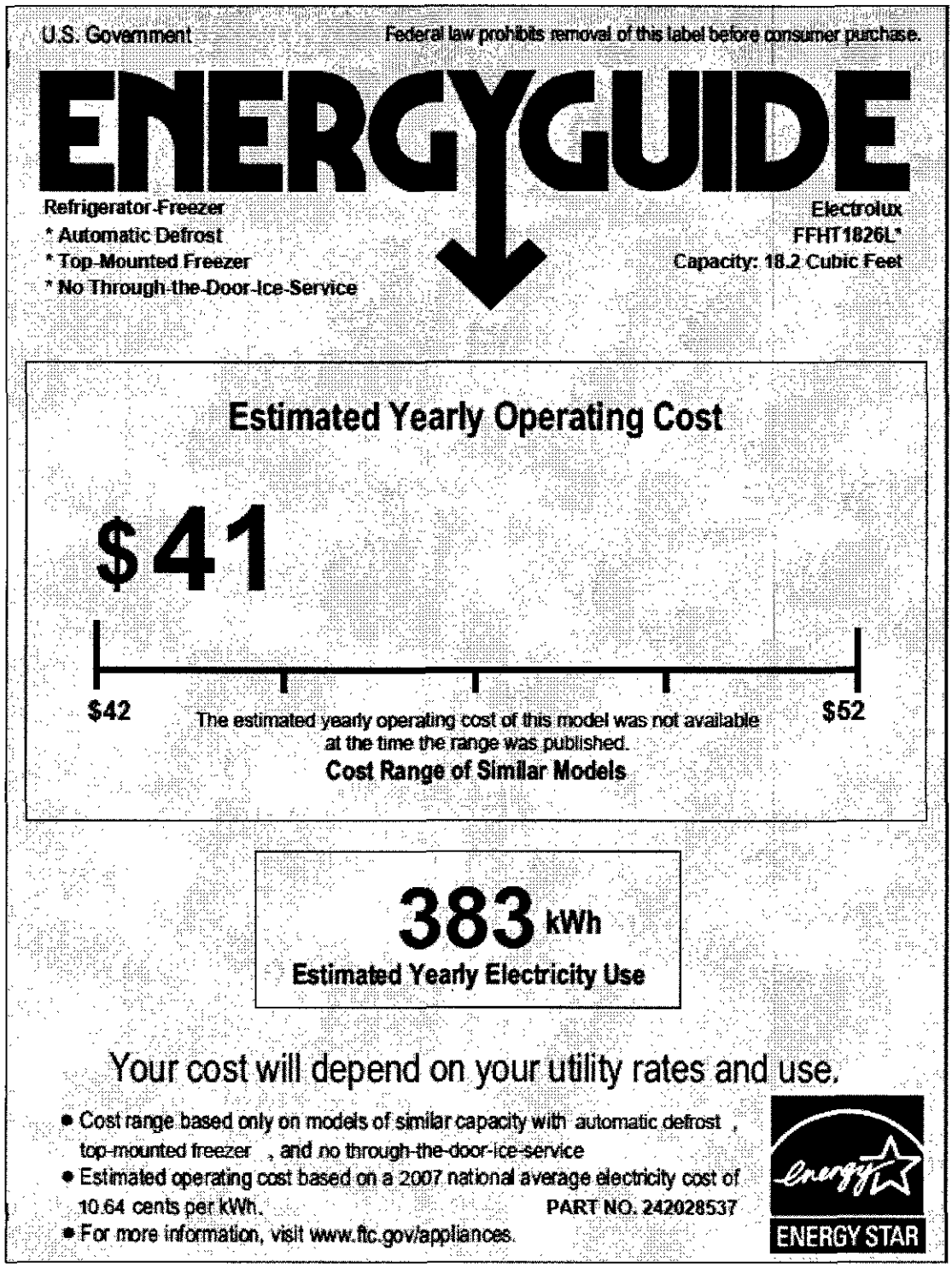
[1]total gross kwh impact divided by 569 participants

Appendix B: Energy Guides

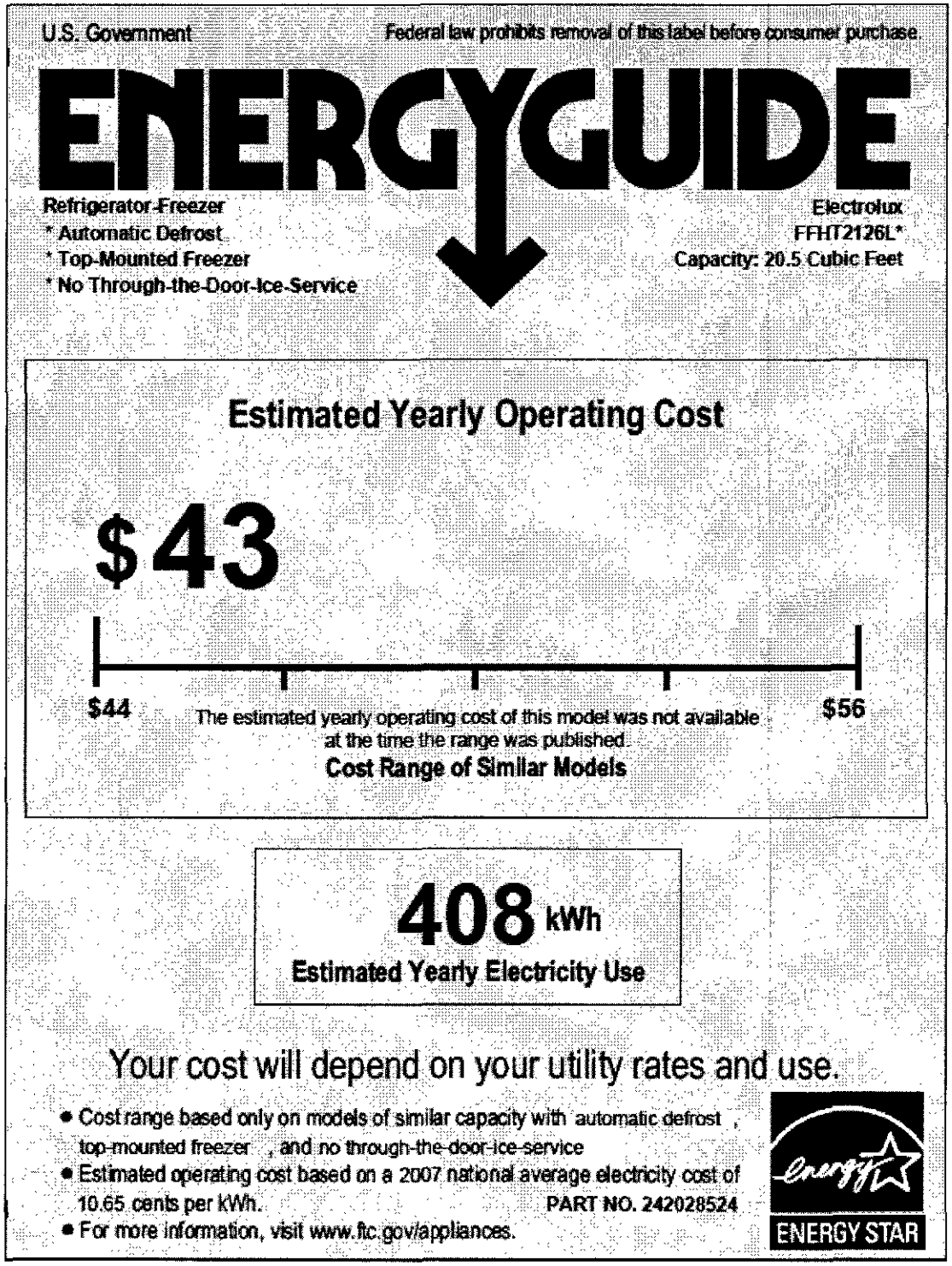
Frigidaire: 15 Cubic Feet



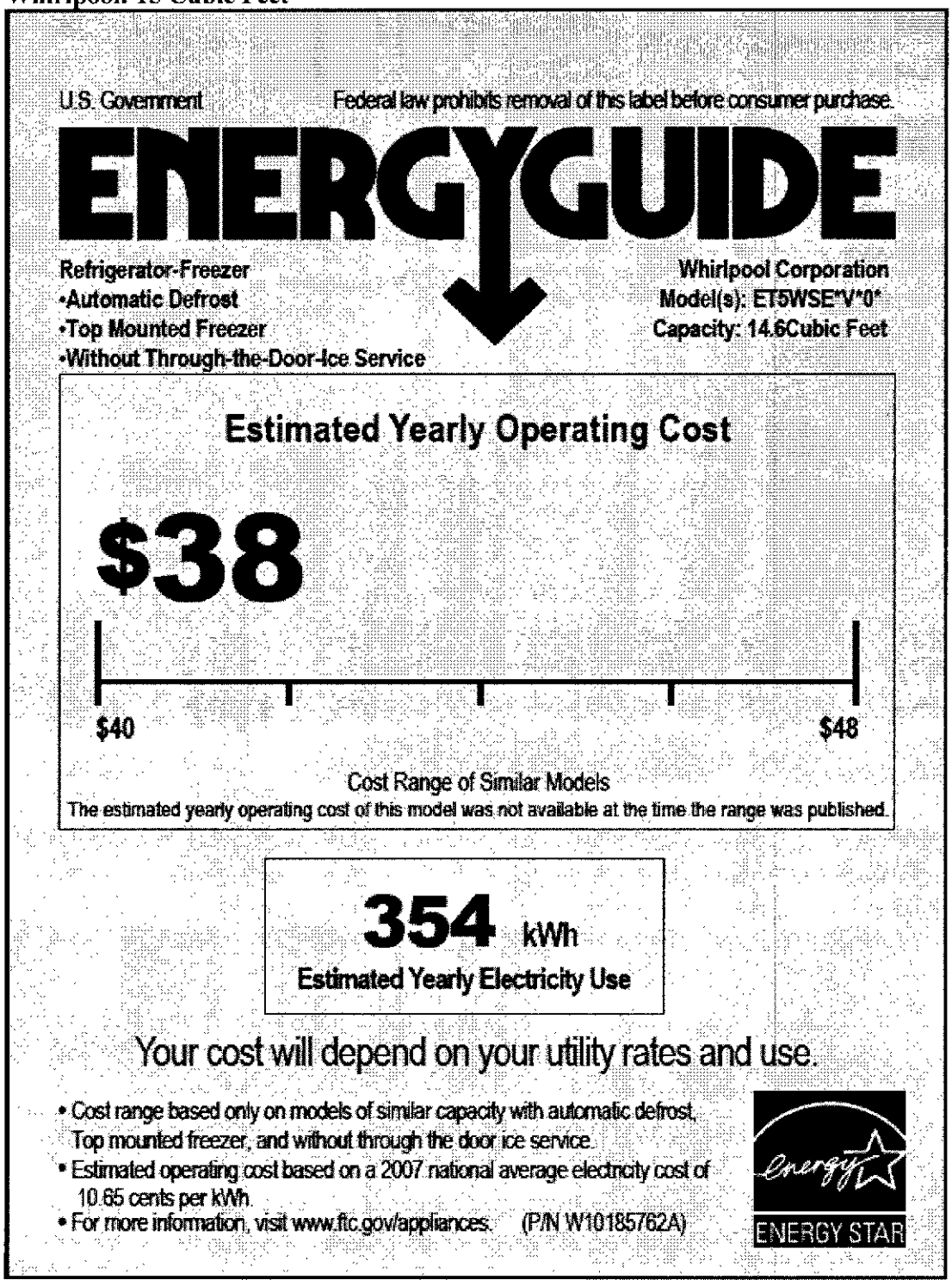
Frigidaire: 18 Cubic Feet



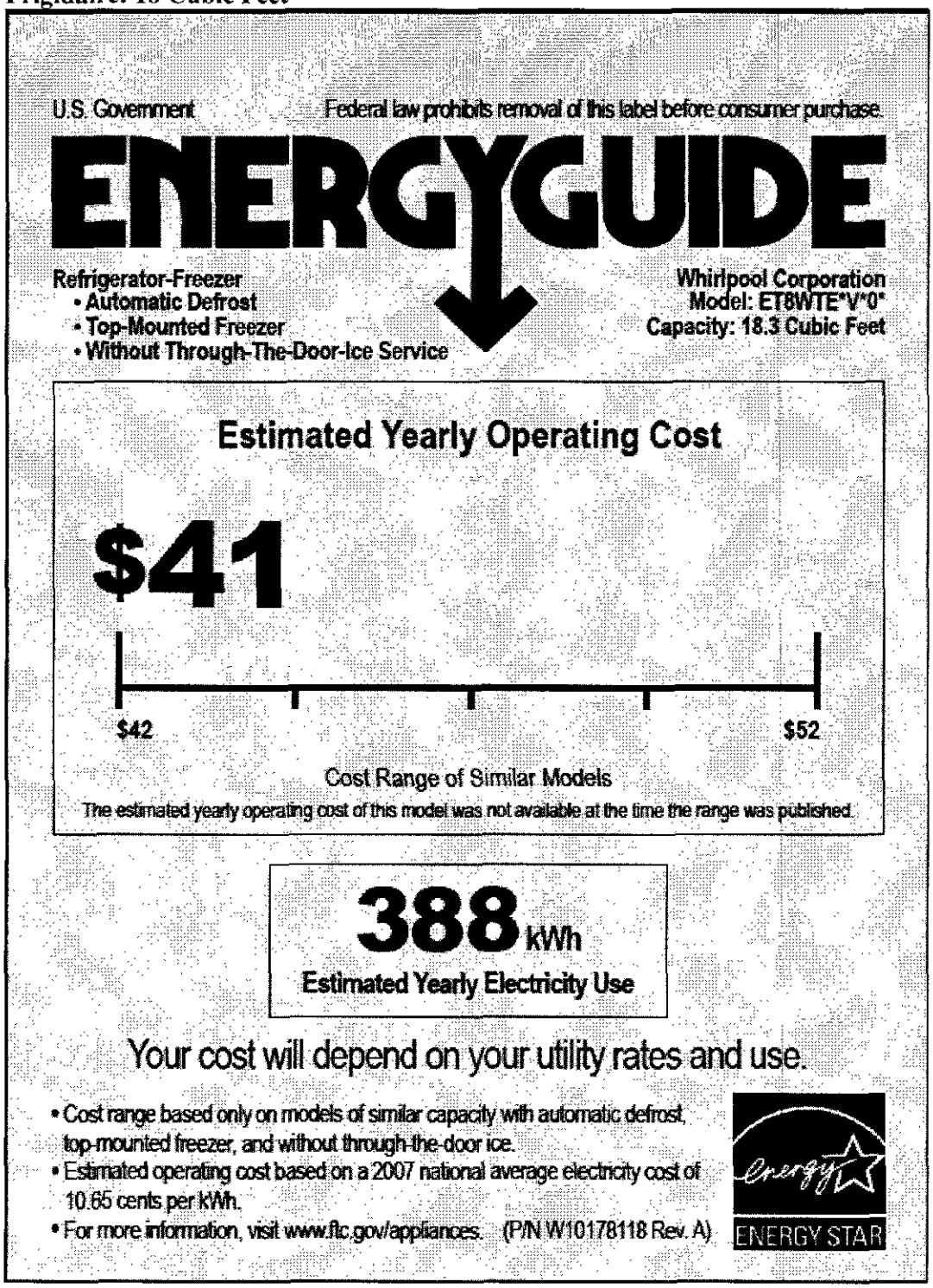
Frigidaire: 21 Cubic Feet


U.S. Government
Federal law prohibits removal of this label before consumer purchase
ENERGYGUIDE
Refrigerator-Freezer
* Automatic Defrost
* Top-Mounted Freezer
* No Through-the-Door-Ice-Service
Electrolux
FFHT2126L*
Capacity: 20.5 Cubic Feet
Estimated Yearly Operating Cost
$43
$44
The estimated yearly operating cost of this model was not available at the time the range was published
$56
Cost Range of Similar Models
408 kWh
Estimated Yearly Electricity Use
Your cost will depend on your utility rates and use.
• Cost range based only on models of similar capacity with automatic defrost , top-mounted freezer , and no through-the-door-ice-service
• Estimated operating cost based on a 2007 national average electricity cost of 10.65 cents per kWh.
PART NO. 242028524
• For more information, visit www.ftc.gov/appliances.
ENERGY STAR

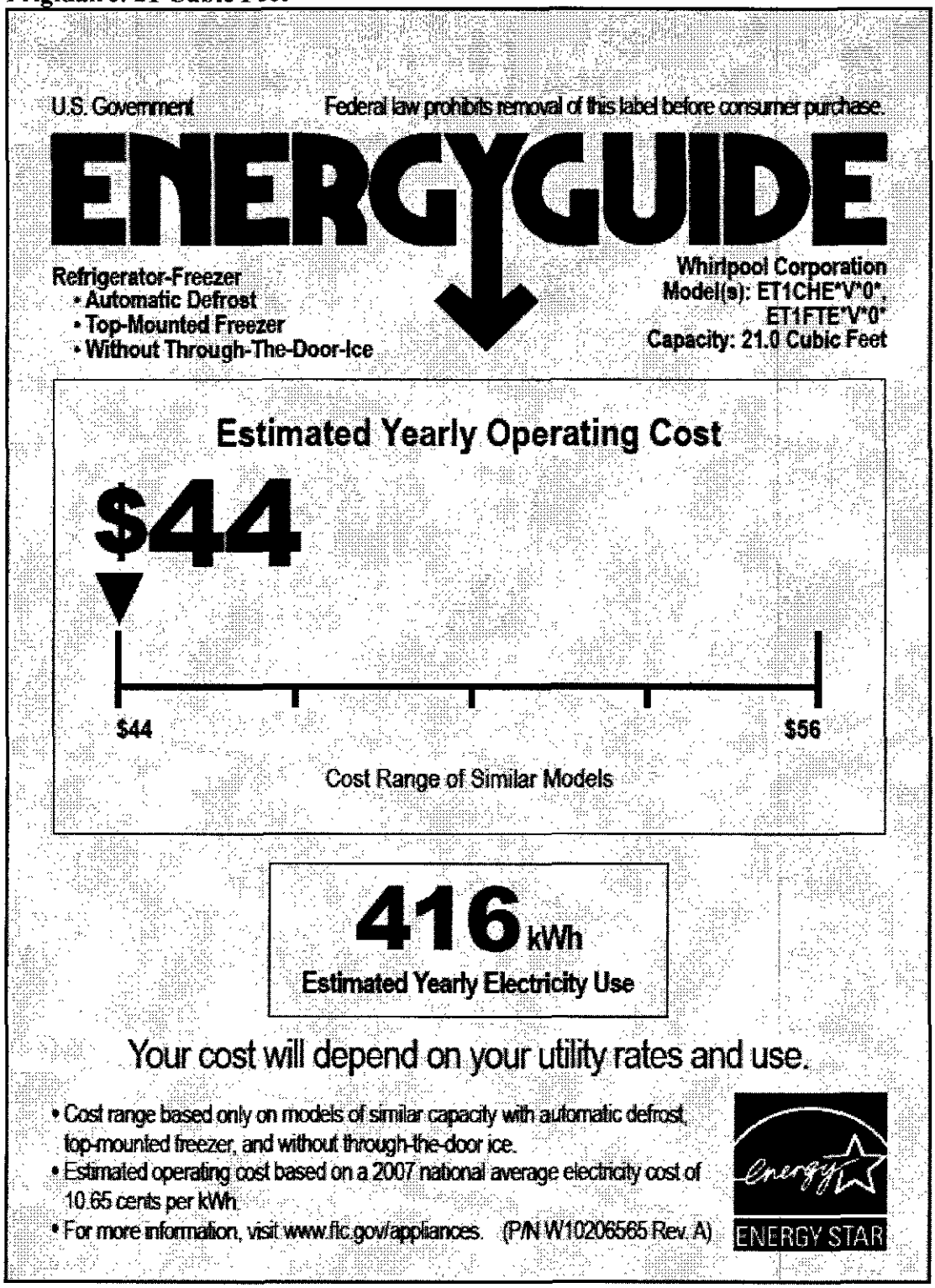
Whirlpool: 15 Cubic Feet



Frigidaire: 18 Cubic Feet



Frigidaire: 21 Cubic Feet



Appendix C: DSMore Table

Impacts ⇨ / Technology ⇩	Product code	State	EM&V gross savings (kWh/unit)	EM&V gross kW (customer peak/unit)	EM&V gross kW (coincident peak/unit)	Unit of measure	Combined spillover less freeridership adjustment	EM&V net savings (kWh/unit)	EM&V net kW (customer peak/unit)	EM&V net kW (coincident peak/unit)	EM&V load shape (yes/no)	EUL (whole number)
Refrigerator Replacement		OH	1,182	0.182	0.182	Refrigerator	0.00%	1,182	0.182	0.182	no	8
Program wide			1,182	0.182	0.182			1,182	0.182	0.182		

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Memorandum

To: Ashlie Ossege, Duke Energy
From: Michael Ozog, Integral Analytics
Date: December 8, 2011
Subject: HECR in Ohio – impacts by report type and frequency

This memo presents the impacts of the HECR program in Ohio broken down by report type (line versus bar) and frequency of the report (monthly versus quarterly). The data that was used to generate these estimates corresponds to the data that was used to estimate the overall HECR impacts in Ohio, as reported in TecMarket Works report of the evaluation of this program, dated September 9, 2011.

Table 1 presents the impacts of the report type (line versus bar graphs), without distinction for the frequency of the reports.

Table 1: HECR Ohio impacts by report type

Type	Savings		t-value
	kWh/day	% of use	
Line	0.50	1.18%	4.37
Bar	0.24	0.57%	2.08

Table 2 presents the impacts of HECR in Ohio broken out by both report type and frequency.

Table 2: HECR Ohio impacts by report type and frequency

Freq	Type	Savings		t-value
		kWh/day	% of use	
Monthly	Line	0.60	1.42%	3.92
	Bar	0.30	0.70%	1.89
Quarterly	Line	0.40	0.91%	2.52
	Bar	0.19	0.44%	1.18

These results show:

- The reports using the bar graphs resulted in a far lower level of savings relative to reports using the line graphs (approximately half as much). This is probably due to the potentially confusing nature of the "ranking" in those reports, where high scores indicated the customer was relatively less efficient than comparable households.
- Monthly reports produced a higher level of savings relative to quarterly reports, irrespective of the type of report.

Note however that while some of the differences are rather large, none of the differences presented in these tables are statistically significant.

Process and Energy Impact Evaluation of the Home Energy Comparison Report Program in Ohio

Final Report

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

September 9, 2011

Submitted by

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TECMARKET Works

TABLE OF CONTENTS

Executive Summary

Key Findings and Recommendations

The key findings and recommendations identified through this evaluation are presented below.

Key Findings: Customer Survey

- There were 332 customers successfully contacted for the survey. Of these, 258 (77.7%) recalled receiving the HECR report.
  - See section titled "Introduction" on page 20.

- 95.7% of the customers who recall the HECR are reading the report. If the full number of contacted customers (including those who do not recall the report) are included in this calculation (n=332, as noted above), and we assume that those who do not recall the report throw it away without reading it, this brings the percent of contacted customers reading the HECR to 74.4%.
  - See section titled "Customers Who Read the HECR and Why" on page 20.

- Before being asked about what messages or tips customers recalled from the HECR, most surveyed customers that read the report defined energy efficiency in simple terms (n=225, or 88.9%), saying "using less energy" or "using the least amount of energy necessary", while some provided specific examples of what should be done to be energy efficient, such as "insulating doors and windows" and "keeping my house sealed" (n=28, or 11.1%).
  - See section titled "Customer Opinions and Actions Regarding Energy Efficiency" on page 22.

- On average, surveyed HECR customers scored their interest in energy efficiency at a higher score than their interest in reading the HECR. This finding is statistically significant with 95% confidence.
  - See section titled "Interest in the Energy Efficiency and the HECR" on page 24.

- *About 85% of the customers overall are happy with how frequently they receive the* HECR, although those that receive the HECR on a monthly basis indicate a higher level of interest in reading the next HECR, which may indicate that those reading the HECR monthly are more engaged with the HECR and therefore more interested in the HECR overall.
  - See section titled "Frequency of the HECR" on page 25.

- HECR customers are more satisfied with the Line Graph version than they are with the Bar Graph version of the HECR.
  - See section titled "Satisfaction with HECR" on page 34.

Recommendations

- If the HECR is deployed as a fully-commercialized program, continue to refine the presentation of the comparison data through monitoring customer responses and

leveraging customer satisfaction surveys. However, this information should also be considered in light of energy savings. A more satisfied customer who saves less energy may not be a program objective. Moreover, Duke Energy should keep in mind that more information is not necessarily better, and that if the desired understanding of social norms of energy use can be achieved with one calculated number, that may be enough. If Duke Energy determines that two calculations must be conveyed to the customer to inform them of the social norm, those two calculations must not be in conflict with one another.
    - See section titled "HECR Report" on page 15.

- Duke Energy should continually refine their selection of tips and facts to be conveyed in the HECR report. While tips directly aimed at energy savings are necessary to supplement the social norm messaging and provide actionable support to customers desiring to reduce usage, it may be useful to include other relevant and interesting facts so that customers continue to be engaged and interested. Likewise, while messaging to cross-sell other Duke Energy programs is necessary to achieve the second of HECR's stated objectives, Duke Energy may need to take care not to oversell the programs, or push programs to customers who are not suitable participants. In order to determine whether customers are indeed interested and engaged versus oversaturated and "numbed" by repetitive information, Duke Energy should conduct periodic customer satisfaction surveys about these and other issues or use tip productivity analysis to determine diminishing returns.
    - See section titled "Other Report Content" on page 16.

- If cross-selling remains an objective of the HECR product at scale, then Duke Energy should formally establish a process to assess the effectiveness of HECR as a lead generation mechanism.
    - See section titled "Results" on page 18.

- Add CFL coupons to the HECR mailing if it can be shown that the participants can use additional CFLs that they are not likely to purchase on their own.
    - See section titled "Conclusions and Recommendations for Program Changes" on page 40.

- The impact evaluation discovered that as a customer's average usage increases, the level of savings from HECR also increases (see the table on the next page). Therefore, the program should target high usage customers to achieve the highest energy savings per participant using advanced segmentation analysis methods.
    - See Table 1 on page 5.

Impact Summary Tables

The energy impacts associated with the program were determined by a billing analysis using both customers that received the HECR report (the treatment group) as well as a group of customers who did not (the control group). The billing analysis relies upon a statistical analysis of actual customer-billed electricity consumption before and after the HECR treatment period. The billing analysis used consumption data from all HECR treatment customers in Ohio (11,112

customers)[1]. A panel model specification was used that incorporated the monthly billed energy use across time and customers. The model included standard statistical procedures to control for the effect of weather on usage, as well as a complete set of monthly indicator variables to capture the effects of non-measureable factors that vary over time (such as economic conditions and season loads).

In developing the data used in the model, we also eliminated those customers who participated in the Duke Energy CFL program after the initial HECR contact. This was done to eliminate the possibility of double counting savings. We focused on the CFL program since that was the program that experienced the highest amount of cross participation. However, we did investigate the effect of eliminating those customers who enrolled in other programs, but that had no effect at all on the estimated impacts for HECR, so we chose to retain those customers in the model. Note that one of the criteria for including a customer in the HECR program was that they had not participated in any Duke Energy energy efficiency program in the past. While this was important to do to insure that the impacts from HECR would not be influenced by the effects of other energy efficiency programs, it does leave open the possibility that these customers in the HECR program may have a lower propensity for adopting energy efficiency programs than the general Duke Energy customer population.

Table 1 presents the billing data analysis estimate of the impact of the HECR program. It was observed that the impacts vary significantly depending upon the average usage of the customer, so in addition to estimating the overall impact of HECR, we developed estimates based upon the average usage of the customer.

Table 1. Usage Level and Annual Savings Summary

Usage Level	Annual kWh Per Participant Savings	T-Value
Overall[2]	175 kWh	4.23
daily use <20 kWh	94 kWh	3.14
daily use >=20 but <30 kWh	37 kWh	1.00
daily use >=30 but <40 kWh	54 kWh	0.93
daily use >=40 but <50 kWh	47 kWh	0.52
daily use >=50 but <60 kWh	387 kWh	3.13
daily use >=60 but <70 kWh	246 kWh	1.65
daily use >=70 but <80 kWh	302 kWh	1.54
daily use >=80 but <90 kWh	348 kWh	1.23
daily use >=90 kWh	839 kWh	2.05

These results show that overall, the HECR program results in statistically significant savings of 175 kWh/year per customer. In addition, when looking at this by the average (pre-program)

[1] The design of the program as well as the results in the 6-month evaluation indicate that the on-off letter treatment will likely have no effects lasting a year after the letter was received, so that aspect of HECR® was not addressed in the impact evaluation.

[2] The overall savings was determined by estimating the model over all customers, irrespective of their usage group. Therefore, it captures the proportion of customers in each group, the savings of that group, and also the variability of savings in each group. Therefore, it need not equal the population weighted average savings by usage group.

usage of the customer, there are a few customer groups that do not show any statistically significant change in usage, while there are other groups, at both the highest usage and lowest usage range, that show significant savings.

Introduction and Purpose of Study

Summary Overview

This document presents the evaluation report for Duke Energy's Home Energy Comparison Report (HECR) Program as it was administered in Ohio. This evaluation did not have a detailed evaluation plan.

Summary of the Evaluation

This document presents the evaluation report for Duke Energy's HECR Program as it was administered in Ohio. The evaluation was conducted by TecMarket Works with assistance from Integral Analytics and Yinsight. The survey instruments were developed by TecMarket Works. The survey was administered by TecMarket Works. The impact analysis was conducted by Integral Analytics. Yinsight (a TecMarket Works subcontractor) conducted the in-depth interviews with program management.

Evaluation Objectives

The purpose of this evaluation is to provide feedback that can help the program provider consider changes to the program that can help achieve improvement in cost effective operations, help understand program impacts and obtain an understanding of customer related conditions and satisfaction.

Researchable Issues

In addition to the objectives noted above, there were a number of researchable issues for this evaluation. These include:

1. To solicit feedback from program participants about their experience with the HECR mailings, such as their recollection of the messages and tips, their home energy scores, and their satisfaction with the reports.
2. To gain an understanding of customer demographic categories responding positively to the HECR program.
3. To determine which report (bar or line graph formats) performs best, and at which frequency (monthly or quarterly).

Description of Pilot Program

The Home Energy Comparison Report Program is a pilot being rolled out in each of Duke Energy's jurisdictions; however this report focuses on early insights from the Ohio pilot program.

The purpose of the pilot is to determine whether receiving comparative usage data for similar residences in the same geographic area motivates customers to better manage and reduce energy usage. The pilot is structured to target a sample of customers residing in individually-metered, owner-occupied, single-family residences served on Duke Energy Ohio's residential rate schedules. The initial pilot also excluded any customers who had previously participated in a Duke Energy energy efficiency program, in an effort to obtain pure "behavioral" impacts[3]. Duke Energy, through proprietary techniques, compiles energy usage and publicly available information (location, size, home age, occupancy) on nearby similar homes to develop the comparisons. Reports are mailed to the residence in one of two formats, either monthly or quarterly. The reports contain personalized tips and messages[4] based on customers' energy usage patterns, information about their homes, as well as follow up opportunities such as an offer to participate in Duke Energy's audit programs. In addition to the sample receiving monthly or quarterly reports, a simple single notification letter was sent to a separate set of customers (n=1000) informing them that their usage would be used in a research study. The letter's purpose was to test what, if any, impact was generated from the knowledge that a household's usage was being "tracked" by Duke Energy.

Pilot Program Participation

The initial treatment group consisted of 10,000 customers in 2010. This group was divided into two groups. One group received quarterly feedback reports and the second received monthly reports. Each of those groups were in turn further divided into one of two types of reports, with one report showing usage data in line formats while the other group received their information in a score and bar chart format. Examples of these HECR formats are presented in Appendix D: Sample HECR Mailing: Bar Graph and Appendix E: Sample HECR Mailing: Line Graph.

The groups and the group populations used in this analysis are presented below in Table 2. In March 2011, a total of 10,114 customers were included in the impact analysis. This number reflects a small drop from the original treatment groups (11,112) owing to customers that were in the process of switching electric generation suppliers, inaccurate addresses or other "qualification errors" such as missing usage or ineligibility, e.g. not single family, owner occupied, *without prior participation in a significant energy program with Duke Energy*. Only 35 customers out of 11,112 actively opted out of the program as of May 12, 2011. In Jan. 2011, there are 1,000 customers who were randomly selected from control group added to the treatment group. The total number of 11,112 includes this new added group.

Table 2. HECR Treatment Group, 2010

	Bar Chart & Score	Line Chart	New Added	Notification Letter

[3] Duke Energy's EE Participation database is first in class regarding the tracking of customer participation at an individual level, allowing for a holistic view of customer participation. This data was then used in the impact analysis to further insure no "double counting" of impacts.
[4] See section "Tips and Messages" for a presentation of the differences between tips and messages.

Monthly	2,273	2,236	1,013	
Quarterly	2,320	2,272		
One Off Letter				1,000

As an additional controlling factor to support the study's cause and effect assessment, an additional group of 1,000 homeowners that had not received a report were also sent a letter indicating that their usage was going to be "tracked" as part of a study that the Company was conducting on residential energy use. The purpose of the letter was to develop insights into how much of the energy impacts observed are a result of the program's reports and information rather than from the knowledge that consumption is being observed. The previous 6-month evaluation of this program by Integral Analytics found that these customers had considerable savings on the month they received the letter, but after 6 months, there was no net change in their energy use due to the program. Therefore, the impact evaluation did not investigate the 12-month savings for these customers, as there is little reason to expect there to be any long-term energy savings effects.

Methodology

Overview of the Evaluation Approach

This evaluation was performed without an evaluation plan. This evaluation has three components: management interviews, participant surveys, and an impact analysis.

Study Methodology: Process

The process evaluation has two components: management interviews and participant surveys. In-depth interviews were conducting with program management, and the participant surveys were conducted with 258 customers in Ohio.

TecMarket Works developed a customer survey for the HECR Program treatment group customers, which was implemented from December 2010 through February 2011.

The complete survey was conducted with a random sample of 258 HECR customers. When the customer was successfully contacted, the surveyor asked that customer if they were familiar with the HECR mailings. If not, the surveyor provided a short description of the HECR mailings they have been receiving: *"This program provided information on how much electricity you used in the previous month*[5] *and in the previous 12 months compared to your neighbors and provided tips on how you could lower your electricity use and costs in becoming more energy efficient."* If the customer still did not recall the HECR, they were thanked for their time and the call was terminated. If they did recall the HECR, the survey continued regardless of whether they read the HECR. There were 258 customers out of 332 contacted that recalled receiving the HECR (77.7%).

HECR customers were surveyed by TecMarket Works. The survey can be found in Appendix C: HECR Customer Survey Instrument.

Study Methodology: Impact

The analytical method employed to evaluate the impacts relied upon a panel data approach where data are available both across households (i.e., cross-sectional) and over time (i.e., time-series). With this type of 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 that allows different variables across homes that do not vary over the estimation period (such as square footage, heating system, etc.) to 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).

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,

[5] Or quarter, depending on how frequently the contacted customer was receiving the HECR.

such as building size and structure, are captured by unique constant terms representing each unique household.

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

$$y_{it} = \alpha_i + \beta x_{it} + \beta^* treat_{it} + \beta' T + \varepsilon_{it} \quad (1)$$

where:

y_{it}	=	the electricity use for home i during month t (normalized by the number of days in that month)
α_i	=	constant term for site i
β, β'	=	vectors of coefficients
x_{it}	=	vector of variables that represent factors causing changes in energy consumption for home i during month t (i.e., weather)
T	=	A vector of monthly indicators for all months in the model. This is included to capture trends in electricity use over time across all customers that cannot be captured by weather terms or post-treatment variables. These terms lessen the possibility of biased impact estimates from the influence of omitted variables.
β^*	=	the coefficient indicating the effect of the program
$treat_{it}$	=	a variable indicating that home i received treatment during month t
ε_{it}	=	error term for home i during month t.

The weather terms included in the model are the heating and cooling degree days for that month, tied to the customer location, and to capture the overall trend in electricity usage, monthly indicator variables were used for each month in the analysis (i.e., time effects).

Data collection methods, sample sizes, and sampling methodology

Process

The complete survey was conducted with a random sample of 258 HECR customers. The survey protocol can be found in Appendix C: HECR Customer Survey Instrument. We attempted to contact program participants by telephone no more than five times at different times of the day and different days before dropping them from the randomly sampled contact list. Call times were from 10:00 a.m. to 8:00 p.m. EST Monday through Saturday.

Impact

The impact evaluation used monthly billing data for all HECR treatment customers, both the original group of 10,000 customers that first received the report in February, as well as an additional 1,000 customers that were added later in the year. The control group consisted of over 20,000 customers, all of which were eligible for the program, but were not assigned to the treatment group.

Number of completes and sample disposition for each data collection effort

The complete survey was conducted with a random sample of 258 HECR customers. TecMarket Works set a target of 63-65 completed surveys in each of four groups to reach a total of approximately 250 completed surveys. The four groups are:

1. Customers receiving Bar Chart HECR on a monthly basis.
2. Customers receiving Bar Chart HECR on a quarterly basis.
3. Customers receiving Line Graph HECR on a monthly basis.
4. Customers receiving Line Graph HECR on a quarterly basis.

Table 3. Number of Completed Surveys by Customer Group

HECR Type	Monthly HECR Targets	Quarterly HECR Targets	Monthly HECR Completed	Quarterly HECR Completed
Bar	63-65	63-65	65	63
Line	63-65	63-65	65	65

Expected and achieved precision

Both the expected and achieved precision is 90% ± 10%.

Description of baseline assumptions, methods and data sources

Not applicable.

Description of measures and selection of methods by measure(s) or market(s)

This pilot program does not include any energy efficient measures. The HECR program consists of regular mailings to a targeted list of customers as described above. Methods of information delivery (bar or line graphs) and frequency of delivery (monthly or quarterly) varied.

Use of TRM values and explanation if TRM values not used

TRM values were not used for this evaluation.

Threats to validity, sources of bias and how those were addressed

Since all the customers that received the HECR treatment start the program at the same month and receive a report each month, there is no variation in the treatment period across the treatment customers. Thus, it is impossible to differentiate the effect of the treatment from non-program effects during the same period. Therefore, the evaluation of HECR required the development of a non-treatment (i.e., control group) to disentangle the program impacts from other macroeconomic impacts. The control group consisted of customers randomly sampled from HECR eligible customers that were not given the report.

While including a non-participating control group in a statistical analysis of an energy efficiency program generally introduces self-selection bias, this was not the case for this study of the HECR. Since customers were randomly assigned into the treatment or control group, there was no decision by the customer to be part of either group. Therefore, there is no self-selection, and no possibility for bias from self-selection.

In order to control for month-to-month non-program impacts, the statistical model included both weather and indicator terms for each month in the model. The indicator terms capture the non-weather related factors that influence a customer's electricity independent of whether or not the customer was part of HECR. Thus, the model controls for such effects as the general economic condition.

Finally, since individuals are randomly assigned to the treatment group, there is no issue of free ridership. This random assignment, plus the large number of customers in the treatment group and the fact that not all HECR customers went on to participate in other Duke Energy programs during the treatment period, implies that there is no need to include in the model variables that capture participation in other energy efficiency programs.

Evaluation Findings

Process Evaluation

Interviewees

For the process evaluation, in-depth interviews were conducted with three Duke Energy program managers, a Duke Energy database administrator, and one market analyst consultant.

Program Description

The Home Energy Comparison Report (HECR) is a pilot designed to achieve two objectives. First, provide customers with information that will produce behavioral changes to reduce residential energy. Second, cross sell Duke Energy's other energy efficiency programs. A Duke Energy program manager reports that their overall goal is to become an energy partner with the customer, rather than just a utility to whom the customer writes a check every month.

The HECR pilots were designed to run for a full year, with the OH HECR pilot starting in February of 2010 with 10,000. Half of these customers receive the HECR report on a monthly basis, the other half receive it on a quarterly basis.

At the time of the interviews, Duke Energy was in the middle of determining the basis for development of HECR as a full program. The program manager reports that the HECR team is working on a business case for a full HECR program, with the decision to be made in the spring of 2011.

Program Design and Theory

A Duke Energy program manager reports that during the design phase, the HECR team referenced many different programs, the primary one being the existing Personalized Energy Report® program (PER®). PER® had already been providing customers with comparison information, but only for the "average" Duke Energy residential customer, not for "similar" homes. The key differentiator for HECR is the addition of data comparing the customer's energy usage to those of similar homes in their area. This comparison allows customers to see whether their usage is higher or lower than a comparable home. Customers are also presented with usage data from the most efficient similar homes as another point of comparison. The HECR team also referenced "neighborhood" comparison report programs offered by third party vendors, but decided to implement the HECR pilot in-house so that they could rapidly make tactical changes as they were developing the pilot.

The program's theory for successful energy reduction rests upon the concept of "social norms". A large body of research in the social sciences has shown that people tend to conform to the social norms around them, even if they may overtly deny any influence. A number of companies recently have leveraged this effect and found that customers can reduce energy use anywhere between 1.5 to 2.5% when they can compare their energy usage to the social norm of similar homes. However, due to the relative infancy of this methodology, there is very little longitudinal data about the persistence of these energy savings. Also, as more and more utilities implement comparison report programs, they are beginning to find that customers respond differently to these reports. One provocative analysis of a utility comparative energy report program by a

UCLA economist suggested that if the comparison report presented saving energy as an objective that would help the environment, those customers who identified themselves as politically conservative actually increased their energy use[6]. The HECR team is aware that customers must be carefully targeted to identify those who would respond favorably to the comparison report, and is refining this targeting in their commercial launch plans.

HECR Report

The HECR report was a one page report containing energy saving tips and charts comparing the customer's energy use with others. This framework defines which homes are considered "similar", what home is considered "average", how to quantify concepts such as "average usage of a similar home" and the "average usage of an efficient home."

"Similar homes" were defined to consist of at least 100 homes that are similar in four main characteristics: their heat source, square footage, age of home, and number of occupants. In more densely populated areas where houses are very similar to one another, there may be 1000 similar homes. Geography is also factored in. Customers in rural outlying areas are compared to homes with similar latitude and longitude. "Average" was defined as the statistical median. "Efficient" homes were originally identified as those homes in the top 10% of efficiency. Customers began calling to give the HECR team feedback on how unrealistic the 10% standard was. HECR heeded the feedback and changed the definition so that homes in the top 25% were considered efficient.

Charts. The results of the comparison analyses were displayed in two ways. In the "line chart" method, a customer's last 13 months of kWh energy usage is displayed in a line chart, along with the usage of the "average" and "efficient" similar homes. In the "score" version, customers are shown their level of efficiency as a number between 0 and 100. This score, based upon the customer's last 24 months of usage, is compared to their previous month's score or to their score last year. Their score may also be compared to a "realistic" score, which Duke Energy calculates based upon the known physical characteristics of their house. Scores are not given for the "average" or "efficient" homes. In both versions, the customers' kWh energy usage is translated into dollar costs, as well as the usage of the "average" and "efficient" home. These dollar costs are presented as bar charts.

The HECR team tested different scoring approaches in the beginning months of the program. TecMarket Works believes it is important to leverage information and early feedback findings from Duke Energy's other jurisdictions to improve Ohio's HECR model. In one of Duke Energy's other jurisdictions in which HECR was pilotted, South Carolina, the score was based upon usage for the most current single month, and can be treated as a snapshot of energy use. In Ohio, a "long term" score was based upon a model of energy use that incorporated data over 24 months. In Ohio, this long term score for the customer's home was presented along with the customer's energy costs for the past month (i.e. costs based upon the snapshot). Customers were confused because the long term score may indicate that the customer was not doing well,

[6] Costa, D. L., and Kahn, M. E. (2010). Energy conservation "nudges" and environmentalist ideology: Evidence from a randomized residential electricity field experiment. NBER Working Paper No. 15939. Available at . Vox EU, policy portal set up by the Centre for Economic Policy Research. Available at http://www.nber.org/papers/w15939. See also http://www.voxeu.org/index.php?q=node/5064

whereas the energy cost calculations may indicate that customer was doing very well. The long term score could not show the effects of actions taken in recently. As one HECR staff member reports, "Because the score was based on the last 24 months of usage, [the HECRstaff] didn't feel like there was enough ability to move the meter." Using this as a lesson learned from the Ohio HECR®, the HECR team used the subsequent roll-out of the South Carolina HECR as a test for a "snapshot" monthly score.

There was another difference between the OH HECR and the South Carolina HECR. In OH, a higher score means worse performance because the HECR team originally wanted the score to move with the usage: if the customer's usage dropped, their score should drop as well. However, customers were confused, and Duke Energy received a few calls from customers asking "what does 95 mean?" When the pilot began a few months later in South Carolina, the HECR team switched the directionality of the scores so that higher scores meant better performance. The marketing staff report that the South Carolina customers found the score easier to understand. However, informal customer feedback suggests that the line chart was still superior to either version of the scores.

Arguably, the critical issue is not about the calculations themselves. "It's not about which is more accurate", cited one marketing staffer, "It's about how customers react to each of them." At the time of these interviews, Duke Energy has yet to decide whether they want to use both the score and the line chart in a fully-commercialized HECR[7].

> RECOMMENDATION: If the HECR is deployed as a fully-commercialized program, continue to refine the presentation of the comparison data through monitoring customer responses and leveraging customer satisfaction surveys. Determine through these and other low-cost methods how usage data can be presented most clearly to customers. Duke Energy should keep in mind that more information is not necessarily better, and that if the desired understanding of social norms of energy use can be achieved with one calculated number, that may be enough. If Duke Energy determines that two calculations must be conveyed to the customer to inform them of the social norm, those two calculations must not be in conflict with one another.

Other Report Content

The HECR also provides tips on saving energy. In OH, these tips are drawn from a database and customized to each household. For example, if the customer had recently received a rebate for an HVAC replacement, that customer would not get a heating tip. The program manager reports that she cannot control which tips are assigned, other than to filter the tips based upon seasonality.

The marketing analyst consultant who developed the analytical framework explains that Duke Energy has made a distinction between behavior and structural efficiency. Buying a new heater and replacing a window affect structural efficiency, even though "buying" and "replacing" can be viewed as behaviors. The HECR attempts to achieve its energy savings goals through conservation behavior.

[7] After these interviews were completed, Duke Energy's HECR team made the determination that any new commercialized HECRprogram would only use the line chart.

One HECR staff member reports that they tested the report with a focus group. Another staff member reports that the tips seemed a little "sales-y" and were not all aimed at getting customers to save energy.

> RECOMMENDATION: Duke Energy should continually refine their selection of tips and facts to be conveyed in the HECR report. While tips directly aimed at energy savings are necessary to supplement social norm messaging, it may be useful to include other relevant and interesting facts so that customers continue to be engaged and interested. Likewise, while messaging to cross-sell other Duke Energy programs is necessary to achieve the second of HECR's stated objectives, Duke Energy may need to take care not to oversell the programs, or push programs to customers who are not suitable participants. In order to determine whether customers are indeed interested and engaged versus oversaturated and numbed, Duke Energy should conduct periodic customer satisfaction surveys about these and other issues.

Explaining Comparisons

Included in each report is a sidebar that explains to the customer who they are being compared against. Under the heading "Whose electricity usage is being compared to mine?" are statistics about the "similar" homes' characteristics including geographic area, type of housing (e.g. single family), type of heat (electric or non-electric), square footage of the homes, and the age ranges of the homes, and the number of homes.

Customer Feedback

HECR staff has attempted to verify home information in the Report by sending a business reply card with one report. A few customers said they had done all they could to improve energy efficiency and didn't want to continue receiving report. A few customers called to say their home characteristics (such as square footage) were incorrect. Customer willingness to share information to get more precise reports may be an opportunity for additional engagement as the program moves forward.

A Duke Energy program manager reports that the HECR team also conducted a round of focus groups a few months after the Ohio HECR was deployed, and they got feedback that was positive: "Folks liked being able to know where they stand."

Report delivery

In order to test whether frequency of messaging affected customer behavior change, half the customers received a monthly report, while the other half received a quarterly report.

Reports are sent out to customers on an opt-out basis. HECR staff report that at the time of the interviews, there have been only 15 customers who called Duke Energy to opt out. However, other customers have been removed from the analysis because they moved.

Duke Energy's quality assurance procedures included tracking "seeds" that were sent out with every mailing, to ensure that the mail drops were made on the expected dates. Duke Energy also sent out the business reply card to see if customers had any corrections to their records.

Improvements to be considered

The marketing analyst reports that the HECR team has had some difficulty getting data in a timely manner. Because customers need to be provided with their past month's energy usage, there is only a small time window in which the data must be processed and analyzed. The HECR team's data needs were constantly changing. "Because this was a pilot, everything changed each month." The marketing analyst reports that it is unclear at this point whether the necessarily flexibility could be built into Duke Energy's IT system, and it is unclear whether HECR's data needs can be settled so that flexibility would not be needed in the future. The interim solution was for Duke Energy to build a separate database as a "playground", using a separate server.

The Duke Energy program manager reports that they are considering whether HECR might be delivered online or via digital devices, to reduce program costs associated with mailing the reports.

Results

At the time of these interviews in late 2010, the program staff had not yet begun analyzing the impact of the program. The program was designed to support rigorous analysis of savings impact. Analysis of the success of HECR's cross-selling aspects is planned for the future, after enough time has occurred to allow a statistical analysis of cross-program participation between participants and non-participants. The new Duke Energy program manager reports that for a commercial launch, cross-selling effects will be analyzed at a high level. This means they are not intending to map individual participants from HECR to other programs on a one-to-one basis. Instead, they plan to look at overall increase in cross program participation for HECR participants as a group, compared to non-participants.

HECR experimental design for impact analysis. The HECR pilot controlled for extraneous factors by assigning another population of customers to act as a control to the test group of report recipients. Due to random sampling techniques, these control group customers can safely be assumed to be similar to the test group customers in every way, except they do not receive the HECR report. By using a randomly selected test and control group, any energy use difference between the two groups may be attributed to the HECR report's influence.

The marketing analyst reports that to determine the test and control groups, the pool of all eligible customers was first divided into approximately 1000 smaller groups of about 80-100 customers each. Then, 1/3 of these groups were randomly assigned to receive the report, with the remaining 2/3 of the groups acting as controls.

Cross selling. Interviewees mentioned two programs that HECR had promoted. The Energy Solutions @ Home program is a home audit targeted at making improvements to a building's envelope. HECR promoted the Energy Solutions @ Home program by encouraging people to go to the Energy Solutions® program, but have not yet heard whether their promotions have generated any inquiries. Likewise, a Duke Energy program manager reports that they used HECR to push PER®, but (as noted earlier) they had not evaluated the success of those efforts yet.

HECR Recipients. Internal and external Duke Energy research indicates there are segments that can be identified regarding those recipients that respond well to HECR, both to the reports and in energy savings returns. One segment in particular has provided approximately 40% of the savings attributable to the HECR program. These customers tend to have a higher electric plug load. Convenience is not a motivational factor to this group and they are willing to make both structural or high involvement improvements as well as low involvement or behavioral improvements. They fall into the above average consumption category, consuming about twice the annual energy of an average users.

Future of HECR Pilot

One Duke Energy program manager reports that Duke Energy is developing a strategy to coordinate their several residential home energy report offerings. In this strategy, HECR would constitute a Level 1 program with basic information pulled from databases. PER® would constitute a Level 2 program, with database information supplemented by information that is gathered directly from the customers.

The Ohio HECR had received regulatory approval for funding as a full program, with deployment to approximately 200,000 customers. However, the new HECR program manager reports that HECR will need to await analysis of final impact results and undergo a stage-gate review by senior management prior to final approval. In view of the generally small levels of savings from these types of programs (1-4%), and because savings are often dependant on segmentation and targeting strategies, this delay reflects sound judgment on the part of Duke Energy. The use of indiscriminate targeting approaches can result in increased energy consumption rather than decreased consumption. Pending approvals, Duke Energy hopes to launch HECR in Ohio in June or July 2011, under a new program name. The actual launch size in Ohio will be determined after the HECR staff makes refinements to their customer targeting, to identify those customers who would be most likely to respond positively to the comparison report.

Results From HECR Customer Surveys

Introduction

TecMarket Works conducted telephone surveys with 258 randomly selected program participants in the state of Ohio from mid-December 2010 through early February 2011. This section presents the results from the surveys. The survey instrument can be found in Appendix C: HECR Customer Survey Instrument.

When the customer was successfully contacted, the surveyor asked that customer if they were familiar with the HECR mailings. If not, the surveyor provided a short description of the HECR mailings they have been receiving: *"This program provided information on how much electricity you used in the previous month [8] and in the previous 12 months compared to your neighbors and provided tips on how you could lower your electricity use and costs in becoming more energy efficient."* If the customer still did not recall the HECR, they were thanked for their time and the call was terminated (n=74, or 22.3% did not recall the program reports). If they did recall the HECR, the survey continued regardless of whether they read the HECR. There were 258 customers out of 332 contacted that recalled receiving the HECR (77.7%).

The results from the full 257 completed Ohio surveys are presented below, with the results of one partial survey included as applicable[9]. Also, there are a number of questions that were only asked if the survey respondent was able to recall any of the tips or messages, or if they read the HECR mailing. Therefore, the number of respondents answering a question varies, and are presented as appropriate to the context throughout this section. The responses below are segregated into two groups: those that received bar chart comparison reports and those that received line graph reports.

Table 4. Number of Completed Surveys by Customer Group

HECR Type	Monthly HECR Targets	Quarterly HECR Targets	Monthly HECR Completed	Quarterly HECR Completed
Bar	63-65	63-65	65	63
Line	63-65	63-65	65	65

Customers Who Read the HECR and Why

Almost all of the surveyed customers report that they read the HECR when they receive it. Over all HECR types[10], 95.7% of the customers responding to the survey and who remember the reports are reading them. If the full number of contacted customers are included in this calculation (n=332, as noted above), and we assume that they throw the HECR away, this brings the percent of customers reading the HECR down to 74.4% of the targeted customers. Table 5 below shows the percent of surveyed customers that read the HECR when they receive it, by type and frequency of their reports. The group of HECR read the least is the Monthly Line HECR. The other three groups of HECR are read by over 95% of the HECR customers.

[8] Or quarter, depending on how frequently the contacted customer was receiving the HECR.
[9] One contact was not able to complete the full survey, but the responses from that partial survey are still presented when a response to the question was provided.
[10] Monthly Bar, Monthly Line, Quarterly Bar, Quarterly Line

Table 5. Customers That Read the HECR

HECR Type	Monthly HECR Count	Monthly HECR Percent	Quarterly HECR Count	Quarterly HECR Percent
Bar	65	100.0%	61	97.8%
Line	58	89.2%	63	96.9%

We asked surveyed customers who read the HECR why they read it. Half of them say they are interested in learning more about how to save energy, and many say they read it to see the comparison made to other's energy usage, or to see how their own energy use changes over time. A list of the responses is below with the number and percentage[11] of customers providing each of the responses.

- "I am interested in learning more about how to save energy." (N=124, 50.2%)
- "To see the comparison with other's energy usage." (N=91, 36.8%)
- "To see the comparison with other's energy usage, and how my energy use changes over time." (N=29, 11.7%)
- "To avoid increases in power costs or lower rates." (N=29, 11.7%)
- "I read it because it is from Duke Energy." (N=23, 9.3%)
- "To see my energy use over time." (N=11, 4.5%)
- "I want to lower my energy bills." (N=9, 3.6%)
- "To understand why my bills are so high." (N=5, 2.0%)
- "I am interested in learning more about climate change or environmental issues." (N=3, 1.2%)
- "I have made improvements and want to see the results." (N=3, 1.2%)
- "I have been trying to save energy and want to see the results." (N=2, 0.8%)
- "Because our house is more efficient than the 'Most efficient'." (N=1, 0.4%)
- "To help understand why I get offers to switch utility providers from Duke Energy competitors." (N=1, 0.4%)
- "To understand my energy bills." (N=1, 0.4%)

The eleven surveyed customers that reported they throw the HECR away provided the following reasons for not reading the HECR:

- "I'm too busy/don't have time." (N=5, 45.5%)
- "Too low a priority for me." (N=3, 27.3%)
- "I can't afford any home improvements right now." (N=1, 9.1%)
- "I do not see the point; I already save energy in all recommended ways." (N=1, 9.1%)
- "The reports do not provide me with any new information." (N=1, 9.1%)
- "The size of my home is wrong on the report." (N=1, 9.1%)
- "When I call the 800 # there is no answer." (N=1, 9.1%)

Of the eleven customers that throw out the HECR, seven of them (63%) say that they did read them at one time, but have stopped reading them because of the reasons listed above.

[11] Percentages do not add up to 100% due to rounding.

Customer Opinions and Actions Regarding Energy Efficiency

We asked surveyed HECR customers if they thought that their efforts to decrease their energy consumption were about the same, more, or less than what others typically do to save energy. The question was worded as *"When you consider the efforts you and your household make to decrease your energy consumption at your home, do you feel that on average your efforts are less than what others typically do, about the same as what others typically do, or more than what others typically do?"*. The results are presented in Table 6. For those customers that throw out the HECR, the highest percentage (54.5%) believes that they do about the same as others. Of customers that read the HECR, the highest percentage (48.2%) believes that they do more than others do to be more energy efficient. Fewer than 10% of either group believes that they do less than others. This suggests that most customers still believe they are doing the same or more than others with regard to efficiency and few believe they are doing less. Also customers that believe they are doing more, are more likely to read the report. As a result it may be the case that customers that have participated in an efficiency program may be a good candidate for the reports in the future.

Table 6. HECR Customers' Perceived Energy Efficiency Actions

	More Than Others	Same As Others	Less Than Others	Don't Know	Total
Read It	119	93	14	21	247
Throw It Away	2	6	1	2	11
Percent					
Read It	48.2%	37.7%	5.7%	8.5%	100.1%
Throw It Away	18.2%	54.5%	9.1%	18.2%	100.0%

We asked all surveyed customers to define, in their own words, "what it means to be energy efficient". The responses for those that do not read HECR are below.

- "Try to use less energy." (n=2)
- "Use the least amount of energy necessary." (n=2)
- "Conservative use of the thermostat and turning off lights."
- "Don't waste energy, turn off lights and keep doors closed."
- "Don't waste energy."
- "Turn off unneeded lights and appliances, and lower the thermostat."
- "Making improvements which we can't afford."
- "Being energy efficient means saving money."
- "Turning off lights and keeping the thermostat low."

Most surveyed customers that read the HECR defined energy efficiency in simple terms (n=225, or 88.9%), saying "use less energy" or "use the least amount of energy necessary", while some provided specific examples of what should be done to be energy efficient, such as "insulating doors and windows" and "keeping my house sealed" (n=28, or 11.1%). A list of responses (mentioned by at least two people) from surveyed customers who read HECR is below.

Non-Specific Responses, n=225

- "Try to use less energy." (N=50)
- "Use the least amount of energy necessary." (N=50)
- "Being energy efficient means saving money." (N=36)
- "Don't waste energy." (N=33)
- "Try to use less energy while staying comfortable." (N=17)
- "Try to use less energy and preserve the environment." (N=11)
- "Being energy efficient means saving money and helping the environment." (N=8)
- "Being aware of energy use." (N=7)
- "Proper maintenance of equipment and conservation of energy." (N=2)
- "Reducing my carbon footprint by using the least energy necessary." (N=2)

Specific Responses, n=28

- "Insulating and keeping doors & windows tight." (N=4)
- "Turning off lights and keeping the thermostat low." (N=4)
- "Keeping my house sealed." (N=2)
- "Turn off unneeded lights and appliances, and lower the thermostat." (N=2)

Additional (all n=1) responses can be found in Appendix F: What It Means to be Energy Efficient.

We asked surveyed customers what they do to be more energy efficient. The question of *"What do you do to be more energy efficient?"* was repeated to allow for up to four responses. The full list of responses can be found in Appendix G: What Surveyed Customers Do to be More Energy Efficient.

While most respondents could provide three or four things that they have done to reduce consumption (66.1%), a very small percent of surveyed customers (8.6%) were only able to identify one thing that they did to be more energy efficient, with the most common self-reported energy efficient action being to "turn off lights". Most surveyed customers were able to provide 3 actions or measures, as presented in Figure 1 below.

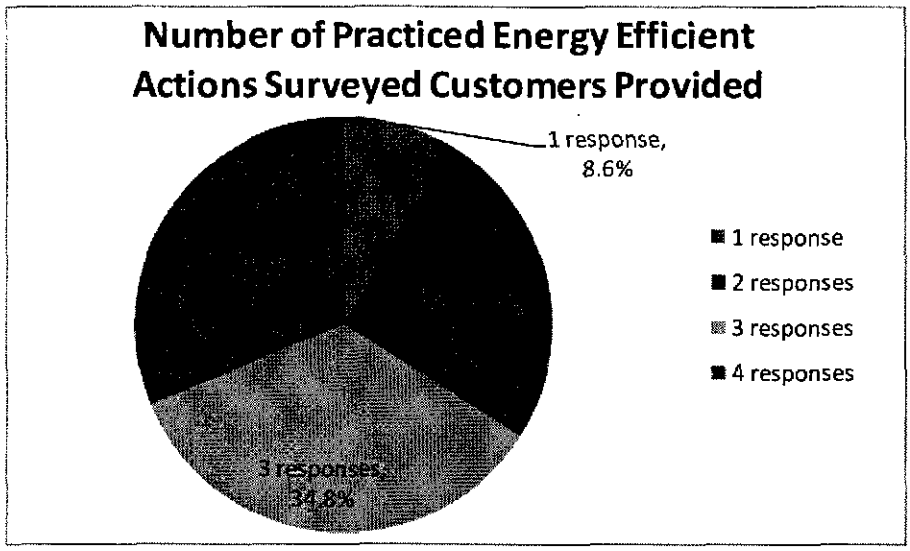


Figure 1. Number of Practices Energy Efficient Actions or Measures Taken by Surveyed Customers

There were a total of 737 energy efficient actions taken reported by the 258 customers surveyed (mean=2.86 per person). The most common responses (n=10 or more customers) are summarized in Figure 2 below. The full list of 737 actions is presented in Appendix G: What Surveyed Customers Do to be More Energy Efficient. The most common customer response was "turn off lights", with 51.2% reporting this action. Other common responses include "lower the thermostat" with 32.6% reporting they do this, and 30.2% of the surveyed HECR customers use CFLs in their homes.

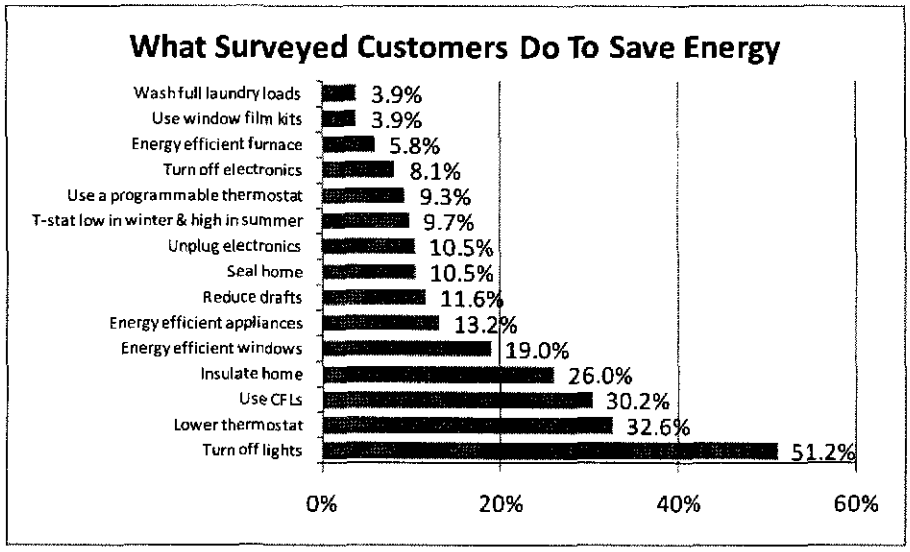


Figure 2. What Surveyed Customers Do To Save Energy (n=258)

Interest in the Energy Efficiency and the HECR

We asked surveyed HECR customers about their interest in energy efficiency and their interest in reading the next HECR they will receive. Customers were asked to rate their interest on a 1-10 scale, with 1 meaning "very uninterested" and 10 meaning "very interested". On average, surveyed HECR customers scored their interest in energy efficiency at a higher score than their interest in reading the HECR. This difference is statistically significant as shown in Table 8. Table 7 below presents the mean interest scores for all surveyed customers by whether or not they read the HECR, and by their self-reported energy efficiency actions compared to others. For example, those that say they do "about the same" as others when it comes to decreasing their energy consumption have the lowest mean interest as an energy efficiency score.

Table 7. Mean Customer Interest in Energy Efficiency and Reading the HECR

	Interest in Energy Efficiency	Interest in Reading the Next HECR
All Surveyed Customers		
Read It	8.68	8.15
Throw It Away	7.64	3.30
Surveyed Customers Indicating EE Actions are "About the Same" as Others		
Read It	8.48	8.24

Throw It Away	6.67	2.2
Surveyed Customers Indicating EE Actions are "Less Than" Others		
Read It	8.79	8.43
Throw It Away	10.00	9.00
Surveyed Customers Indicating EE Actions are "More Than" Others		
Read It	8.87	8.29
Throw It Away	9.50	3.00
Surveyed Customers Indicating EE Action Comparison to Others is "Don't Know"		
Read It	8.43	7.67
Throw It Away	7.50	3.50

Table 8. One-Sample Test of the Difference in Interest

Interest In:	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
EE	98.368	256	.000	8.638	8.47	8.81
HECR	60.359	255	.000	8.031	7.77	8.29

Frequency of the HECR

Table 9 below presents the number of surveyed HECR customers who indicated they read the HECR and their preferences on the frequency in which they receive the HECR, along with that group's mean interest score (in reading the next HECR). About 85% of the customers overall are happy with how frequently they receive the HECR, although those that receive the HECR on a monthly basis (rather than quarterly) indicate a higher level of interest in reading the next HECR, which may indicate that those reading the HECR monthly are more engaged with the HECR and therefore more interested in the HECR overall compared to the customers who receive the quarterly reports.

Table 9. Frequency of the HECR

Customer Preference	Monthly		Quarterly		Overall
	Bar (n=65)	Line (n=58)	Bar (n=61)	Line (n=63)	
Less Frequently	N=9	N=12	N=3	N=4	28
Percent	13.8%	20.7%	4.9%	6.3%	11.3%
Interest Score	*7.2*	*7.2*	*6.0*	*7.0*	
Same Frequency	N=54	N=46	N=55	N=54	209
Percent	83.1%	79.3%	90.2%	85.7%	84.6%
Interest Score	8.3	8.8	8.26	8.2	
More Frequently	N=2	N=0	N=3	N=5	10
Percent	3.1%	0%	4.9%	7.9%	4.0%
Interest Score	*10.0*	-	*8.7*	*9.2*	
Prefer E-mail Version	N=21	N=10	N=22	N=17	70
Percent	32.3%	17.2%	36.1%	27.0%	28.3%

Of the monthly HECR customers that would prefer to get the HECR less frequently, one indicated they would like to get it annually, 5 indicated they would prefer to receive the HECR every other month, and 14 said quarterly or a few times a year would be preferable. Of the two monthly HECR customers that would like to receive the HECR more frequently, one said they would like it monthly (as it is now) and the other would like to receive a report daily via E-mail.

Of the quarterly HECR customers that would prefer to get the HECR less frequently, one indicated they would like to get it annually and 3 indicated they would prefer to receive the HECR twice a year. Of the quarterly HECR customers that would prefer to get the HECR more frequently, four indicated they would like to get it monthly and four indicated they would prefer to receive the HECR every other month.

Seven of the eleven customers who indicated that they do not read the HECR receive the report monthly, and 3 of those 7 would like to continue to receive at the same frequency, another 2 said they do not want to receive the HECR at all. One indicated they would like to receive a HECR only when there is a significant change in their energy consumption.

Of the four quarterly HECR customers that do not read the HECR, two do not want to receive them at all, and the other two are fine with receiving the HECR quarterly.

Tips and Messages

The series of questions regarding recalled tips and message that were asked of surveyed HECR customers can be found in Appendix C: HECR Customer Survey Instrument starting on page 45, and begin with question 9. First we asked if they recalled any of the tips that they read on the HECR, and if they did, we asked which tips they recalled. For all recalled tips and messages (up to four[12]), we asked a series of questions about those tips or messages they recalled. We asked if their response to the tip or message was favorable, if it was believable, if and what they did in response to the tip or message, and how influential the HECR was in their decision to take the action.

Duke Energy provided TecMarket Works with an example of each HECR mailing, and the database of customer contacts provided to TecMarket Works included which HECR mailings customers received and when (by the mail drop date provided). With this information, we determined if the message or tip they recalled was a correct or false recollection of a tip or message they received. If the recalled tip or message was correct, we calculated how many days passed from the day they received the HECR with that tip or message to the day that they were surveyed by TecMarket Works.

If a message or tip was sent to a customer on multiple HECRs, then the days to recall - or days from receiving the HECR mailing with that HECR message or tip to the day the customer was surveyed - is from the last HECR mailing with that message. For example, if the customer received a CFL tip on a report with a mail drop date of April 20, 2010 and again received a CFL tip with a mail drop date of November 15, 2010, and then was surveyed on January 18, 2010, we count the number of days from the November drop date for the "days to recall" metric, which would be 64 days in this example (instead of 273).

[12] Only three customers recalled four tips, all others recalled 0-3 tips or messages.

The Difference Between Tips and Messages

Duke Energy staff provided a key to what energy efficiency statements were tips and which were messages. The key can be found in Appendix J: Summary of Tips and Messages. In summary, the difference was the location of the statements on the HECR. Examples of the HECR provided to TecMarket Works can be found in Appendix K: All Examples of All HECR Mailings.

Recalled Tips and Messages

Surveyed HECR customers that read the HECR were asked if they recalled any of the tips or messages on any of the HECRs they received. Table 10 presents a summary of how many surveyed HECR customers recalled tips or messages. The top row of the table presents the number of customers recalling tips or messages in each of the four groups, with the percent of each group in the second row. A higher percentage of HECR customers are recalling tips or messages if they receive the Bar Graph version of the HECR. About 35-40% of Line Graph HECR recipients recall a tip or message, while about 60% of Bar Graph HECR recipients recall a tip or message. Further, the average number of tips or messages recalled is much higher for the Bar Graph HECR recipients. Table 10 presents the mean number of tips or messages recalled for the full group of surveyed HECR customers that read the HECR, and the mean for those surveyed customers who recalled at least one tip or message. Bar Graph HECR recipients also recall a higher mean number of tips and/or messages, with about 1 tip or message recalled, on average, by all surveyed Bar Graph recipients, compared to a mean of about 0.5 tips or messages per person receiving the Line Graph HECR. For those that recall at least one tip or message, the mean number of tips or messages recalled by Bar Graph HECR recipients is 1.77 for those receiving the HECR quarterly, and 1.92 for those receiving the HECR monthly. This drops to about 1.5 tips or messages recalled per person for those receiving the Line Graph version. These differences between the mean number of Bar Graph and Line Graph recipients' recalled tips and messages is significant at the 90 +/- 10 CI when the differences between the four groups are compared, and when all Bar Graph and Line Graph values are compared, removing whether the customer is a Monthly or Quarterly HECR recipient.

The bottom four rows in Table 10 present the same metrics, but only consider tips and messages that were correctly recalled. There were very few surveyed HECR customers (n=6, or 2.4%) that incorrectly recalled a tip or message.

Table 10. Summary of Number of Tips and Messages Recalled

	Monthly		Quarterly	
	Bar (n=65)	Line (n=58)	Bar (n=61)	Line (n=63)
Count of Customers Indicating They Recalled Tips or Messages	39	20	35	25
Percent of Customers Indicating They Recalled Tips or Messages	60.0%	34.5%	57.4%	39.7%
Mean Number of Tips or Messages Recalled (maximum of 4), All Surveyed	1.15	0.52	1.02	0.65
Mean Number of Tips or Messages Recalled (maximum of 4), All Surveyed With At Least One Recalled Tip or Message	1.92	1.50	1.77	1.64
The Values Below Consider Only Correctly Recalled Tips and Messages				
Count of Customers Recalling At Least One Tip or	37	18	33	25

Message Correctly				
Percent of Customers Recalling At Least One Tip or Message Correctly	56.9%	31.0%	54.1%	39.7%
Mean Number of Correctly Recalled Tips or Messages (maximum of 4), All Surveyed	1.05	0.50	0.79	0.57
Mean Number of Correctly Recalled Tips or Messages (maximum of 4), All Surveyed With At Least One Correctly Recalled Tip or Message	1.84	1.61	1.45	1.44

Tips and messages that were excluded from this analysis are as follows:

- Cookware
- Do laundry in evening
- Drain water heater
- EE Appliances
- Extra blanket
- Fill dishwasher (n=2)
- Get EE appliances
- Get thermal doors & windows
- Install EE windows
- Less hot water
- Power Manager
- Replacing drafty doors & windows
- Shrink wrap
- Turn lights off when not needed (n=3)
- Turn off electronics & computers
- Turn off unused equipment
- Unplug electronics
- Use appliances during off-peak hours
- Use cold water for laundry
- Use curtains over windows
- Wrap water heater with thermal blanket (n=3)

Some of these tips may have been presented to the HECR customers, but there is no way of being certain of their accuracy. The key to the tips and messages as provided by Duke Energy did not include all tips and messages because the three tips at bottom of the report were removed from the key because they were not technically accurate for all HECR customers. This was more of an issue in the early mailings and can be reviewed in Appendix J: Summary of Tips and Messages. The energy tips for many of the mailings that were at the bottom of the HECR were different for each customer. Therefore, all customers received different energy tips compared to the examples provided. Without knowing for certain if these customers received these recalled tips, TecMarket Works removed them from the analysis.

Comparison: Messages versus Tips

The primary difference between a tip and a message is the location of the statement on the HECR. For a complete list of messages and tips included in this analysis, please see Appendix J: Summary of Tips and Messages. Table 11 presents the mean number of tips and messages recalled by HECR group, and the mean number of days to recall that tip or message.

The surveyed HECR customers were more likely to recall tips over messages, but it would be difficult to determine why. The tips cover a variety of topics such as insulation of homes, programmable thermostats, CFLs, etc. Recalled messages were almost all about CFLs, which is arguably the most expected answer. Almost all of the messages recalled (53 out of 56, or 94.6%) are about CFLs, and statements about CFLs was a message that was repeated over multiple HECR mailings for many customers. This could help explain why the days to recall is much lower for messages than tips. As explained above, when messages (or tips) were repeated on multiple HECR mailings, we used the most recent HECR drop date for calculating Days to Recall.

Table 11. Number of Correctly Recalled Tips and Messages

	Monthly		Quarterly	
	Bar (n=37)	Line (n=18)	Bar (n=33)	Line (n=25)
Number of Correctly Recalled Tips	55	21	25	23
Mean Number of Tips per Customer	1.49	1.17	0.76	0.92
Number of Correctly Recalled Messages	13	8	23	13
Mean Number of Messages per Customer	0.35	0.44	0.70	0.52
Mean Days of Recall: Tips	105	110	122	174
Mean Days of Recall: Messages	58	85	65	50

The tables below present all of the correctly recalled tips and messages[13] (note that most are tips, so only messages are noted in the first column and are at the bottom of the list for each table), the number of surveyed customers recalling the tip or message, how many of them responded to the tip or message favorably, how many found it believable, and finally, how many of them took action based on the tip or message along with the influence of the HECR on their taking the action. The Influence Score was determined by calculating the mean response to the following: *"Please indicate how influential the Home Energy Comparison Report was to your decision to take this action using a 1 to 10 scale with 1 meaning the report had no influence and you would have taken this action on your own, and 10 meaning that the report was very influential and that you would not have taken this action on your own without reading the tip on the Report."*

For surveyed HECR customers that receive the Monthly Bar report, the most commonly recalled tips were window shrink wrap (n=10), CFLs (n-9), and programmable thermostats (n=9). Of these three, CFLs resonated most favorably with customers with a score of 8.4 out of 10, and all 9 of them found the tip believable and took action in response to the tip. HECR's influence on their action was given a score of 7.4 out of 10.

[13] Tips are presented alphabetically for easy reference and comparison between the four groups. Recalled messages are at the bottom of each of the tables.

Programmable thermostat and shrink wrap tips were received favorably (7.9 and 7.5, respectively), and half of those recalling these tips took action. The recalled tip with the highest favorability score was about lowering thermostats with a score of 9.5 from 5 customers. This is surprising, as this would seem to be a "common knowledge" kind of tip that would be known by many. It may have served as a timely and friendly reminder that lowering the thermostat by a few degrees can pay off. However, only 3 of the 5 customers took action on this tip, and gave the action an Influence Score of 3 out of 10, indicating they would have done this on their own.

Table 12. Recalled Tips and Messages: Monthly Bar, n=37 Surveyed Customers

Recalled Message or Tip	Number of Recalls for This Tip or Message	Mean Favorability Score	Number Finding It Believable	Number of Customers Taking Action	Mean Influence Score of HECR on Action
CFLs	9	8.4	9	9	7.4
Cold Laundry	1	6.0	1	1	1.0
Insulate	3	6.0	3	1	-
Laundry back-to-back	1	9.0	1	1	10.0
Lower thermostat	5	9.5	5	3	3.0
New HVAC	1	6.0	1	0	-
Programmable thermostat	9	7.9	8	5	4.0
Seal	4	8.3	4	1	7.0
Shrink Wrap	10	7.5	10	5	7.6
Solar heat	2	8.0	2	1	9.0
Water heater temp	1	6.0	1	0	-
Replace Windows	4	7.5	4	1	10.0
Wrap water heater	5	6.4	5	2	4.0
Message: CFLs	13	7.8	12	13	6.75

There were fewer Monthly Line customers recalling messages and/or tips (n=18 out of 58, or 31%). Their recalled tips and messages are presented below in Table 13. Most commonly recalled was the message about CFLs, with 7 customers recalling it with a mean favorability score of 8.0. All but one said they took action in response to this tip. Sealing up drafts was the most commonly recalled tip with 5 customers recalling this tip with a high favorability score of 8.6. This tip was sent about two months before the survey began, explaining the relatively high recall rate (see Figure 3 and Appendix J: Summary of Tips and Messages).

Table 13. Recalled Tips and Messages: Monthly Line, n=18 Surveyed Customers

Recalled Message or Tip	Number of Recalls for This Tip or Message	Mean Favorability Score	Number Finding It Believable	Number of Customers Taking Action	Mean Influence Score of HECR on Action
CFLs	2	8.5	2	2	8.0
Daylighting	1	10.0	1	1	8.0
Insulate	1	9.0	1	1	7.0
Laundry back-to-back	1	9.0	1	1	8.0
Lower thermostat	3	7.7	2	2	7.0
Programmable	2	8.0	1	0	-

thermostat					
Seal	5	8.6	5	3	6.7
Shrink Wrap	3	8.0	3	2	4.0
Water heater temp	1	7.0	1	0	-
Wrap water heater	2	7.5	2	0	-
Message: CFLs	7	8.0	7	6	7.5
Message: EE Appliances	1	6.0	1	0	-

Customers that receive the HECR on a quarterly basis did not recall as many tips and messages as those receiving the HECR monthly (see Table 11), but they still responded favorably to many tips and took action influenced to some degree by the HECR, particularly to the CFL message. While only two customers took action after reading the tip about insulation, and gave it a low influence score, this is a tip that was recalled many months after it was sent out with an average "days to recall" of 206 days, as shown in Figure 3.

Table 14. Recalled Tips and Messages: Quarterly Bar, n=33 Surveyed Customers

Recalled Message or Tip	Number of Recalls for This Tip or Message	Mean Favorability Score	Number Finding It Believable	Number of Customers Taking Action	Mean Influence Score of HECR on Action
Insulate	6	8.3	6	2	4.0
Lower thermostat	3	8.0	3	3	5.0
Programmable thermostat	4	6.5	3	0	-
Seal	3	6.3	3	1	1.0
Shrink Wrap	2	7.5	2	1	-
Unplug Appliances	5	7.4	3	4	9.0
Water heater temp	2	10.0	2	2	4.5
Message: CFLs	21	7.3	19	20	6.0
Message: Lower thermostat	1	10.0	1	1	1
Message: Dehumidifier	1	5.0	1	0	-

Quarterly Line customers are similar to the Quarterly Bar customers in their recall of messages and tips with CFLs and insulation being the most commonly recalled. A few surveyed Quarterly Line HECR customers recalled and acted on tips to seal drafts, service their HVAC systems, and use shrink wrap on windows and provided high Influence Scores (8.0 or 8.5) for these actions.

Table 15. Recalled Tips and Messages: Quarterly Line, n=25 Surveyed Customers

Recalled Message or Tip	Number of Recalls for This Tip or Message	Mean Favorability Score	Number Finding It Believable	Number of Customers Taking Action	Mean Influence Score of HECR on Action
CFLs	4	8.8	4	3	6.7
Insulate	5	7.6	4	3	5.3
Lower thermostat	4	8.3	4	1	-
Programmable	3	9.3	3	1	5.0

thermostat					
Seal	3	8.7	3	2	8.5
Service HVAC	2	8.5	2	1	8.0
Shrink Wrap	2	8.0	2	1	8.0
Message: CFLs	13	7.8	12	10	7.4

Table 16 presents all the above recalled tips and messages in one table, combining all counts and averaging the favorability and influence scores of all responses for each tip or message. The CFL message was recalled by 54 surveyed customers (out of 113 recalling tips and messages, 47.8%), with 49 of them taking action in response to this tip (90.7%) with a mean influence score of 6.7 out of 10, indicating that the HECR did, to some degree, influence their actions. Many of these customers said that they called Duke Energy to get the coupons for CFLs and are replacing some or all of their bulbs with CFLs, or in the process of transitioning to all CFLs.

Table 16. All Recalled Tips and Messages

Recalled Message or Tip	Number of Recalls for This Tip or Message	Mean Favorability Score	Number Finding It Believable	Number of Customers Taking Action	Mean Influence Score of HECR on Action
CFLs	15	8.5	15	14	7.3
Cold Laundry	1	6.0	1	1	1.0
Daylighting	1	10.0	1	1	8.0
Insulate	15	7.7	14	7	4.9
Laundry back-to-back	2	9.0	2	2	9.0
Lower thermostat	15	8.4	14	9	5.3
New HVAC	1	6.0	1	0	-
Programmable thermostat	18	7.8	15	6	3.0
Seal	15	8.1	15	7	5.9
Service HVAC	2	8.5	2	1	8.0
Shrink Wrap	17	7.6	17	9	6.8
Solar heat	2	8.0	2	1	9.0
Unplug Appliances	5	7.4	3	4	9.0
Water heater temp	4	8.3	4	2	4.5
Replace Windows	4	7.5	4	1	10.0
Wrap water heater	7	6.7	7	2	4.0
Message: CFLs	54	7.6	50	49	6.7
Message: Dehumidifier	1	5.0	1	0	-
Message: EE Appliances	1	6.0	1	0	-
Message: Lower thermostat	1	10.0	1	1	1

The tips and messages were received by HECR customers at varying times, with some tips and messages being repeated. The "days to recall" metric is one that is presented here so that readers can determine the "staying power" of certain tips and messages by comparing their recall rates, favorability and influence with the days to recall presented in Figure 3. The drop dates of the

messages and tips as presented in Appendix J: Summary of Tips and Messages. The tips and messages with the lowest mean number of days to recall were all tips and messages that were sent within the previous few months of the survey. However, many of the tips and messages have a very long gap from being presented in a HECR to the time the customer was surveyed.

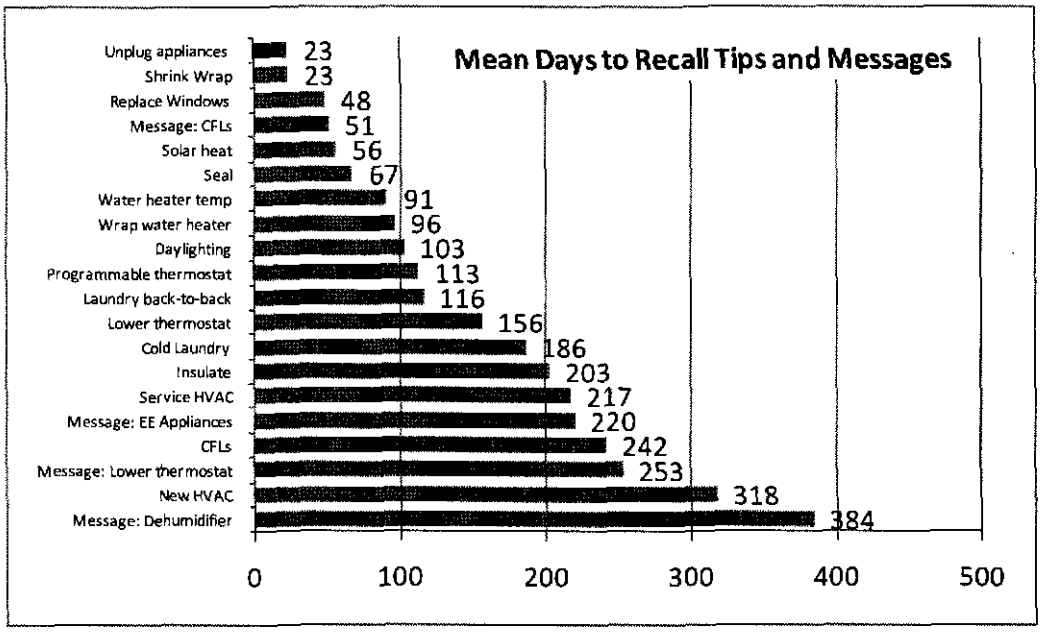


Figure 3. Mean Days to Recall Tips and Messages, All Groups

Tip and Message Relevance

Almost all (111 out of 119, or 93.3%) of the surveyed HECR customers that correctly or incorrectly recalled tips or messages felt that the tips and messages included on the HECR were relevant and applied to them and to their household. Four said they didn't feel the tips and messages were relevant and provided the following comments about their relevance.

- "I have done them [tips/messages] all already."
- "I didn't find the suggestion of buying energy efficient appliances relevant because we cannot afford them."
- "Anything relating to gas usage was irrelevant because our house does not use natural gas."

Other Energy Efficiency Actions Taken

Many of the surveyed HECR customers have taken actions since January of 2010 (when they started receiving the HECR mailing) that they say were not influenced by the HECR messages or tips. Table 17 presents the number and percent of surveyed customers who have reported that they have taken energy efficient actions. If the customer indicated that they took action, we asked them what they did. These open-ended responses are in Appendix L: List of Self-Reported Energy Efficiency Actions. The first question was open-ended and contains a variety of

responses. The series of questions following the first asked about specific changes that they may have made in their homes. While there are some differences between those that read HECR and those that do not, please keep in mind that there were only 11 surveys with people that do not read the HECR.

Table 17. Energy Efficiency Actions Taken by Customers

	Read HECR (N=247)		Throw Away HECR (n=11)	
	N	Percent	N	Percent
Has Taken Energy Efficiency Action	88	35.8%	1	9.1%
Has Replaced Appliances	76	30.1%	1	9.1%
Changes Affecting Cooling of Home	88	35.8%	2	18.2%
Changes Affecting Heating of Home	107	43.3%	4	36.4%
Changes Affecting Lighting of Home	167	67.6%	7	63.6%
Changes Affecting Electronics or Computers	59	23.9%	1	9.1%
Changes Affecting Hot Water Heating	62	25.1%	2	18.2%
Has a Swimming Pool or Spa	30	12.1%	0	-
Changes Affecting Pool or Spa	12	4.9%	0	-

Satisfaction with HECR

Customers who indicated that they read the HECR (n=247) provided their satisfaction with various aspects of the HECR. Their satisfaction is presented in this section.

Surveyed HECR customers that read the HECR were asked to indicate their agreement with a series of statements using a scale of 1-10, with 1 indicating that they strongly disagreed with the statement, and 10 indicating that they strongly agreed with the statement. A summary of the results are presented in Table 18.

The highest levels of satisfaction across the four groups are bolded in Table 18 below. For each statement (with one exception: "new ideas" for monthly HECR), surveyed customers receiving the Line Graph version of the HECR agree more strongly with the statements, indicating that HECR customers are more satisfied with the Line Graph version than they are with the Bar Graph version of the HECR. The customers that receive the Line Graph HECR on a monthly basis provided the highest scores for five of the seven statements.

Table 18. Mean Satisfaction with HECR

Statement	Monthly		Quarterly		Overall
	Bar (n=65)	Line (n=58)	Bar (n=61)	Line (n=63)	
The reports are easy to read and understand.	8.88	**9.14**	8.57	8.77	8.84
The energy saving tips in the report provided new ideas that I was not previously considering.	6.97	6.95	5.71	**7.34**	6.75
I find the reports useful.	8.43	**8.52**	7.77	8.42	8.28
I enjoy receiving and reading the reports.	8.20	8.22	7.79	**8.23**	8.11
I find the graphics helpful in understanding how my energy usage compares to others like me.	8.66	**9.21**	8.05	8.92	8.71

I find the graphics helpful in understanding how my energy usage changes over the seasons.	NA[14]	**9.07**	NA	8.52	8.76
Overall I am satisfied with the reports.	8.69	**8.86**	8.64	8.73	8.73

Many of the surveyed HECR customers are sharing or discussing their reports with others. If they indicated that they did share or discuss their HECR with others, we asked with whom they shared or discussed it. Table 19 presents the percent of customers sharing or discussing their HECR by HECR type and frequency with the overall percentage presented in the last column. Almost half (45.7%) of the surveyed customers shared or discussed the HECR with their families. Another 16.2% shared or discussed their reports with others outside their families, such as co-workers, neighbors, and/or friends.

Table 19. Percent of HECR Customers Sharing Their Reports with Others

	Monthly		Quarterly		Overall
	Bar (n=65)	Line (n=58)	Bar (n=61)	Line (n=63)	
Percent discussing their HECR with others in their household.	46.2%	43.1%	49.2%	42.9%	45.7%
Percent discussing their HECR with others outside of their household.	21.5%	17.2%	16.4%	9.5%	16.2%

Energy Efficiency Scores

We asked surveyed customers that read the HECR how useful they found the Home Energy Comparison Score on a 1 to 10 scale with 1 meaning "Not At All Useful" and 10 meaning "Very Useful". We also asked them if their score had gotten better (decreased score), stayed the same, or gotten worse (increased score), and if they were trying to improve their score.

Table 20 below presents the number and percentage of surveyed HECR customers that think their score is getting better, worse, or staying the same. Most believe that it's getting better (36%) or staying the same (37%), and about a quarter of them (23.5%) don't know how it's changed.

Table 20. HECR Customer Self-Reported Score Changes

	Monthly		Quarterly		Overall
	Bar (n=65)	Line (n=56)	Bar (n=61)	Line (n=61)	
Think Their Score Is Improving	28	14	23	23	88
Percent	43.1%	25.0%	37.7%	37.7%	36.2%
Think Their Score Is Staying the Same	29	26	14	22	91
Percent	44.6%	46.4%	23.0%	36.1%	37.4%
Think Their Score Is Getting Worse	2	0	4	1	7
Percent	3.1%	-	6.6%	1.6%	2.9%

[14] This statement was read only to HECR customers that receive the Line Graph version of the report, as it does not apply to those that get the Bar Graph version.

Don't Know How Their Score Changed	6	16	20	15	57
Percent	9.2%	28.6%	32.8%	24.6%	23.5%

Those that think their score is improving find the HECR score the most useful with a mean score of 8.2 on a 10-point scale, which is more than a full point higher than those that think their score is staying the same, getting worse, or those that don't know how their score has changed.

Table 21. Usefulness of the HECR Score

	Monthly		Quarterly		Overall
	Bar (n=65)	Line (n=56)	Bar (n=61)	Line (n=61)	
Think Their Score Is Improving	8.4	8.2	7.6	8.4	8.2
Think Their Score Is Staying the Same	6.4	7.6	6.8	6.9	6.9
Think Their Score Is Getting Worse	7.5	-	6.0	8.0	6.7
Don't Know How Their Score Changed	5.7	7.2	5.8	6.7	6.4
Overall	7.2	7.7	6.7	7.4	7.3

Table 22 below shows that those that think their score is improving are also the most likely to try to improve their score.

Table 22. Percent of HECR Customers Trying to Improve Their Score

	Monthly		Quarterly		Overall
	Bar (n=65)	Line (n=56)	Bar (n=61)	Line (n=61)	
Think Their Score Is Improving	85.7%	100.0%	95.7%	91.3%	92.0%
Think Their Score Is Staying the Same	89.7%	73.1%	92.9%	77.3%	82.4%
Think Their Score Is Getting Worse	100.0%	-	75.0%	100.0%	85.7%
Don't Know How Their Score Changed	83.3%	50.0%	75.0%	33.3%	57.9%
Overall	87.7%	73.2%	86.9%	70.5%	80.2%

Accuracy of Home Information

About 60% of the HECRs sent to the surveyed customers report that their home information is correct on their HECR. About a third of them do not know. This could be because they don't know the age or size of their home[15], or because they don't look at the house data on their HECR.

	Monthly		Quarterly		Overall
	Bar (n=65)	Line (n=56)	Bar (n=61)	Line (n=61)	
Percent Correct	58.5%	57.1%	63.9%	65.6%	61.3%
Percent Incorrect	4.6%	7.1%	1.6%	6.6%	4.9%
Don't Know	36.9%	35.7%	34.4%	27.9%	33.7%

Very few (about 5%) of the surveyed HECR customers report that there is incorrect information on their mailings. The following comments were provided by the surveyed HECR customers about what is incorrect on their HECR.

[15] We asked what the size of the heated area of their home is at the end of the survey, and of the 82 customers indicating "don't know" to this question regarding HECR accuracy, 31.2% (n=26) of them responded "don't know" when we asked about the size of their home later in the survey.

House Size:

- "Our house is 100-200 sq ft smaller than what the report says."
- "My house is smaller (it's 1500 sq ft) than Duke Energy seems to think."
- "My house is larger and older than what the report says."
- "The house size is wrong. It is really 1800 sq ft, not the 3400-4000 listed."
- "The size of the house is wrong. It is really 1800 sq ft, not the 600-1200 listed."
- "The size of the house may be off."
- "The size of the house is wrong."
- "The report has the size of the house wrong; it has 3 floors."

Age of Home:

- "The age of the house is wrong."
- "The age of the house was possibly incorrect."
- "The age of the house is wrong. It was built in the 1940s, with additions made in the 1960s and 1970s. There were energy efficient improvements made in the 1990s."

House Size and Age of Home:

- "The size listed is too small, and the age may be wrong, too."

Customer-Suggested Changes to the HECR

About 20% of the surveyed HECR customers that read the HECR had suggestions for changes to the HECR. Those that read the survey gave many suggestions for changes they would like to see made to the HECR, and this complete list can be found in Appendix H: Changes Surveyed HECR Customers Would Like to See, by Group. The suggestions vary, but there were four categories of statements that stood out:

1. **Online Functionality** (n=8), such as:
   a. having the report sent via email and/or available on online
   b. being able to manage their HECR subscription and customer profile online
   c. having a website to visit with more tips and links

2. **HECR Design**, having it easier to read, especially for older customers (n=7).

3. **Comparison to Other Homes** (n=21)
   a. having the home info correct is important, such as the size and age of home
   b. HECR should take more factors into account, such as pools and family size

4. **Tip Suggestions** (n=12), such as:
   a. new ideas & trends
   b. tips that are more specific to each customer
   c. more free or low-cost tips

Table 23. Customers That Would Like Changes Made to the HECR

	Monthly	Quarterly	Overall

	Bar (n=65)	Line (n=65)	Bar (n=63)	Line (n=65)	
Customers that read the HECR and would like to see changes to the HECR	32.3%	20.0%	23.8%	7.7%	20.9%
Customers that throw away the HECR and would like to see changes to the HECR	-	4.6%	1.2%	-	1.6%

The four surveyed customers that do not read the HECR and would like changes to be made had the following comments.

- "I am not interested in making any changes right now and do not want to spend any more money. I am not happy with the 'minion' from Duke."
- "I would like more information about my home."
- "Duke should answer the 800 number."
- "The report should be sent by email."

Additional Services from Duke Energy

TecMarket Works asked surveyed HECR customers (those that read it and those that throw the HECR away, n=258) about their interest in a list of additional services that Duke Energy may offer. TecMarket Works read the following statement: *"As a follow up to the report, Duke Energy is interested in providing further services that might be of interest to customers. I am going to read a list of possible services that Duke Energy may consider offering. On a scale from 1-10, with 1 indicating that you would be very uninterested, and 10 indicating that you would be very interested agree, please rate your interest in the following services."*

A summary of the responses is presented in Table 24 below. Surveyed HECR customers have the most interest in rebates for energy efficient home improvements and in home energy audits, which are provided through Duke Energy's Smart $aver® and Home Energy House Call® programs, respectively. While many indicated that they would like help in finding energy efficient equipment and appliances, there was very low interest (2.71 on a 10-point scale) in social networking sites set up by Duke Energy to read about or discuss energy efficient solutions with energy experts. There was not a follow up question asking customers how they would like to receive this information if they indicated they were interested in getting help, but since many read the HECR, directions to finding this kind of information could be included in a HECR mailing.

Table 24. Interest in Additional Duke Energy Services

	Monthly		Quarterly		Overall (n=258)
	Read (n=123)	Throw Away (n=7)	Read (n=124)	Throw Away (n=4)	
Help in finding weatherization contractors to make your home more efficient	4.50	3.17	4.51	4.25	4.47
Help in finding energy efficient	5.29	5.00	5.65	4.25	5.44

equipment and appliances					
Rebates for energy efficient home improvements	7.69	8.17	7.57	7.00	7.63
Inspection services of work performed by contractors	5.79	5.00	5.62	3.25	5.65
Financing for energy efficient home improvements	5.25	4.83	5.12	2.75	5.14
Home energy audits or inspections of your home with specific recommendations for improvements	6.68	5.17	5.89	1.50	6.18
Social Networking sites such as Facebook and Twitter to read about or discuss energy efficient solutions with energy experts.	2.64	1.00	2.92	1.00	2.71

Conclusions and Recommendations for Program Changes

The Home Energy Comparison Report provides Duke Energy residential customers with a meaningful comparison of their home's energy use compared to other homes similar to their own.

TecMarket Works presents the following recommendations for program changes.

1. Duke Energy should consider setting up test groups that receive the same HECR type with the same tips and messages. The pilot, as it is operating in Ohio now, does not allow for the testing of specific tips and messages, as HECR mailings vary considerably between HECR customers. Of the surveyed customers, only a few of them received the same HECR mailings containing the same tips and messages, and the tracking of these various tips and messages was not available, and therefore many of the recalled tips and messages had to be excluded from this analysis. With a specific set of test groups of customers receiving the same mailings with identical tips and messages, a more thorough and meaningful analysis of which tips and messages are recalled and acted upon could be performed.

2. Add CFL coupons to the HECR mailing if it can be shown that the participants can use additional CFLs that they are not likely to purchase on their own. Customers that use the coupons will show that they are reading the HECR and are open to the messages and tips, and possibly to solicitations for participation in other Duke Energy programs. The number of redeemed coupons can also be utilized in the billing analysis and allow for engineering estimates of energy savings.

3. The next pilot of HECR in Ohio should follow the South Carolina model for the Home Energy Comparison Score and have the score increase with increased efficiency, so that a high score is a good score. Striving for a lower score is counter-intuitive to many, and may explain why many of the surveyed customers do not know if their score is improving.

Impact Analysis

The results of the impact evaluation of the monthly HECR report are presented in Table 4. While the estimated model included weather terms and monthly indicator variables, these are omitted to highlight the estimate impact of the program.

Table 4: Estimated Savings Model – dependent variable is daily usage kWh, Jan. 2009 to February 2011 (savings are negative)

Independent Variable	Coefficient (kWh/day)	t-value
Treatment	-0.480	-4.23
Sample Size	771,793 observations (30,208 homes)	
R-Squared	78%	

This estimated model shows that the HECR program results in an average annual savings of 0.480 kWh/day or 175 kWh/year. This estimate is statistically significant at the 95% confidence level. The estimated models, both overall and by customer usage level, are presented in Appendix M: Estimated Billing Data Models.

Note that it was not possible to determine the kW impacts of the program since consumption data was only available at the monthly (kWh) level.

Appendix A: Required Savings Tables

This appendix summarizes the overall gross ex-ante savings for the program. Note that there was no information on the type of measures installed by each customer which received the report, nor was any interval metering conducted as part of this analysis, so it was not possible to determine the kW savings. Also, given the random assignment in this program, there are probably no free riders in the program, so there is no difference between the gross and net savings.

Program	Participation Count	Ex Ante Per unit kWh impact	Ex Ante Per unit kW impact	Gross Ex Ante kWh Savings	Gross Ex Ante kW Savings
Total HECR	11,112	175	N/A[16]	1,944,600	N/A

[16] kW impacts can not be determined through billing analysis. Future studies may include engineering estimates.

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 Comparison Report Program. We'll talk about the Program and its objectives, your thoughts on improving the program and its participation rates, 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 Comparison Report Program's objectives.

2. In your opinion, which objectives do you think are being met or will be met? How do you think the program's objectives have changed over time?

3. Are there any program objectives that are not being addressed 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? Do you think these changes will increase program participation?

4. Should the program objectives be changed in any way because of market conditions, other external or internal program influences, or any other conditions that have developed since the program objectives were devised? What changes would you put into place, and how would it affect the objectives?

5. What kinds of marketing, outreach and customer contact approaches do you use to make your customers aware of the program and its options? Are there any changes to the program marketing that you think would increase participation?

6. Are there any changes to the incentives or marketing that could possibly increase participation in the program?

Overall HECR Management

7. Describe the use of any advisors, technical groups or organizations that have in the past or are currently helping you think through the program's approach or methods. How often do you use these resources? What do you use them for?

8. Overall, what about the Home Energy Comparison Report Program works well and why?

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

10. If you had a magic wand and could change any part of the program what would you change and why?

Program Design & Implementation

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

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

13. How do you manage and monitor or evaluate contractor involvement or performance? What is the quality control and tracking process? What do you do if contractor performance is exemplary or below expectations?

14. In your opinion, did the incentives cover enough different kinds of energy efficient products?

1. ❑ Yes 2. ❑ No 99. ❑ DK/NS

If no, 14b. What other products or equipment should be included? Why?

_____

_____

15. In what ways can the Home Energy Comparison Report Program's operations be improved?

16. Do you have any suggestions for how program participation can be increased?

Appendix C: HECR Customer Survey Instrument

The questions below require mostly short, scaled replies from the interviewee, and not all questions will be asked of all participants.

Home Energy Comparison Report Program

Participant Survey

Use five 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 sizes: OH=250, SC=250)

SURVEY

Note: Only read words in bold type.

Hello, my name is _____. I am calling on behalf of Duke Energy to conduct a customer survey. 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

❑ Contact dropped after fifth attempt.

We are conducting this survey to obtain your opinions about the Home Energy Comparison Report. Duke Energy's records indicate that you have been receiving the Home Energy Comparison Report in the mail. We are not selling anything. Your answers will be confidential, and will help us to make improvements to the report 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 remember receiving the Home Energy Comparison Reports in the mail from Duke Energy since** <date of first mailing>**?**

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

This program provided information on how much electricity you used in the previous month and in the previous 12 months compared to your neighbors and provided tips on how you could lower your electricity use and costs in becoming more energy efficient.

Do you remember receiving these reports now?

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

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

Great, I'd like to continue this survey with you. The survey will take 10-20 minutes. At the end I would like to verify your address so we can send you $10 for your time on the phone with me today. May we continue?

2. **What do you do with the Home Energy Comparison Report when you receive it?**

a. ❑ I read it
b. ❑ Someone else in the house reads it - *can I talk to that person? Schedule callback if necessary.*
c. ❑ Threw it away/ignored it
d. ❑ Other: _____

If a: 2a. **Why do you read the Home Energy Comparison Report?**

a. ❑ It is from Duke Energy
b. ❑ I am interested in learning more about how to save energy
c. ❑ I am interested in learning more about climate change or environmental reasons
d. ❑ Avoid increases in power costs or lower rates
e. ❑ Other: _____
f. ❑ Don't Know

If c: 2b. **Why do you throw it away or ignore it?**

a. ❑ I'm too busy/don't have time
b. ❑ It's too confusing
c. ❑ I don't believe it's accurate for my household
d. ❑ I've done all the tips it suggests
e. ❑ I'm already doing the best that I can

f. ❑ I do not care about energy savings or use
g. ❑ Too low a priority for me
h. ❑ Other: _____
i. ❑ Don't Know

2c. **Did you always ignore the report, or did you read some but have since stopped?**

a. ❑ Never read them
b. ❑ I read some – **About how many did you read?** _____
c. ❑ Don't Know

3. **When you consider the efforts you and your household make to decrease your energy consumption at your home, do you feel that on average your efforts are less than what others typically do, about the same as what others typically do, or more than what others typically do?**

a. ❑ Less than others
b. ❑ About the same
c. ❑ More than others
d. ❑ Don't Know

4. **In your own words, please tell me what it means to be energy efficient.**

_____

_____

5. **When you think about what you and your household does or can do to decrease energy consumption, what things come to mind?**

a. ❑ _____ **Anything else?**
b. ❑ _____ **Anything else?** (*repeat until exhausted*)
c. ❑ Don't Know

6. **Using a 1 to 10 scale with 1 meaning "very uninterested" and 10 meaning "very interested", what is your level of interest in saving energy in your home?**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

7. **Using the same 1 to 10 scale with 1 meaning "very uninterested" and 10 meaning "very interested", what is your level of interest in reading your next report?**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

8. **Would you like to receive these reports more frequently, less frequently, or at the same frequency they are now being sent to you?**

a. ❑ More frequently
b. ❑ Less frequently
c. ❑ Same frequency
d. ❑ Don't want to get any
e. ❑ Don't Know

If 8 is a or b, 8a: **How often would you prefer to get the reports?**

a. ❑ Daily
b. ❑ Weekly
c. ❑ Monthly
d. ❑ Every other month
e. ❑ Few times a year/quarterly
f. ❑ Annually
g. ❑ Other: _____
h. ❑ Don't Know

8b. **Would you prefer to get the reports electronically through email?**

a. ❑ Yes
b. ❑ No
c. ❑ Don't Know

If they did not read the reports, Skip to question 16.

9. **You received multiple tips on how to save energy on the Home Energy Comparison Reports. Do you recall what any of the tips were?**

a. ❑ Yes
b. ❑ No
c. ❑ Don't Know

If yes, 9a. **What tips do you remember?**

❑ _____ **Anything else?**
❑ _____ **Anything else?**
❑ _____ **Anything else?**

9b. **Using a 1 to 10 scale with 1 meaning your reaction to this tip was very unfavorable and 10 meaning your reaction was very favorable, please tell me about your reaction to this tip.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know ❑ Don't Remember

9c. **Did you feel that this tip was believable, that is, that it could help you reduce your energy consumption?**

❑ Yes ❑ No ❑ Don't Know

If no, 9d.

What about it was not believable?

_____

9e. **Did you do anything to your home/behavior in response to this tip?**

❑ Yes ❑ No ❑ Don't Know ❑ Maybe

If yes, 9f. **What did you do?**

_____

If no, 9g. **Do you plan to do anything in response to this tip?**

❑ Yes ❑ No ❑ Don't Know ❑ Maybe

If yes, 9h. **When?** _____

10. **Please indicate how influential the Home Energy Comparison Report was to your decision to take this action using a 1 to 10 scale with 1 meaning the report had no influence and you would have taken this action on your own, and 10 meaning that the report was very influential and that you would not have taken this action on your own without reading the tip on the Report.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

Repeat 9b-h and 10 for all recalled tips.

11. **Did you feel that the tips included on the report were relevant and applied to you and your household?**

❑ Yes ❑ No ❑ Don't Know

If no, 11a. **Do any specific tips stand out to you as not applying to you or your house?**

❑ _____ **Any others?**
❑ _____ **Any others?**
❑ _____ **Any others?**

12. **The report presented a comparison of your home energy usage to that of similar homes. Using a 1 to 10 scale with 1 meaning this comparison was not at all useful and 10 meaning it was very useful, how useful was this comparison?**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

13. **The Report provided you with a home energy efficiency score. Has your efficiency score gotten better, worse, or stayed the same since you first started receiving the report in** <first report month>**?**

a. ❑ Better (Decreased Score)
b. ❑ Worse (Increased Score)
c. ❑ Stayed the same
d. ❑ Don't Know

14. **Are you trying to improve your home efficiency score?**

a. ❑ Yes
b. ❑ No
c. ❑ Don't Know

For all actions indicated in response to question 9..

15. **Are the characteristics such as your home size and age correct on your report?**

a. ❑ Yes
b. ❑ No
c. ❑ Don't Know

If No, 15a. **What is incorrect?**

_____

16. **Since January 2010, have you done anything else to save electricity in your home that was not included as a tip contained in the Home Energy Comparison Reports?**

a. ❑ Yes
b. ❑ No
c. ❑ Don't Know

If yes, 16a. **What have you done?**

❑ _____ *Get details.*
Anything else?
❑ _____ *Get details.*
Anything else?
❑ _____ *Get details.*
Anything else?
❑ Don't Know

17. **Have you done anything with the appliances in your home to save energy, such as removed second refrigerators or replaced old units?**

a. ❑ Yes
b. ❑ No
c. ❑ Don't Know

If yes, 17a. **What have you done?**

❑ _____ *Get details.* **Anything else?**
❑ _____ *Get details.* **Anything else?**
❑ _____ *Get details.* **Anything else?**
❑ Don't Know

18. **Have you done anything that affected the cooling of your home?**

a. ❑ Yes
b. ❑ No
c. ❑ Don't Know

If yes, 18a. **What have you done?**

❑ _____ *Get details.* **Anything else?**

❑ _____ *Get details.* **Anything else?**
❑ _____ *Get details.* **Anything else?**
❑ Don't Know

19. **Have you done anything that affected the heating of your home?**

a. ❑ Yes
b. ❑ No
c. ❑ Don't Know

If yes, 19a. **What have you done?**

❑ _____ *Get details.* **Anything else?**
❑ _____ *Get details.* **Anything else?**
❑ _____ *Get details.* **Anything else?**
❑ Don't Know

20. **Have you done anything that affected the lighting in your home?**

a. ❑ Yes
b. ❑ No
c. ❑ Don't Know

If yes, 20a. **What have you done?**

❑ _____ *Get details.* **Anything else?**
❑ _____ *Get details.* **Anything else?**
❑ _____ *Get details.* **Anything else?**
❑ Don't Know

21. **Have you done anything with home computers or electronics?**

a. ❑ Yes
b. ❑ No
c. ❑ Don't Know

If yes, 21a. **What have you done?**

❑ _____ *Get details.* **Anything else?**
❑ _____ *Get details.* **Anything else?**
❑ _____ *Get details.* **Anything else?**
❑ Don't Know

22. **Have you done anything to affect hot water heating in your home?**

a. ❑ Yes
b. ❑ No
c. ❑ Don't Know

If yes, 22a. **What have you done?**

❑ _____ *Get details.* **Anything else?**
❑ _____ *Get details.* **Anything else?**
❑ _____ *Get details.* **Anything else?**
❑ Don't Know

23. **Do you have a pool?**

a. ❑ Yes
b. ❑ No
c. ❑ Don't Know

If yes. 23a. **Did you make any changes to your pool's heating or filtering systems to make it more efficient?**

a. ❑ Yes
b. ❑ No
c. ❑ Don't Know

If yes, 23b. **What have you done?**

❑ _____ *Get details.* **Anything else?**
❑ _____ *Get details.* **Anything else?**
❑ _____ *Get details.* **Anything else?**
❑ Don't Know

If they did not read the reports, Skip to question 31.

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

24. **The reports are 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?**_____

_____

25. **The energy saving tips in the 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?**_____

_____

26. **I find the reports useful.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

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

_____

27. **I enjoy receiving and reading the reports.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

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

_____

BAR CHART 28. **I find the graphics helpful in understanding how my energy usage compares to others like me.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

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

_____

LINE GRAPH 28. **I find the graphics helpful in understanding how my energy usage compares to others like me.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

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

_____

LINE GRAPH 28a. **I find the graphics helpful in understanding how my energy usage changes over the seasons.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

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

_____

29. **Overall I am satisfied with the reports.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

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

_____

30. **Have you shared or discussed this report with others?**

a. ❑ Yes
b. ❑ No
c. ❑ Don't Know

If yes, 30a. **Who did you share it with?**

a. ❑ Family
b. ❑ Friends
c. ❑ Neighbors
d. ❑ Co-workers
e. ❑ Other: _____
f. ❑ Don't Know

As a follow up to the report, Duke Energy is interested in providing further services that might be of interest to customers. I am going to read a list of possible services that Duke

Energy may consider offering. On a scale from 1-10, with 1 indicating that you would be very uninterested, and 10 indicating that you would be very interested agree, please rate your interest in the following services.

31. **Help in finding weatherization contractors to make your home more efficient**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

32. **Help in finding energy efficient equipment and appliances**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

33. **Rebates for energy efficient home improvements**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

34. **Inspection services of work performed by contractors**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

35. **Financing for energy efficient home improvements**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

36. **Home energy audits or inspections of your home with specific recommendations for improvements**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

37. **Social Networking sites such as Facebook and Twitter to read about or discuss energy efficient solutions with energy experts.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

38. Is there anything that you would like to see changed about the report?

Response: _____

The next set of questions will help us understand how you make decisions. When I read the statements, please tell me if you Strongly Disagree, Moderately Disagree, Slightly Disagree, Slightly Agree, Moderately Agree, or Strongly Agree.

39. **I find that a well ordered life with regular hours suits my temperament.**

a. ❑ Strongly Disagree
b. ❑ Moderately Disagree
c. ❑ Slightly Disagree
d. ❑ Slightly Agree
e. ❑ Moderately Agree
f. ❑ Strongly Agree
g. ❑ Don't Know
h. ❑ Refused

40. **I don't like to be with people who are capable of unexpected actions.**

a. ❑ Strongly Disagree
b. ❑ Moderately Disagree
c. ❑ Slightly Disagree
d. ❑ Slightly Agree
e. ❑ Moderately Agree
f. ❑ Strongly Agree
g. ❑ Don't Know

41. **I find that establishing a consistent routine enables me to enjoy life more.**

a. ❑ Strongly Disagree
b. ❑ Moderately Disagree
c. ❑ Slightly Disagree
d. ❑ Slightly Agree
e. ❑ Moderately Agree
f. ❑ Strongly Agree
g. ❑ Don't Know

42. **I enjoy having a clear and structured mode of life.**

a. ❑ Strongly Disagree
b. ❑ Moderately Disagree
c. ❑ Slightly Disagree
d. ❑ Slightly Agree
e. ❑ Moderately Agree
f. ❑ Strongly Agree
g. ❑ Don't Know

43. **I like to have a place for everything and everything in its place.**

a. ❑ Strongly Disagree
b. ❑ Moderately Disagree
c. ❑ Slightly Disagree
d. ❑ Slightly Agree
e. ❑ Moderately Agree
f. ❑ Strongly Agree
g. ❑ Don't Know

44. **I dislike unpredictable situations.**

a. ❑ Strongly Disagree
b. ❑ Moderately Disagree
c. ❑ Slightly Disagree
d. ❑ Slightly Agree
e. ❑ Moderately Agree
f. ❑ Strongly Agree
g. ❑ Don't Know

I would now like you ask you a few demographic questions before we get off the phone.

45. **What is the approximate square footage of the heated areas of your home?**

a. ❑ less than 500
b. ❑ 500-999
c. ❑ 1000-1999
d. ❑ 2000-2499
e. ❑ 2500-2999
f. ❑ 3000-3499
g. ❑ 4000 or more
h. ❑ Other: _____
i. ❑ Don't Know

46. **Does your home have an attic?**

a. ❑ Yes
b. ❑ No
c. ❑ Don't Know

47. **Does your home have a basement?**

a. ❑ Yes 47a. **Is the basement area heated?**
   1. ❑ Yes
   2. ❑ No
   3. ❑ Part of it is heated
   4. ❑ Don't Know
b. ❑ No
c. ❑ Don't Know

48. **What is the fuel used in your primary heating system?**

a. ❑ Electric
b. ❑ Natural Gas
c. ❑ Oil
d. ❑ Propane
e. ❑ No heating system
f. ❑ Other: _____
g. ❑ Don't Know

49. **How old is your heating system?**

a. ❑ 0-4 years
b. ❑ 5-9 years
c. ❑ 10-14 years
d. ❑ 15-19 years
e. ❑ 20 years or more
f. ❑ Don't Know

50. **What kind of cooling system is in your home?**

a. ❑ None
b. ❑ Central Air
c. ❑ Heat Pump
d. ❑ Window/Wall AC units
e. ❑ Other: _____
f. ❑ Don't Know

If they have a cooling system:

50a. **How old is your cooling system?**

a. ❑ 0-4 years
b. ❑ 5-9 years
c. ❑ 10-14 years
d. ❑ 15-19 years
e. ❑ 20 years or more
f. ❑ Don't Know

51. **What is your thermostat setting for a typical heating day on a winter afternoon?**

a. ❑ <67 degrees
b. ❑ 67-70 degrees
c. ❑ 71-73 degrees
d. ❑ 74-77 degrees
e. ❑ >77 degrees
f. ❑ Thermostat off
g. ❑ No thermostat
h. ❑ Don't Know

52. **What is your thermostat setting for a typical cooling day on a summer afternoon?**

a. ❑ <69 degrees
b. ❑ 69-72 degrees
c. ❑ 73-76 degrees
d. ❑ 77-78 degrees
e. ❑ >78 degrees
f. ❑ Thermostat off
g. ❑ No thermostat
h. ❑ Don't Know

53. **Including yourself, how many people live in your home?**

a. ❑ 1
b. ❑ 2
c. ❑ 3
d. ❑ 4
e. ❑ 5
f. ❑ 6
g. ❑ 7
h. ❑ 8 or more

If 2 or more people in home:

53a. **How many of them are teenagers?** (age 13-19)

a. ❑ 0
b. ❑ 1
c. ❑ 2
d. ❑ 3
e. ❑ 4
f. ❑ 5
g. ❑ 6
h. ❑ 7
i. ❑ 8 or more

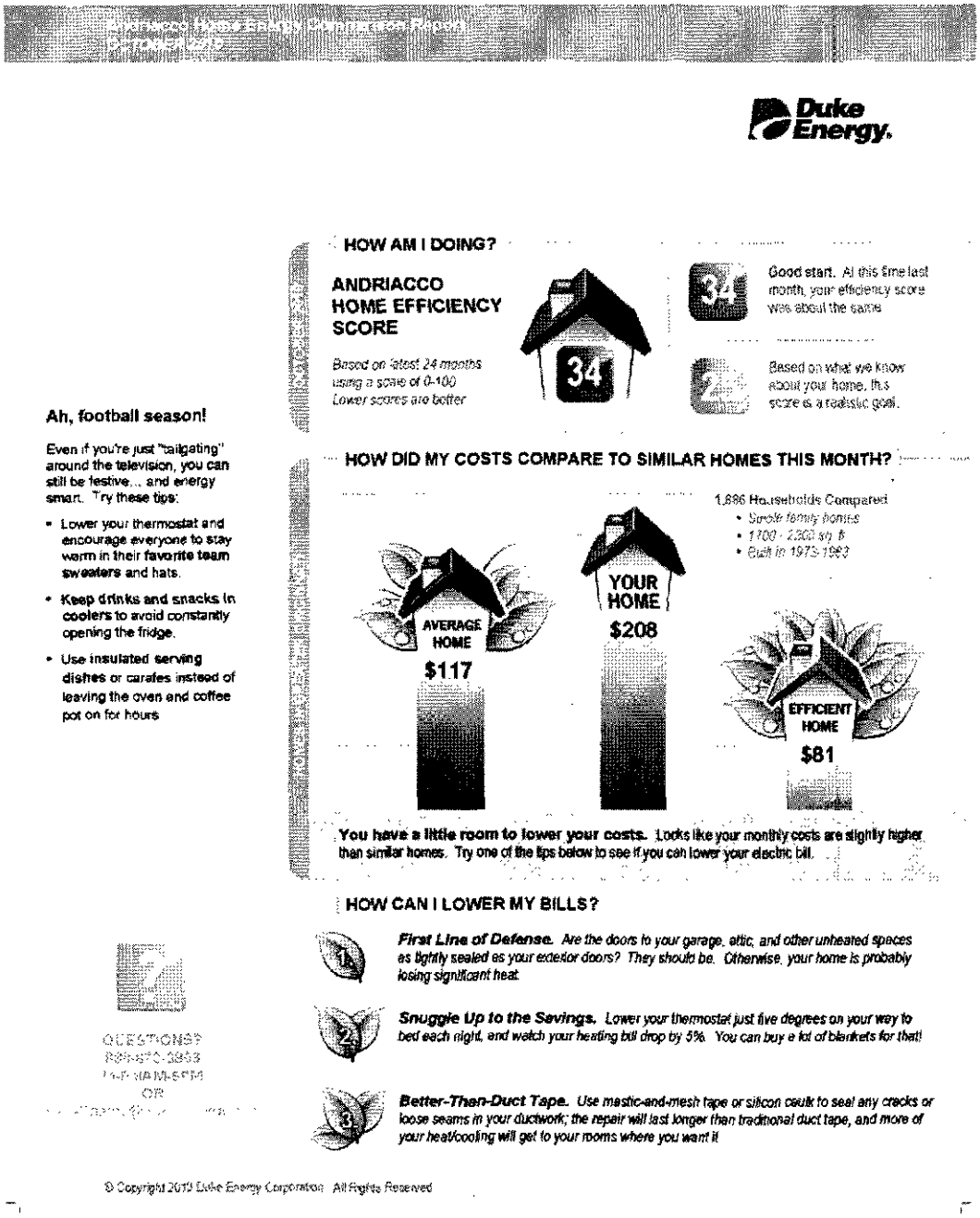
If they ask why: Explain that teenagers are generally associated with higher energy use.

We've reached the end of the survey. As I mentioned earlier, we would like to send you $10 for your time and feedback today. Should we send the $10 to <address on file>**, or would a different address be better?**

a. ❑ Address on file
b. ❑ Other: _____

You should receive your $10 in about 2-3 weeks. Thanks again for your time today!
(*politely end call*)

Appendix D: Sample HECR Mailing: Bar Graph



Duke Energy

Ah, football season!

Even if you're just "tailgating" around the television, you can still be festive... and energy smart. Try these tips:

- Lower your thermostat and encourage everyone to stay warm in their favorite team sweaters and hats.
- Keep drinks and snacks in coolers to avoid constantly opening the fridge.
- Use insulated serving dishes or carafes instead of leaving the oven and coffee pot on for hours

HOW AM I DOING?

ANDRIACCO HOME EFFICIENCY SCORE

Based on latest 24 months using a scale of 0-100 Lower scores are better

34

34 Good start. At this time last month, your efficiency score was about the same

24 Based on what we know about your home, this score is a realistic goal.

HOW DID MY COSTS COMPARE TO SIMILAR HOMES THIS MONTH?

1,886 Households Compared
- *Single family homes*
- *1100 - 2300 sq ft*
- *Built in 1975-1993*

You have a little room to lower your costs. Looks like your monthly costs are slightly higher than similar homes. Try one of the tips below to see if you can lower your electric bill.

HOW CAN I LOWER MY BILLS?

1 ***First Line of Defense.*** *Are the doors to your garage, attic, and other unheated spaces as tightly sealed as your exterior doors? They should be. Otherwise, your home is probably losing significant heat.*

2 ***Snuggle Up to the Savings.*** *Lower your thermostat just five degrees on your way to bed each night, and watch your heating bill drop by 5%. You can buy a lot of blankets for that!*

3 ***Better-Than-Duct Tape.*** *Use mastic-and-mesh tape or silicon caulk to seal any cracks or loose seams in your ductwork; the repair will last longer than traditional duct tape, and more of your heat/cooling will get to your rooms where you want it.*

QUESTIONS?
REPORT #
INFORMATION
OR

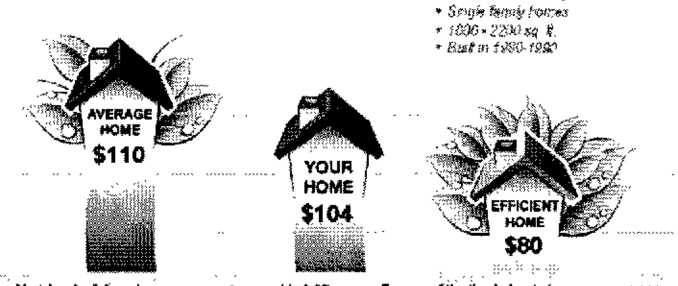
Appendix E: Sample HECR Mailing: Line Graph

Ah, football season!

Even if you're just "tailgating" around the television, you can still be festive... and energy smart. Try these tips:

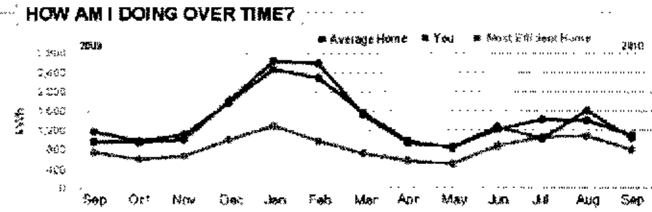
- Lower your thermostat and encourage everyone to stay warm in their favorite team sweaters and hats.
- Keep drinks and snacks in coolers to avoid constantly opening the fridge.
- Use insulated serving dishes or carafes instead of leaving the oven and coffee pot on for hours.

HOW AM I DOING?



Not bad. A few changes can make a world of difference. Try one of the tips below to improve your costs.

HOW AM I DOING OVER TIME?



About the same as last year. In the last 12 months, your home used about the same energy as the average home.

HOW CAN I LOWER MY BILLS?

1. ***First Line of Defense.*** *Are the doors to your garage, attic, and other unheated spaces as tightly sealed as your exterior doors? They should be. Otherwise, your home is probably losing significant heat.*
2. ***Snuggle Up to the Savings.*** *Lower your thermostat just five degrees on your way to bed each night, and watch your heating bill drop by 5%. You can buy a lot of blankets for that!*
3. ***Let JUST the sunshine in.*** *Windows are a great way to bring the outdoors in. But don't invite in more than the sunshine and the view. Insulated windows and storms can reduce drafts and increase your property value as well.*

QUESTIONS?
OR

Appendix F: What It Means to be Energy Efficient

The survey asked the following of HECR customers: **In your own words, please tell me what it means to be energy efficient.** Their responses are presented below.

Non-Specific Responses, n=225

- "Try to use less energy." (N=50)
- "Use the least amount of energy necessary." (N=50)
- "Being energy efficient means saving money." (N=36)
- "Don't waste energy." (N=33)
- "Try to use less energy while staying comfortable." (N=17)
- "Try to use less energy and preserve the environment." (N=11)
- "Being energy efficient means saving money and helping the environment." (N=8)
- "Being aware of energy use." (N=7)
- "Proper maintenance of equipment and conservation of energy." (N=2)
- "Reducing my carbon footprint by using the least energy necessary." (N=2)
- "Being a good citizen." (N=1)
- "Being a good steward of energy resources." (N=1)
- "Cheap reliable clean energy." (N=1)
- "Customizing your house to your family's usage & be greener." (N=1)
- "Making good use of what I have." (N=1)
- "Making improvements which we can't afford." (N=1)
- "Proper maintenance." (N=1)
- "Use the least amount of energy necessary while staying comfortable." (N=1)
- "Using only the energy that you need by being moderate & mindful of usage." (N=1)

Specific Responses, n=28

- "Insulating and keeping doors & windows tight." (N=4)
- "Turning off lights and keeping the thermostat low." (N=4)
- "Keeping my house sealed." (N=2)
- "Turn off unneeded lights and appliances, and lower the thermostat." (N=2)
- "Buying energy efficient products and insulating my home." (N=1)
- "Conservative use of the thermostat and having proper insulation." (N=1)
- "Conservative use of the thermostat and turning off lights." (N=1)
- "Conservative use of the thermostat, having proper insulation and turning off lights." (N=1)
- "Conservative use of the thermostat, having proper insulation, turning off lights and dressing warmer in the winter." (N=1)
- "Conservative use of the thermostat, turning off lights and doing laundry in large loads." (N=1)
- "Conserving energy and using EE appliances." (N=1)
- "Don't waste energy and use EE appliances." (N=1)
- "Don't waste energy, turn off lights and keep doors closed." (N=1)
- "Heating or cooling only the room in use." (N=1)
- "Insulating, keeping doors & windows tight and using EE appliances." (N=1)
- "Not wasting water, turning off lights and using EE light bulbs." (N=1)

- "Turn off unneeded lights, use EE appliances, and lower the thermostat." (N=1)
- "Turning off lights and appliances." (N=1)
- "Turning off lights and having home well insulated." (N=1)
- "Turning off unused items and using energy efficient equipment." (N=1)

Appendix G: What Surveyed Customers Do to be More Energy Efficient

The survey asked the following question of HECR customers: **When you think about what you and your household does or can do to decrease energy consumption, what things come to mind? Anything else?** Their responses are presented below.

- Turn off lights (N=132)
- Lower thermostat (N=84)
- Use CFLs (N=78)
- Insulate house (N=67)
- EE windows (N=49)
- EE appliances (N=34)
- Reduce drafts (N=30)
- Seal house (N=27)
- Unplug electronics (N=27)
- Thermostat low in winter & high in summer (N=25)
- Programmable thermostat (N=24)
- Turn off electronics (N=21)
- EE furnace (N=15)
- Shrink wrap (N=10)
- Wash full laundry loads (N=10)
- Water heater at 120 (N=9)
- Close off unused rooms (N=8)
- EE Doors (N=8)
- Blinds (N=7)
- Extra clothes in winter (N=6)
- Conserve hot water (N=5)
- EE doors (N=5)
- EE heat pump (N=5)
- Minimize AC use (N=5)
- Air dry laundry (N=4)
- Drapes (N=4)
- EE roof (N=4)
- Solar heating (N=4)
- Close door & windows (N=3)
- Cold water laundry (N=3)
- Conserve water (N=3)
- Daylighting (N=3)
- EE HVAC (N=3)
- EE water heater (N=3)
- Off peak (N=3)
- Space heater (N=3)

- Timers on lights (N=3)
- Blankets (N=2)
- Fans (N=2)
- Heat with wood (N=2)
- LED holiday lights (N=2)
- Power strips (N=2)
- Recycle (N=2)
- Shorter showers (N=2)
- Air out house at night in summer & close off rooms (N=1)
- Attic fan (N=1)
- Avoid heated dry cycle on dishwasher (N=1)
- Battery operated radio (N=1)
- Budget Billing (N=1)
- Carpet on the concrete floors (N=1)
- Cook less (N=1)
- Dry clothes back to back (N=1)
- EE garage door (N=1)
- EE home (N=1)
- Eliminate hot tub (N=1)
- Fix leaky faucets (N=1)
- Furnace filter (N=1)
- Implemented many home energy audit recommendations (N=1)

Appendix H: Changes Surveyed HECR Customers Would Like to See, by Group

Monthly Bar

- "The report should be sent by email." (N=3)
- "The basis for the comparisons should be more detailed." (N=3)
- "The report should extend the usage graph to 24 months." (N=2)
- "The basis for the comparisons should be more precise." (N=1)
- "Please make the print bigger." (N=1)
- "The report should be more specific to my home." (N=1)
- "The report should include new ideas to save energy." (N=1)
- "Duke should provide daily access to my real-time electricity usage via a website. Duke should have lower rates." (N=1)
- "Please enlarge the 12-month usage graphs and provide more analysis there." (N=1)
- "Please make sure they are sent - I only recall receiving one report (Nov. or Dec. 2010)." (N=1)
- "The report should be more encouraging to those who are doing well." (N=1)
- "The report should be sent as a bill insert to save paper and postage." (N=1)
- "The report should be sent quarterly. The basis of comparison is not meaningful. Energy rates keep going up. This program seems wasteful. I find it very frustrating. Wireless meters seem inaccurate." (N=1)
- "The report should have more legible print on the reverse side - it is too light in color." (N=1)
- "The report should include more encouragement for a good score." (N=1)
- "The report should include more specific energy-saving tips in terms that are easy to understand. The report should suggest contractors or service providers who can help implement, for example, infrared photos of heat loss." (N=1)
- "The tips are very helpful." (N=1)

Monthly Line

- "The basis for the comparisons should be more precise." (N=3)
- "Please correct my house size." (N=2)
- "The report should be sent by email." (N=2)
- "Duke should answer the 800 number." (N=1)
- "I wonder how accurate it is." (N=1)
- "I would like more information about my home." (N=1)
- "The charts should be weighted on heating degree days." (N=1)
- "The house age and size should be easier to read." (N=1)
- "The printing on back of the report, in gray, is hard to read - please use a darker ink." (N=1)
- "The report should be sent bi-monthly." (N=1)
- "The report should extend the usage graph to 24 months." (N=1)
- "The report should include new ideas to save energy." (N=1)
- "There should be cost-benefit guidance." (N=1)

Quarterly Bar

- "Simplify and shorten it." (N=2)
- "The basis for the comparisons should be made clear." (N=2)
- "The basis for the comparisons should be more detailed." (N=2)
- "The basis for the comparisons should be more precise." (N=2)
- "I am not interested in making any changes right now and do not want to spend any more money. I am not happy with the 'minion' from Duke." (N=1)
- "It should have more details about how Duke arrives at the energy efficiency numbers for average and efficient homes." (N=1)
- "The comparisons don't help much unless you give ideas about how other people are saving energy." (N=1)
- "The report should have bullet points with customized recommendations and monthly tracking of my home energy efficiency score." (N=1)
- "The report should incorporate more graphs and visual aids." (N=1)
- "The report should show the reasons for the home energy efficiency score. I am frustrated by it because I use energy frugally, but that is not reflected by my score." (N=1)
- "The reports are redundant." (N=1)
- "There should be cost-benefit guidance." (N=1)

Quarterly Line

- "I would like information about gas usage." (N=1)
- "It is not clear why we are where we are in the range." (N=1)
- "Please make the print bigger." (N=1)
- "The basis for the comparisons should be more precise." (N=1)
- "The report should be more specific to my home." (N=1)
- "The report should be sent by email." (N=1)
- "The statements at the bottom of the "How Am I Doing" box can be confusing. It shows my home is better than the average home, but the statement says I'm not doing a good job." (N=1)

Appendix I: Surveyed HECR Customer Demographics

Surveyed HECR customers were asked a series of demographic questions at the end of the survey. The results are presented below for the full surveyed population (n=258). These data were collected for Duke Energy's internal use. TecMarket Works can provide any cross-tabulations within this section or with the HECR customer survey results, as requested by Duke Energy.

Square Footage of Home (Heated Area)

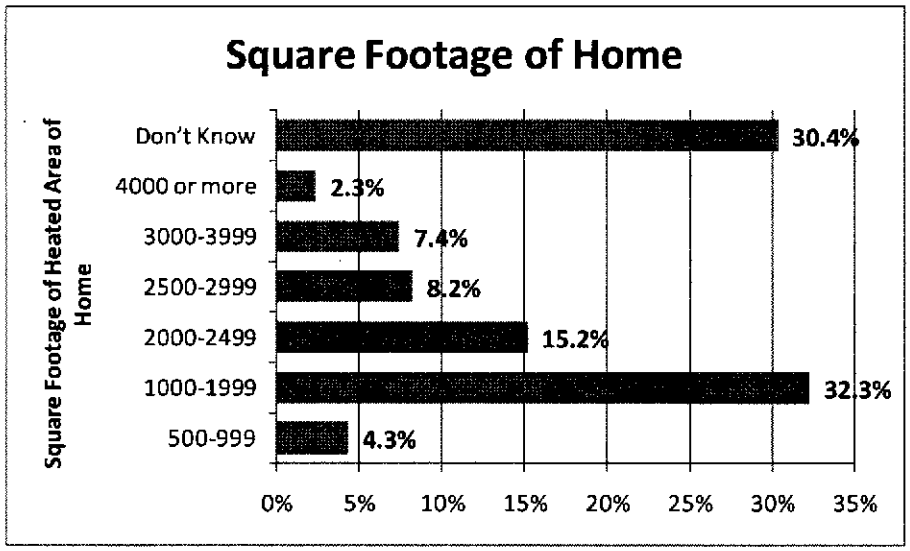


Figure 4. Square Footage of Surveyed HECR Customers, Heated Area

Attics and Basements

	N	Percent
No Attic and No Basement	15	5.8%
Attic Only	37	14.4%
Attic and Unheated Basement	33	12.8%
Attic and Partially Heated Basement	35	13.6%
Attic and Fully Heated Basement	88	34.2%
Unheated Basement, No Attic	15	5.8%
Partially Heated Basement, No Attic	8	3.1%
Fully Heated Basement, No Attic	26	10.1%

Heating Systems

	N=255	Percent
Electric	81	31.8%

0-4 years old	33	12.9%
5-9 years old	18	7.1%
10-14 years old	8	3.1%
15-19 years old	4	1.6%
20+ years old	14	5.5%
Age Unknown	4	1.6%
Natural Gas	**148**	**58.0%**
0-4 years old	47	18.4%
5-9 years old	31	12.2%
10-14 years old	23	9.0%
15-19 years old	17	6.7%
20+ years old	21	8.2%
Age Unknown	9	3.5%
Oil	**15**	**5.9%**
0-4 years old	2	0.8%
5-9 years old	5	2.0%
10-14 years old	2	0.8%
15-19 years old	2	0.8%
20+ years old	4	1.6%
Propane	**5**	**2.0%**
0-4 years old	1	0.4%
5-9 years old	3	1.2%
10-14 years old	1	0.4%
Other	**6**	**2.4%**

Cooling Systems

	N=254	Percent
Central Air	**186**	**73.2%**
0-4 years old	48	18.9%
5-9 years old	47	18.5%
10-14 years old	33	13.0%
15-19 years old	22	8.7%
20+ years old	23	9.1%
Age Unknown	13	5.1%
Heat Pump	**47**	**18.5%**
0-4 years old	23	9.1%
5-9 years old	13	5.1%
10-14 years old	4	1.6%
15-19 years old	2	0.8%
20+ years old	4	1.6%
Age Unknown	1	0.4%
Window Unit(s)	**19**	**7.5%**
0-4 years old	12	4.7%
5-9 years old	5	2.0%
10-14 years old	2	0.8%
Other	**2**	**0.8%**

Thermostat Settings in Winter

	N=255	Percent
<67 degrees	77	30.2%
67-70 degrees	125	49.0%
71-73 degrees	38	14.9%
74-77 degrees	14	5.5%
>77 degrees	1	0.4%

Thermostat Settings in Summer

	N=249	Percent
<69 degrees	20	8.0%
69-72 degrees	92	36.9%
73-76 degrees	65	26.1%
77-78 degrees	31	12.4%
>78 degrees	11	4.4%
Thermostat off	20	8.0%
No thermostat	10	4.0%

Number of Residents in Home

Number of People	N=257	Percent
1	47	18.3%
2	127	49.4%
3	28	10.9%
4	31	12.1%
5	17	6.6%
6	6	2.3%
7	1	0.4%

Number of People in Above Table That Are Teenagers	N=54 homes	Percent
1	18	48.6%
2	15	40.5%
3	4	10.8%

Appendix J: Summary of Tips and Messages

NOTE: . The energy tips at the bottom of the OH reports are different for each customer. So all customers will receive different energy tips compared to the sample provided.

Ohio Customers: Monthly Reports - Tips and Messages					
Drop Date 1	**Drop Date 2**	**Mailings**	**Name of PDF**	**Tip**	**Message**
Feb 23 & Feb 26	Mar 4	What is This?	OHWave1WhatIsThis	• What Is This	
March 18	March 29	What is This?	OHWave2WhatIsThis	• What Is This	
April 20	May 4	Did you Know?	OHWave3DidYouKnow		• Raise thermostat
May 18	June 3	Smart Grid	OHWave4SmartGrid	• Smart Grid	
June 21	June 28	1. Beach 2. SS 3. ESH	1. OHWave5Beach 2. OHWave5SS 3. OHWave5ESH	1. SS ▪ Smart Saver 2. ESH ▪ ESH	3. Beach • Unplug electronics
July 19	July 30	ESH Draft	OHWave6ESHDraft	• ESH	
Aug 17	Aug 30	1. BudgetBill 2. EEVideos 3. ESHBucksli p 4. Green	1. OHWave7BB 2. OHWave7Videos 3. OHWave7ESH 4. OHWave7Green	1. BudgetBill • Budget Billing 2. EEVideos • Videos 3. ESHBuckslip • ESH 4. Green • Go Green	
Sept 21	Oct 1	1. BRC 2. ESH 3. School	1. OHWave8BRC 2. OHWave8ESH 3. OHWave8School	1. BRC • Review card 2. ESH • ESH	3. School • Change thermostat & timers
Oct 18	Oct 29	Football	OHWave9Football		• Football party o Sweaters o Coolers o Insulated dishes
Nov 15	Nov 29	1. CFL 2. Water Heater	1. OHWave10CFL 2. OHWave10WaterHeater	1. CFL • Free CFLs	2. Water Heater • Wrap water heater
Dec 17		Train Display	OHWave11TrainDisplay	Train Display	
	Dec 30	1. Heat Pump 2. Thermostat Wars	1. OHWave11HeatPump 2. OHWave11ThermostatWar s	1. Heat Pump • Heat pump	2. Thermostat Wars • Space heater
Jan 18		ESH	OHWave12ESH	OHWave12ESH • ESH	

Ohio Customers: Quarterly Reports - Tips and Messages					
Drop Date 1	**Drop Date 2**	**Mailings**	**Name of PDF**	**Tip**	**Message**
Feb 23 & 26	Mar 4	What is This?	OHWave1WhatIsThis	• What Is This	
May 18	June 3	Did you know?	OHWave4Thermostat OHWave4DidYouKnow (both of above are the same)		• Raise thermostat
Aug 17	Aug 30	1. BudgetBill 2. EEVideos 3. Green	1. OHWave7BB 2. OHWave7Videos 3. OHWave7Green	1. BudgetBill • Budget Billing 2. EEVideos • Videos 3. Green • Go Green	
Nov 15	Nov 29	1. CFL 2. Water Heater	1. OHWave10CFL 2. OHWave10WaterHeater	1. CFL • Free CFLs	2. Water Heater • Wrap water heater

Appendix K: All Examples of All HECR Mailings in Grayscale

Drop Date 1	Drop Date 2	Mailings	Name of PDF	Tip	Message
Feb 23 & Feb 26	Mar 4	What is This?	OHWave1WhatIsThis	• What Is This	

OHWave1WhatIsThis

Duke Energy.

What is this?

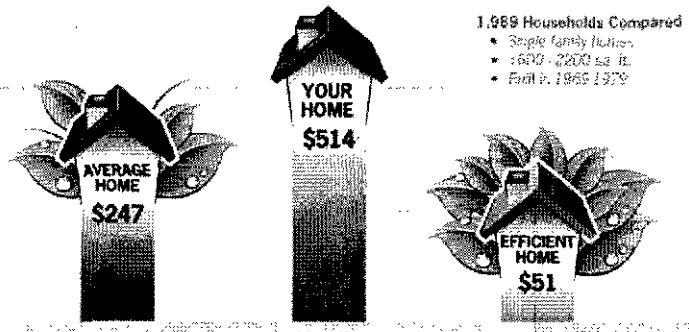
We've sent you this report to help you compare your home's electricity cost to that of similar homes and find out ways to use energy more wisely.

Working together, we can build a sustainable energy future. Conserving energy is not only good for the environment and your pocketbook, but helps Duke Energy control costs.

If you do not wish to receive this report in the future, just let us know by using the contact information below.

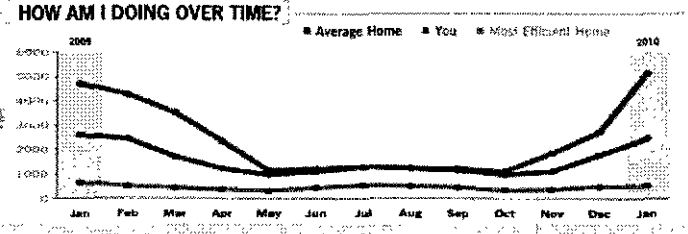
QUESTIONS?
888-873-3833
8-5 AM-5PM
OR

HOW AM I DOING?



You have room to lower your costs. Looks like your monthly costs are significantly higher than similar homes. Consider trying one of the tips we've provided below.

HOW AM I DOING OVER TIME?



About the same as last year. However, in the last 12 months, your home used 55% more energy than the average home.

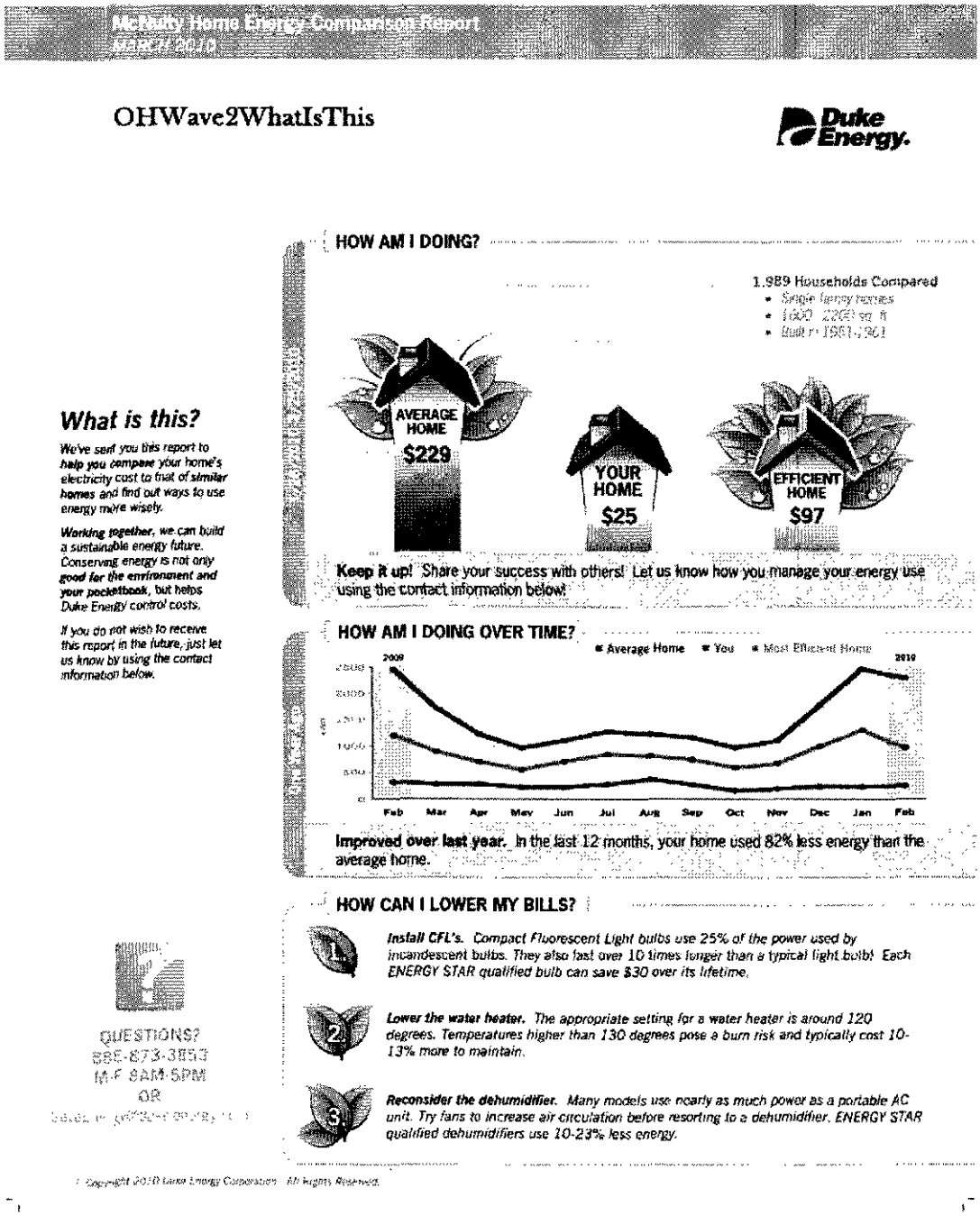
HOW CAN I LOWER MY BILLS?

1. ***Optimize air purifiers.*** *It's not always necessary to run these continuously in order to maintain air quality. Consider using them with a timer and clean filters regularly in order to maintain good airflow.*

2. ***Install CFL's.*** *Compact Fluorescent Light bulbs use 25% of the power used by incandescent bulbs. They also last over 10 times longer than a typical light bulb! Each ENERGY STAR qualified bulb can save $30 over its lifetime.*

3. ***Replace an old furnace.*** *Many older furnace units lose around 40% of the heat they create. A new unit will capture and distribute closer to 95% of the heat produced. This can equate to a 35% reduction in heating cost.*

Drop Date 1	Drop Date 2	Mailings	Name of PDF	Tip	Message
March 18	March 29	What is This?	OHWave2WhatIsThis	• What Is This	



Drop Date 1	Drop Date 2	Mailings	Name of PDF	Tip	Message
April 20	May 4	Did you Know?	OHWave3DidYouKnow		• Raise thermostat

OHWave3DidYouKnow

Duke Energy.

HOW AM I DOING?

SHARP HOME EFFICIENCY SCORE

Based on latest 24 months using a scale of 0-100. Lower scores are better.

86 Great job! At this time last month, your efficiency score was significantly higher

70 Based on what we know about your home, this score is a realistic goal

Did you know?

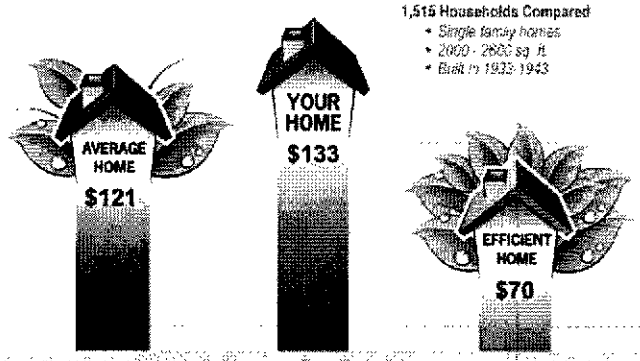
With warmer weather approaching, now is a great time to think about your thermostat. On average, you can save up to 3% on cooling energy bills for every degree you raise your thermostat during the summer.

With proper use of a programmable thermostat, you can save $180 a year in energy costs for a typical single-family home. (Source: Energy Star)

For more tips like this, visit www.duke-energy.com/ohio/savings/lower-your-bill.asp

HOW DID MY COSTS COMPARE TO SIMILAR HOMES THIS MONTH?

1,515 Households Compared
- *Single family homes*
- *2000 - 2600 sq. ft.*
- *Built in 1933-1943*



Not bad. A few changes can make a world of difference. Try one of the tips below to improve your costs.

HOW CAN I LOWER MY BILLS?

1. ***Wrap your water heater.*** *If you don't have an insulation sleeve on your water heater, consider installing one to decrease heat loss to the surrounding areas.*

2. ***Install CFLs.*** *Compact Fluorescent Light bulbs use 25% of the power used by incandescent bulbs. They also last over 10 times longer than a typical light bulb! Each ENERGY STAR qualified bulb can save $30 over its lifetime.*

3. ***Insulate the walls.*** *Older homes often have no insulation in the walls. If your walls feel very different than room temperature, consult an insulation inspector to learn how to increase the comfort level and value of the house.*

QUESTIONS?
888-375-3853
M-F 8AM-5PM
OR
SaveEnergy@duke-energy.com

Drop Date 1	Drop Date 2	Mailings	Name of PDF	Tip	Message
May 18	June 3	Did you know?	OHWave4DidYouKnow		• Raise thermostat

Baker Home Energy Comparison Report
[illegible]

OHWave4DidYouKnow

Duke Energy.

HOW AM I DOING?

BAKER HOME EFFICIENCY SCORE

Based on latest 24 months using a scale of 0-100. Lower scores are better

78 Good start. At this time last quarter, your efficiency score was about the same.

70 Based on what we know about your home, this score is a realistic goal

Did you know?

With warmer weather approaching, now is a great time to think about your thermostat. On average, you can **save up to 3%** on cooling energy bills for **every degree you raise your thermostat** during the summer.

With proper use of a programmable thermostat, you can **save $180** a year in energy costs for a typical, single-family home. (Source: Energy Star)

For more tips like this, visit www.duke-energy.com/ohio/savings/lower-your-bill.asp

HOW DID MY COSTS COMPARE TO SIMILAR HOMES THIS MONTH?

2,302 Households Compared
- *Single family homes*
- *1200 - 1600 sq. ft*
- *Built in 1895-1905*

Keep it up! Share your success with others! Let us know how you manage your energy use using the contact information below!

HOW CAN I LOWER MY BILLS?

1. ***Service your HVAC.*** *Have your HVAC system serviced at least twice a year. Poorly maintained systems will become 1-2% less efficient every year.*

2. ***Install CFLs.*** *Compact Fluorescent Light bulbs use 25% of the power used by incandescent bulbs. They also last over 10 times longer than a typical light bulb! Each ENERGY STAR qualified bulb can save $30 over its lifetime.*

3. ***Insulate the attic.*** *Extreme temperatures force systems to work harder. Attic temperatures can range from 120 degrees in the summer to well below 0 in the winter. Adding 6" of insulation can save 10-40% of energy used by the heater or AC.*

QUESTIONS?
[illegible]
M-F 8AM-5PM
OR
[illegible]

Drop Date 1	Drop Date 2	Mailings	Name of PDF	Tip	Message
May 18	June 3	Smart Grid	OHWave4SmartGrid	• Smart Grid	

Duke Home Energy Comparison Report
MAY 2010

OHWave4SmartGrid

Duke Energy.

The Smart Grid

In 2010, Duke Energy launched a mass deployment of Smart Grid technology (advanced meters + communications equipment) to enable us to have a two-way "conversation" with customers through the power system.

The Smart Grid will provide timely feedback about what's happening on our system to help:

- detect + solve problems quickly
- prevent + shorten outages
- give customers information to manage energy use

For more on our Smart Grid projects in Cincinnati, visit http://www.duke-energy.com/company.asp

HOW AM I DOING?

SHARP HOME EFFICIENCY SCORE

Based on latest 24 months using a scale of 0-100. Lower scores are better

25 **Good start.** At this time last month, your efficiency score was about the same.

15 Based on what we know about your home, this score is a realistic goal

HOW DID MY COSTS COMPARE TO SIMILAR HOMES THIS MONTH?

1,515 Households Compared
- *Single family homes*
- *2000 - 2600 sq. ft*
- *Built in 1957-1967*

Not bad. A few changes can make a world of difference. Try one of the tips below to lower your costs even further.

HOW CAN I LOWER MY BILLS?

1 ***Install CFLs.*** *Compact Fluorescent Light bulbs use 25% of the power used by incandescent bulbs. They also last over 10 times longer than a typical light bulb! Each ENERGY STAR qualified bulb can save $30 over its lifetime.*

2 ***Replace an old fridge.*** *Refrigerators over 10 years old are not as efficient as new ENERGY STAR units. The same size ENERGY STAR model typically costs $50-75 less to run per year. Try not to leave an old fridge plugged in as a "backup".*

3 ***Use insulated windows.*** *Insulated glass and storm windows will reduce unwanted heat transfer in and out of your home, as well as increase the property value.*

QUESTIONS?
[illegible]
M-F 8AM-5PM
OR
[illegible]

Drop Date 1	Drop Date 2	Mailings	Name of PDF	Tip	Message
May 18	June 3	Did you know?	OHWave4Thermostat		• Raise thermostat

Full-size Home Energy Comparison Report
MAY 2010

OHWave4Thermostat

Duke Energy.

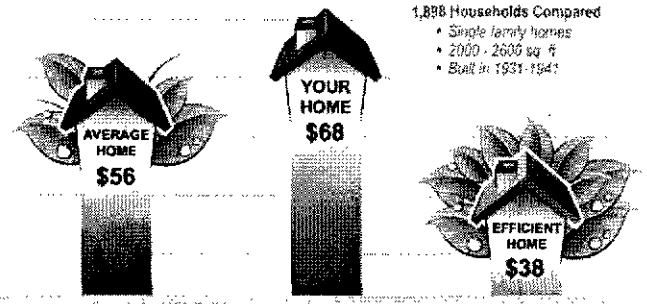
Did you know?

With warmer weather approaching, now is a great time to think about your thermostat. On average, you can save up to 3% on cooling energy bills for every degree you raise your thermostat during the summer.

With proper use of a programmable thermostat, you can save $180 a year in energy costs for a typical, single-family home. (Source: Energy Star)

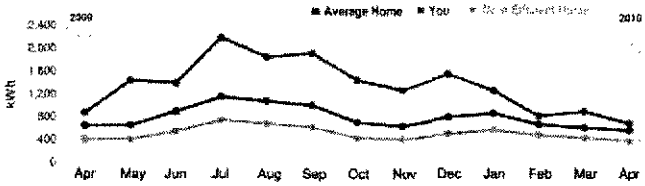
For more tips like this, visit www.duke-energy.com/ohio/savings/lower-your-bill.asp

HOW AM I DOING?



Not bad. A few changes can make a world of difference. Try one of the tips below to improve your costs.

HOW AM I DOING OVER TIME?



Improved over last year, but losing ground. In the last 12 months, your home used 74% more energy than the average home.

HOW CAN I LOWER MY BILLS?

1. ***Unplug unused electronics.*** *Products such as televisions and phone chargers will draw power 24 hours a day when plugged into the wall. Plug electronics into a power strip with an on-off switch to reduce these "phantom loads".*

2. ***Install CFLs.*** *Compact Fluorescent Light bulbs use 25% of the power used by incandescent bulbs. They also last over 10 times longer than a typical light bulb! Each ENERGY STAR qualified bulb can save $30 over its lifetime.*

3. ***Insulate the attic.*** *Extreme temperatures force systems to work harder. Attic temperatures can range from 120 degrees in the summer to well below 0 in the winter. Adding 6" of insulation can save 10-40% of energy used by the heater or AC.*

QUESTIONS?
[illegible]
M-F 8AM-5PM
OR
[illegible]

Drop Date 1	Drop Date 2	Mailings	Name of PDF	Tip	Message
June 21	June 28	Beach	OHWave5Beach		Beach • Unplug electronics

Sharp Move Energy Postcard - Digital
June 2010

Duke Energy.

OHWave5Beach

Before you take off for the beach...

Over time, your toaster or TV uses more energy when you're not using it than when you are. Many appliances and chargers continue to draw power just by being plugged in.

If you know you won't be using them for a while, take a minute to unplug these devices. You'll save some money to put towards your summer vacation instead of into a TV that no one watches for a week.

HOW AM I DOING?

SHARP HOME EFFICIENCY SCORE

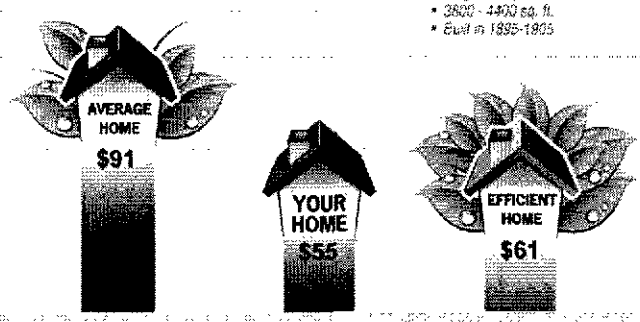
Based on latest 24 months using a scale of 0-100. Lower scores are better

48 Great job! At this time last month, your efficiency score was significantly higher.

30 Based on what we know about your home, this score is a realistic goal

HOW DID MY COSTS COMPARE TO SIMILAR HOMES THIS MONTH?

229 Households Compared
- *Single family homes*
- *3600 - 4400 sq. ft.*
- *Built in 1995-1905*



Not bad. A few changes can make a world of difference. Try one of the tips below to lower your costs even further.

HOW CAN I LOWER MY BILLS?

1 ***Use that high capacity.*** *One large load of laundry uses less water and energy than several small ones. Try to combine loads or wait until you have enough dirty items to use your washer's largest setting.*

2 ***Thank yourself all year.*** *Take an afternoon to check the caulk and weather stripping around all of the doors and windows in your home. A few minutes worth of repairs can make a huge difference in the comfort and efficiency of your home... year-round.*

3 ***Help your home breathe.*** *Attic temperatures can exceed 120 degrees. Don't trap that heat or make your air conditioner fight it. A whole-house fan can rapidly replace it with cooler outside air and requires 1/10th the energy of an air conditioner.*

QUESTIONS?
[illegible]
M-F 8AM-5PM
OR
[illegible]

Drop Date 1	Drop Date 2	Mailings	Name of PDF	Tip	Message
July 19	July 30	ESH Draft	OHWave6ESHDraft	• ESH	

Supplement to Energy Conservation Report
July 2011

OHWave6ESHDraft

Duke Energy.

DEFINE YOUR ENERGY SOLUTION

draft [draft] *n.*

1. *How the Reds got so good*
2. *Cold beer on tap*
3. ***What's sitting your energy bills***

Leaks in your attic and duct work could be driving up your monthly energy costs. Transform your house into a comfortable, energy efficient home.

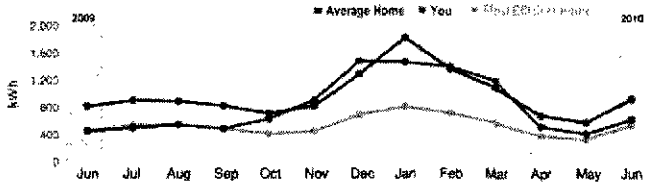
Call 888.873.3853 to speak with a Duke Energy Expert about a special program to help identify and eliminate those drafts to save money.

HOW AM I DOING?

390 Households Compared
- *Single family homes*
- *500 - 1100 sq. ft.*
- *Built in 1944-1954*

Not bad. A few changes can make a world of difference. Try one of the tips below to lower your costs even further.

HOW AM I DOING OVER TIME?



Higher than last year, but gaining ground. In the last 12 months, your home used 15% less energy than the average home.

HOW CAN I LOWER MY BILLS?

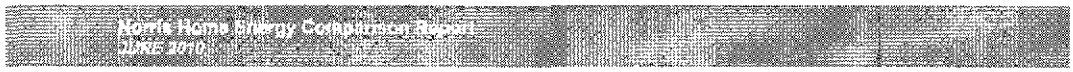
Grab a blanket... for your water heater! *Your water heater keeps water hot for you around-the-clock... even when you're not using any. Make its job a little easier. Insulation "blankets" are sold at most hardware stores and take just minutes to install.*

Give cold a chance! *Most detergents work just as well in cold water. And most washers use 90% less energy in cold-cold mode. So give cold a try. You'll save money and reduce fading as well.*

Get with the program! *Are you paying to heat and cool your home when people are sleeping... or not even there? Consider purchasing a programmable thermostat. At an average savings of $180 a year, it will pay for itself in no time!*

QUESTIONS?
888-873-3853
M-F 8AM-5PM
OR
[illegible]@duke-energy.com

Drop Date 1	Drop Date 2	Mailings	Name of PDF	Tip	Message
June 21	June 28	SS	OHWave5SS	3. SS ▪ Smart Saver	



OHWave5ESH

Duke Energy.

Make Dad Proud

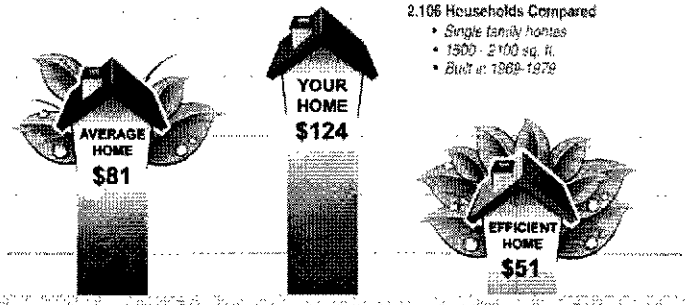
Remember when Dad said, "Don't leave the door open! **You're cooling the outdoors!"**

Now you keep the door closed, but you still may be wasting energy through **hard-to-see air passages** or leaks in your home.

Call 888 873.3653 to **speak with a Duke Energy Expert** about a special program to help identify and eliminate those leaks to save money.

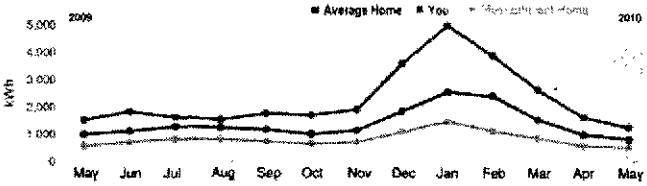
HOW AM I DOING?

2,106 Households Compared
- *Single family homes*
- *1500 - 2100 sq. ft.*
- *Built in 1969-1979*



You have a little room to lower your costs. Looks like your monthly costs are slightly higher than similar homes. Try one of the tips below to see if you can lower your electric bill.

HOW AM I DOING OVER TIME?



About the same as last year. However, in the last 12 months, your home used 66% more energy than the average home.

HOW CAN I LOWER MY BILLS?

1. ***First Line of Defense.*** *Are the doors to your garage, attic, and other unheated spaces as tightly sealed as your exterior doors? They should be. Otherwise, you're probably cooling areas that don't need to be cooled.*

2. ***Retirement pays.*** *If your refrigerator is more than a decade old, you could save $50-75 per year with a new ENERGY STAR model. Offer your fridge a full retirement as thanks for all those years of service!*

3. ***Better-Than-Duct Tape.*** *Use mastic-and-mesh tape or silicon caulk to seal any cracks or loose seams in your ductwork; the repair will last longer than traditional duct tape, and more of your heat/cooling will get to your rooms where you want it.*

QUESTIONS?
888-873-3653
M-F 8AM-5PM
OR
[illegible]@DukeEnergy.com

Drop Date 1	Drop Date 2	Mailings	Name of PDF	Tip	Message
July 19	July 30	ESH Draft	OHWave6ESHDraft	• ESH	

OHWave6ESHDraft

Duke Energy.

DEFINE YOUR ENERGY SOLUTION

draft [draft] *n.*

1. *How the Reds got so good*
2. *Cold beer on tap*
3. ***What's killing your energy bills***

Leaks in your attic and duct work could be driving up your monthly energy costs. Transform your house into a comfortable, energy efficient home.

Call 888.873.3853 to speak with a Duke Energy Expert about a special program to help identify and eliminate those drafts to save money.

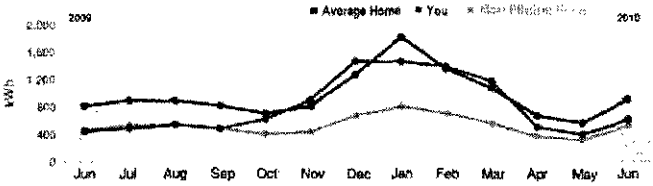
QUESTIONS?
888-873-3853
M-F 8AM-5PM
OR
Save@DukeEnergy.com

HOW AM I DOING?

390 Households Compared
* *Single family homes*
* *500 - 1199 sq. ft.*
* *Built in 1944-1954*

Not bad. A few changes can make a world of difference. Try one of the tips below to lower your costs even further.

HOW AM I DOING OVER TIME?



Higher than last year, but gaining ground. In the last 12 months, your home used 15% less energy than the average home.

HOW CAN I LOWER MY BILLS?

1. ***Grab a blanket... for your water heater!*** *Your water heater keeps water hot for you around-the-clock... even when you're not using any. Make its job a little easier. Insulation "blankets" are sold at most hardware stores and take just minutes to install.*

2. ***Give cold a chance!*** *Most detergents work just as well in cold water. And most washers use 90% less energy in cold-cold mode. So give cold a try. You'll save money and reduce fading as well.*

3. ***Get with the program!*** *Are you paying to heat and cool your home when people are sleeping... or not even there? Consider purchasing a programmable thermostat. At an average savings of $180 a year, it will pay for itself in no time!*

Drop Date 1	Drop Date 2	Mailings	Name of PDF	Tip	Message
Aug 17	Aug 30	BudgetBill	OHWave7BB	5. BudgetBill • Budget Billing	

Blanchard Home Energy Comparison Report
August 2010

OHWave7BB

Duke Energy.

It's nice to know.

Tired of playing checkbook roulette every month? **Take the guess work out** of your energy budget.

With two convenient plans, our **Budget Billing** program means never needing to wonder how much your next bill will be.

Visit www.duke-energy.com/ohio/billing/budget.asp and sign up today!

HOW AM I DOING?

BLANCHARD HOME EFFICIENCY SCORE

Based on latest 24 months using a scale of 0-100. Lower scores are better.

91 **Good start.** At this time last month, your efficiency score was about this same

85 Based on what we know about your home, this score is a realistic goal

HOW DID MY COSTS COMPARE TO SIMILAR HOMES THIS MONTH?

1,369 households Compared
- *Single family homes*
- *2100 - 2700 sq. ft*
- *Built in 1935-1945*

Not bad. A few changes can make a world of difference. Try one of the tips below to improve your costs.

HOW CAN I LOWER MY BILLS?

1 ***Throw a little light on the subject.*** *Lamps can be more efficient and inviting than overhead lights. Try placing them where light is most often needed. . . or in corners, to maximize the amount of light reflected back into the room.*

2 ***Thank yourself all year.*** *Take an afternoon to check the caulk and weather stripping around all of the doors and windows in your home. A few minutes worth of repairs can make a huge difference in the comfort and efficiency of your home. . . year-round.*

3 ***An Air Conditioner by Any Other Name.*** *Did you know that many dehumidifiers use as much energy as a portable air conditioner? Try using fans or windows to increase air circulation. . . or at least make sure your dehumidifier is an ENERGY STAR model.*

Drop Date 1	Drop Date 2	Mailings	Name of PDF	Tip	Message
Aug 17	Aug 30	ESHBuckslip	OHWave7ESH	ESHBuckslip • ESH	

Sharp Home Energy Comparison Report
August 2010

OHWave7ESH

Duke Energy.

Uncomfortable with your report?

Have you already taken steps to try to change what this report is telling you?

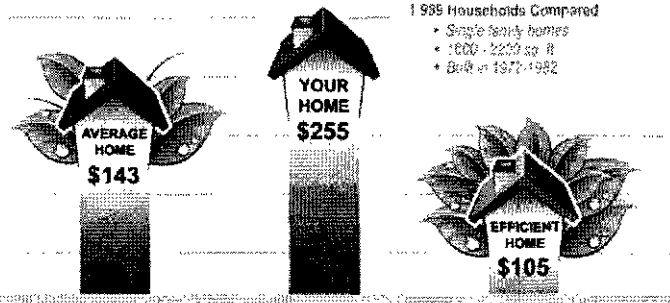
We know you've worked hard to save energy on your own, and sometimes it's hard to know what the next step should be.

That's why we developed a valuable service called **Energy Solutions @ Home.**

See the enclosed flyer for more details about our program.

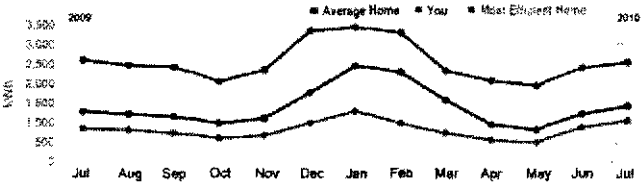
HOW AM I DOING?

1,985 Households Compared
- Single family homes
- 1800 - 2250 sq. ft.
- Built in 1972-1982



You have a little room to lower your costs. Looks like your monthly costs are slightly higher than similar homes. Try one of the tips below to see if you can lower your electric bill.

HOW AM I DOING OVER TIME?



About the same as last year. However, in the last 12 months, your home used 81% more energy than the average home.

HOW CAN I LOWER MY BILLS?

1. ***What's that gasping sound?*** *Is that your heater straining to draw air through a dirty filter? Save energy and improve air quality by regularly changing filters. Most manufacturers recommend every 4-6 weeks. . . more often in extreme conditions.*

2. ***120 is hot. 130 is scalding.*** *Make sure your water heater is set at 120 degrees. Anything higher than 130 poses a burn risk. It also decreases the life of your water heater and increases your energy costs by 10-13%.*

3. ***Get with the program!*** *Are you paying to heat and cool your home when people are sleeping... or not even there? Consider purchasing a programmable thermostat. At an average savings of $180 a year, it will pay for itself in no time!*

Drop Date 1	Drop Date 2	Mailings	Name of PDF	Tip	Message
Aug 17	Aug 30	Green	OHWave7Green	Green • Go Green	

OHWave7Green

Duke Energy.

It IS easy being green.

Think the only way to obtain **clean, sustainable power** is to buy your own solar panels or wind turbine? Think again.

Duke Energy is committed to investing in a greener future. And we make it easy for you to join us. For as little as $2/month, you can **show Mother Earth you love her, too.**

Visit www.duke-energy.com/ohio/renewable-energy/gogreen.asp to Go Green!

HOW AM I DOING?

HARMON HOME EFFICIENCY SCORE

Based on latest 24 months using a scale of 0-100. Lower scores are better.

Good start. At this time last month, your efficiency score was about the same

Based on what we know about your home, this score is a realistic goal.

HOW DID MY COSTS COMPARE TO SIMILAR HOMES THIS MONTH?

2,382 Households Compared
- *Single family homes*
- *1200 - 1800 sq. ft*
- *Built in 1954-1979*

Not bad. A few changes can make a world of difference. Try one of the tips below to improve your costs.

HOW CAN I LOWER MY BILLS?

1. ***Boiling is boiling.*** *Once water begins to boil, reduce heat to the lowest setting that will maintain the boil. Anything higher is only wasting energy.*

2. ***120 is hot. 130 is scalding.*** *Make sure your water heater is set at 120 degrees. Anything higher than 130 poses a burn risk. It also decreases the life of your water heater and increases your energy costs by 10-13%.*

3. ***Get with the program!*** *Are you paying to heat and cool your home when people are sleeping... or not even there? Consider purchasing a programmable thermostat. At an average savings of $180 a year, it will pay for itself in no time!*

Drop Date 1	Drop Date 2	Mailings	Name of PDF	Tip	Message
Aug 17	Aug 30	EEVideos	OHWave7Videos	EEVideos • Videos	

Sharp Home Energy Comparison Report
Account #####

OHWave7Videos

Duke Energy.

Show me the money!

Got a few minutes? We can save you a few dollars.

Whether you want to reduce your heating and cooling costs, lower humidity, or get the most from your household appliances, **our Energy Efficiency videos** can show you how.

Visit www.duke-energy.com/ohio/savings/energy-efficiency-videos.asp to view all five helpful videos.

HOW AM I DOING?

SHARP HOME EFFICIENCY SCORE

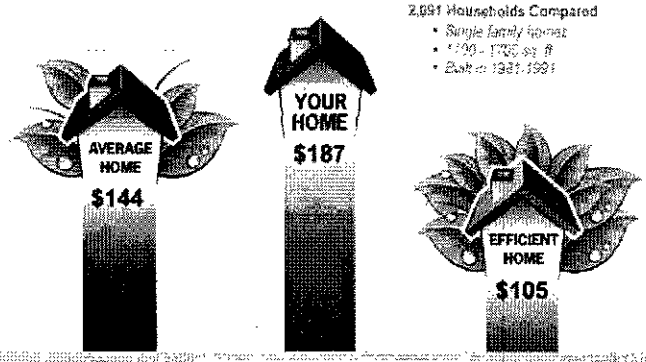
Based on latest 24 months using a scale of 0-100. Lower scores are better

14 Looking good. At this time last quarter, your efficiency score was higher.

0 Based on what we know about your home, this score is a realistic goal

HOW DID MY COSTS COMPARE TO SIMILAR HOMES THIS MONTH?

2,991 Households Compared
- *Single family homes*
- *1700 - 1795 sq. ft*
- *Built in 1981-1991*



You have a little room to lower your costs. Looks like your monthly costs are slightly higher than similar homes. Try one of the tips below to see if you can lower your electric bill.

HOW CAN I LOWER MY BILLS?

1. ***There's off, and there's OFF.*** *Many products never REALLY turn off. If it has a clock or a remote, or one of those power "bricks" on its cord, it draws electricity 24x7. Kill these "vampires" by plugging them into a power strip you can switch off when not in use.*

2. ***Give cold a chance!*** *Most detergents work just as well in cold water. And most washers use 90% less energy in cold-cold mode. So give cold a try. You'll save money and reduce fading as well.*

3. ***Let JUST the sunshine in.*** *Windows are a great way to bring the outdoors in. But don't invite in more than the sunshine and the view. Insulated windows and storms can reduce drafts and increase your property value as well.*

Drop Date 1	Drop Date 2	Mailings	Name of PDF	Tip	Message
Sept 21	Oct 1	BRC	OHWave8BRC	BRC • Review card	

Sharp Home Energy Comparison Report
SEPTEMBER 2010

OHWave8BRC

Duke Energy.

HOW AM I DOING?

SHARP HOME EFFICIENCY SCORE

Based on latest 24 months using a scale of 0-100. Lower scores are better.

86 Good start. At this time last month your efficiency score was about the same

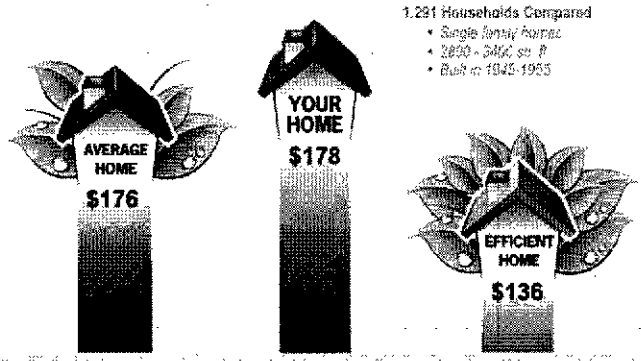
75 Based on what we know about your home, this score is a realistic goal

Everything Correct?

We admit it. This report is based on some assumptions about your home. Would you please take a minute to review the attached card and let us know if we've got everything right? If not, please set us straight! The postage is on us.

HOW DID MY COSTS COMPARE TO SIMILAR HOMES THIS MONTH?

1,291 Households Compared
- *Single family homes*
- *2800 - 3400 sq. ft.*
- *Built in 1945-1955*



Not bad. A few changes can make a world of difference. Try one of the tips below to improve your costs.

HOW CAN I LOWER MY BILLS?

1 ***Dimmers can be a bright idea.*** *Dimmers and 3-way switches can help you select exactly the light you desire... and use only the power you need. Remember that only specially-designed CFLs work with dimmers or 3-way switches.*

2 ***More isn't always better.*** *Inefficient showerheads can waste 30-40 gallons of water per day, depending upon the size of your household. A new low-flow showerhead can pay for itself in just a few months. . . and go on to save you $50-100 per year.*

3 ***Get with the program!*** *Are you paying to heat and cool your home when people are sleeping... or not even there? Consider purchasing a programmable thermostat. At an average savings of $180 a year, it will pay for itself in no time!*

Drop Date 1	Drop Date 2	Mailings	Name of PDF	Tip	Message
Sept 21	Oct 1	ESH	OHWave8ESH	ESH • ESH	

Smart Home Energy Comparison Report
SEPTEMBER 2010

OHWave8ESH

Duke Energy.

Uncomfortable with your report?

Have you already taken steps to try to change what this report is telling you?

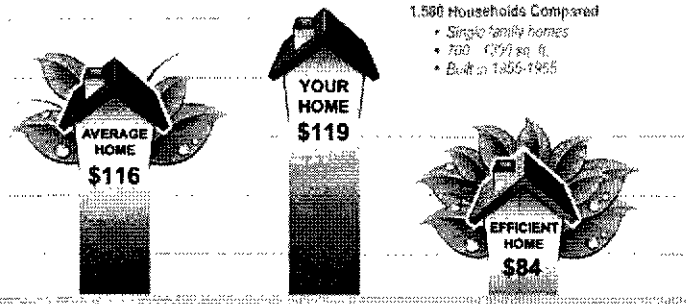
We know you've worked hard to save energy on your own, and sometimes it's hard to know what the next step should be.

That's why we developed a valuable service called **Energy Solutions @ Home®**.

Call 1-888-873-3853 for more details about our program.

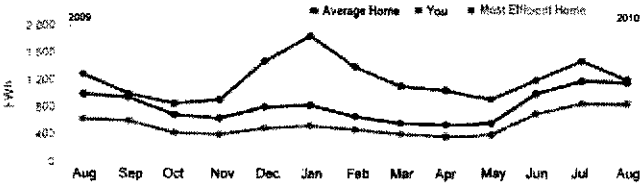
HOW AM I DOING?

1,580 Households Compared
- Single family homes
- 700 - 999 sq. ft.
- Built in 1955-1965



Not bad. A few changes can make a world of difference. Try one of the tips below to improve your costs.

HOW AM I DOING OVER TIME?



About the same as last year. However, in the last 12 months, your home used 51% more energy than the average home.

HOW CAN I LOWER MY BILLS?

1. ***Clean, Shiny... and Efficient.*** *Clean burners and reflectors don't just look good. They keep your stove operating at peak efficiency.*

2. ***120 is hot. 130 is scalding.*** *Make sure your water heater is set at 120 degrees. Anything higher than 130 poses a burn risk. It also decreases the life of your water heater and increases your energy costs by 10-13%.*

3. ***Your Window to Energy Savings.*** *Single-pane windows can let in a lot more than sunlight. Consider replacing your old, drafty windows with double- or triple-pane "low emissivity" windows. You'll reduce your heating and cooling costs AND add value to your home.*

Drop Date 1	Drop Date 2	Mailings	Name of PDF	Tip	Message
Sept 21	Oct 1	School	OHWave8School		School • Change thermostat & timers

Harmon Home Energy Comparison Report
SEPTEMBER 2010

OHWave8School

Duke Energy.

School is in session!

Has your home received it's new schedule yet?

Here is your first assignment: Take a few moments to **reprogram your thermostat** with any changes to your family's schedule.

Want some extra credit? **Consider adjusting timers** on lights and appliances, as well. The days may still be warm, but they are already getting shorter!

HOW AM I DOING?

HARMON HOME EFFICIENCY SCORE

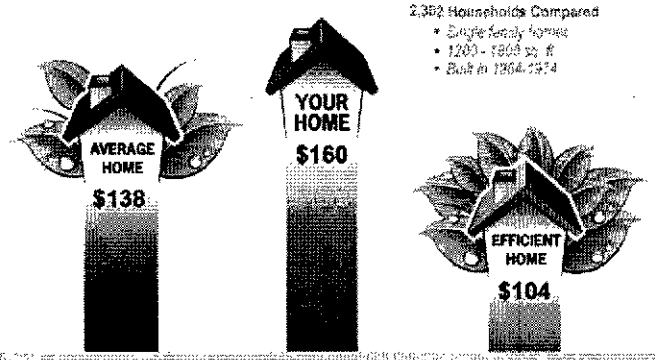
Based on latest 24 months using a scale of 0-100. Lower scores are better.

85 Good start. At this time last month, your efficiency score was about the same.

80 Based on what we know about your home, this score is a realistic goal.

HOW DID MY COSTS COMPARE TO SIMILAR HOMES THIS MONTH?

2,352 Households Compared
- Single family homes
- 1200 - 1800 sq. ft.
- Built in 1964-1974



Not bad. A few changes can make a world of difference. Try one of the tips below to improve your costs.

HOW CAN I LOWER MY BILLS?

1 ***Grab a blanket... for your water heater!*** *Your water heater keeps water hot for you around-the-clock... even when you're not using any. Make its job a little easier. Insulation "blankets" are sold at most hardware stores and take just minutes to install.*

2 ***Front-loaders come out on top.*** *If you're in the market for a new washing machine, consider a front-loading model. They can be up to 50% more efficient than top-loaders, quieter, and gentler on your clothes.*

3 ***Give your walls a hand!*** *Older homes often have no insulation in the walls. If your walls feel very different than room temperature, consult an insulation inspector to learn how to increase the comfort level and value of the house.*

QUESTIONS?
[illegible]
OR
[illegible]

Drop Date 1	Drop Date 2	Mailings	Name of PDF	Tip	Message
Oct 18	Oct 29	Football	OHWave9Football		• Football party o Sweaters o Coolers o Insulated dishes

OHWave9Football

Duke Energy.

Ah, football season!

Even if you're just "tailgating" around the television, you can still be festive... and energy smart. Try these tips:

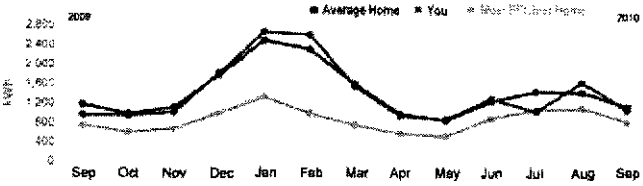
- Lower your thermostat and encourage everyone to stay warm in their **favorite team sweaters** and hats.
- **Keep drinks and snacks in coolers** to avoid constantly opening the fridge.
- Use **insulated serving dishes** or carafes instead of leaving the oven and coffee pot on for hours.

HOW AM I DOING?

1,985 Households Compared
- *Single family homes*
- *1000 - 2200 sq. ft.*
- *Built in 1980-1990*

Not bad. A few changes can make a world of difference. Try one of the tips below to improve your costs.

HOW AM I DOING OVER TIME?



About the same as last year. In the last 12 months, your home used about the same energy as the average home.

HOW CAN I LOWER MY BILLS?

1. ***First Line of Defense.*** *Are the doors to your garage, attic, and other unheated spaces as tightly sealed as your exterior doors? They should be. Otherwise, your home is probably losing significant heat.*
2. ***Snuggle Up to the Savings.*** *Lower your thermostat just five degrees on your way to bed each night, and watch your heating bill drop by 5%. You can buy a lot of blankets for that!*
3. ***Let JUST the sunshine in.*** *Windows are a great way to bring the outdoors in. But don't invite in more than the sunshine and the view. Insulated windows and storms can reduce drafts and increase your property value as well.*

Drop Date 1	Drop Date 2	Mailings	Name of PDF	Tip	Message
Nov 15	Nov 29	CFL	OHWave10CFL	CFL • Free CFLs	

OHWave10CFL

Duke Energy.

Free and Easy!

CFL (Compact Fluorescent Light) bulbs burn cooler, use 75% less energy, and last 10x longer than incandescents. **Now they're FREE from Duke Energy!** Here are three easy ways to order yours today:

- Call **1-800-943-7585** and then press or say **"1."**
- Visit **duke-energy.com/free-cfls.**
- Log into your **Online Services** customer account.

HOW AM I DOING?

PHROM HOME EFFICIENCY SCORE

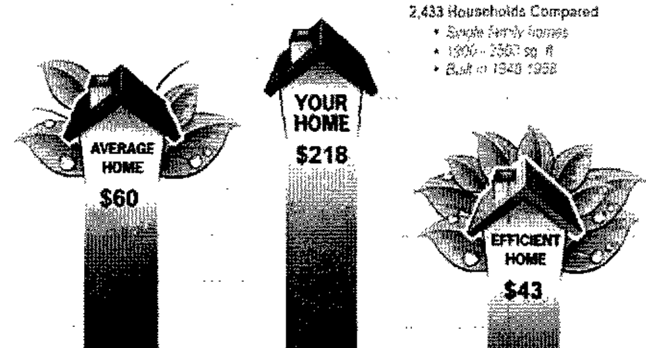
Based on latest 24 months using a scale of 0-100. Lower scores are better.

20

30 — Great job! At this time last quarter, your efficiency score was significantly higher.

15 — Based on what we know about your home, this score is a realistic goal.

HOW DID MY COSTS COMPARE TO SIMILAR HOMES THIS MONTH?



2,433 Households Compared

- *Single family homes*
- *1900 - 2500 sq. ft*
- *Built in 1940-1958*

You have room to lower your costs. Looks like your monthly costs are significantly higher than similar homes. Have you tried one of the tips below to see if you can lower your bill?

HOW CAN I LOWER MY BILLS?

1. ***There's off, and there's OFF.*** *Many products never REALLY turn off. If it has a clock or a remote, or one of those power "bricks" on its cord, it draws electricity 24x7. Kill these "vampires" by plugging them into a power strip you can switch off when not in use.*
2. ***120 is hot. 130 is scalding.*** *Make sure your water heater is set at 120 degrees. Anything higher than 130 poses a burn risk. It also decreases the life of your water heater and increases your energy costs by 10-13%.*
3. ***Shrink-Wrapped Savings.*** *Drafty windows can account for up to 30% of your heating bill. Seal them with a "shrink wrap" kit available at any hardware store. All you need is a few minutes and a blow dryer.*

QUESTIONS?

Drop Date 1	Drop Date 2	Mailings	Name of PDF	Tip	Message
Nov 15	Nov 29	Water Heater	OHWave10WaterHeater		Water Heater • Wrap water heater

OHWave10WaterHeater

Duke Energy.

Hugs for Heaters

Your water heater keeps water hot and ready for you 24X7. Take a few minutes to say thanks! Insulation "blankets" sold at most hardware stores are quick and easy to install. Your water heater will thank you by using LESS energy and lasting longer, too.

HOW AM I DOING?

NYE HOME EFFICIENCY SCORE

Based on latest 24 months using a scale of 0-100. Lower scores are better

35

35 Good start. At this time last month your efficiency score was about the same.

25 Based on what we know about your home, this score is a realistic goal.

HOW DID MY COSTS COMPARE TO SIMILAR HOMES THIS MONTH?

1,516 Households Compared
- Single family homes
- 2000 - 2600 sq. ft
- Built in 1969-1979

Not bad. A few changes can make a world of difference. Try one of the tips below to improve your costs.

HOW CAN I LOWER MY BILLS?

1 ***First Line of Defense.*** *Are the doors to your garage, attic, and other unheated spaces as tightly sealed as your exterior doors? They should be. Otherwise, your home is probably losing significant heat.*

2 ***In a fog?*** *With a properly installed and vented bathroom fan, you should never need to deal with fogged mirrors again. Don't open a window and let heat out with the moisture. Get a quiet, high-efficiency fan instead.*

3 ***Get with the program!*** *Are you paying to heat and cool your home when people are sleeping... or not even there? Consider purchasing a programmable thermostat. At an average savings of $180 a year, it will pay for itself in no time!*

Drop Date 1	Drop Date 2	Mailings	Name of PDF	Tip	Message
	Dec 30	Heat Pump	OHWave11HeatPump	Heat Pump • Heat pump	

Monthly Home Energy Comparison REPORT
DECEMBER 2010

OHWave11HeatPump

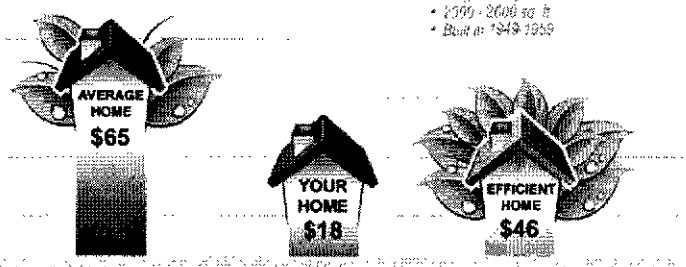
Duke Energy.

Are you paying too much at the pump?

If your heat pump is more than a **decade old**, odds are that you can replace it with **new technology** that is **20-40% more efficient.** Start shopping around now while Old Faithful still has some life left in it. Duke can help. Go to **www.duke-energy.com/ohio/savings/smart-saver.asp** to learn more about our **equipment rebates.**

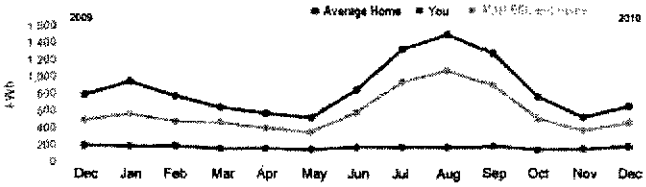
HOW AM I DOING?

1,898 Households Compared
- Single family homes
- 1,999 - 2,000 sq. ft.
- Built in 1949-1959



Keep it up! Share your success with others! Let us know how you manage your energy use using the contact information below!

HOW AM I DOING OVER TIME?



About the same as last year. In the last 12 months, your home used 81% less energy than the average home.

HOW CAN I LOWER MY BILLS?

1. ***One good turn deserves another.*** *If you do multiple loads of laundry, dry them back-to-back. Your dryer is "pre-heated" by the first load and needs less energy for the others.*

2. ***Quicker AND More Efficient.*** *Microwave ovens are not just 75% faster than conventional ovens; they typically use 30% less energy as well.*

3. ***Shrink-Wrapped Savings.*** *Drafty windows can account for up to 30% of your heating bill. Seal them with a "shrink wrap" kit available at any hardware store. All you need is a few minutes and a blow dryer.*

Drop Date 1	Drop Date 2	Mailings	Name of PDF	Tip	Message
	Dec 30	Thermostat Wars	OHWave11ThermostatWars		Thermostat Wars • Space heater

Single-Family Home Energy Comparison Report
DECEMBER 2010

OHWave11ThermostatWars

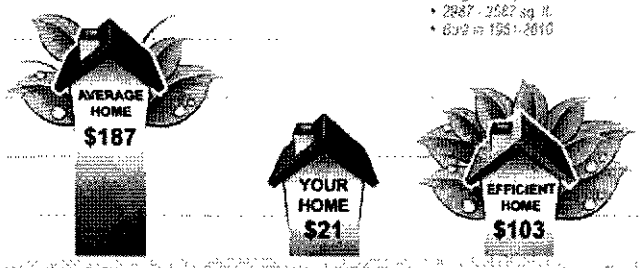
Duke Energy.

Winning the Thermostat Wars.

Is one person - or space - in your home always **colder than the others?** Quit fighting over the thermostat. A small, **efficient space heater** adds warmth only where it's needed, at a **fraction of the energy cost.**

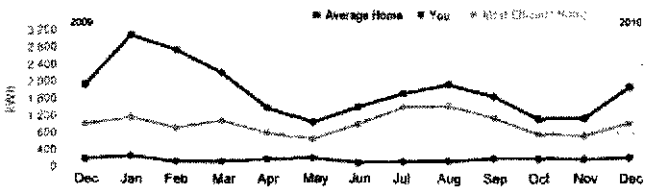
HOW AM I DOING?

484 Households Compared
- Single family homes
- 2987 - 2987 sq. ft.
- Built in 1951-2010



Keep it up! Share your success with others! Let us know how you manage your energy use using the contact information below!

HOW AM I DOING OVER TIME?



About the same as last year. In the last 12 months, your home used 91% less energy than the average home.

HOW CAN I LOWER MY BILLS?

1. ***Free Solar Heat.*** *If your home has windows - especially south-facing - you have a source of solar heat. Take advantage by opening blinds during the day to let the sun in and closing them at night to retain the heat. Reverse the process during cooling season.*

2. ***It's not enough to heat the water.*** *Make sure the water you've paid to heat ARRIVES hot by wrapping hot water pipes with insulation, especially if they pass through unheated areas like garages and crawl spaces.*

3. **Shrink-Wrapped Savings.** *Drafty windows can account for up to 30% of your heating bill. Seal them with a "shrink wrap" kit available at any hardware store. All you need is a few minutes and a blow dryer.*

Drop Date 1	Drop Date 2	Mailings	Name of PDF	Tip	Message
Dec 17		Train Display	OHWave11TrainDisplay	Train Display	

OHWave11TrainDisplay

Duke Energy.

All Aboard!

On Friday, 11/26, our **Holiday Train** pulled into Cincinnati for the 65th year...on schedule and in full splendor!

Featuring **300 cars and 60 engines**-not to mention a **floating castle**-the display is well worth a visit to our office at Fourth and Main. Hours are ***10-6 Mon-Sat*** *and* ***noon-5 on Sundays*** through 12/31 (closed Christmas day).

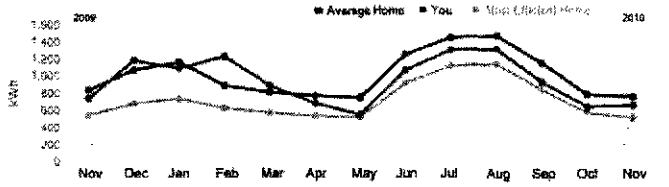
To learn more, visit our website at http://news.duke-energy.com /2010/10/28/duke-energy-holiday -train/

HOW AM I DOING?

750 Households Compared
- *Single family homes*
- *[illegible] sq. ft.*
- *Built in 1935-1950*

Not bad. A few changes can make a world of difference. Try one of the tips below to improve your costs.

HOW AM I DOING OVER TIME?



About the same as last year. In the last 12 months, your home used 6% less energy than the average home.

HOW CAN I LOWER MY BILLS?

1. ***Hit that switch!*** *Offices save thousands by installing sensors that turn off lights in empty rooms. You can buy sensors or timers, too. . . . or just turn off the lights if you're leaving a room for more than five minutes.*

2. ***More Cozy Than Warm.*** *Chimneys are designed to draw smoke - and heat - out of your house. Fireplace doors can lessen heat loss while you are using your fireplace and especially when you are not. Always close your fireplace down as tightly as possible when not in use.*

3. ***Your Window to Energy Savings.*** *Single-pane windows can let in a lot more than sunlight. Consider replacing your old, drafty windows with double- or triple-pane "low emissivity" windows. You'll reduce your heating and cooling costs AND add value to your home.*

Drop Date 1	Drop Date 2	Mailings	Name of PDF	Tip	Message
Jan 18		ESH	OHWave12ESH	ESH	

Share Home Energy Comparison Report
JANUARY 2011

OHWave12ESH

Duke Energy.

The Resolution Solution

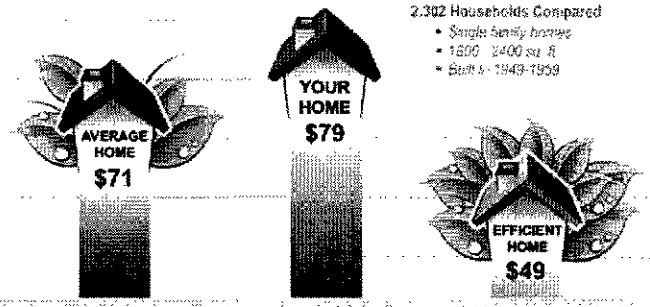
We can't help you get fit, find a new job, or clean out your garage. But our **Energy Solutions @ Home experts can help you whip your home - and energy bill - into shape.**

Our Energy Experts will work with you to **identify** hard-to-spot areas where your home may be **leaking air and money.** And our professionally installed improvements will **increase your comfort and save you money** for years to come.

Find out more by calling our **Energy Experts at 888-873-3853.**

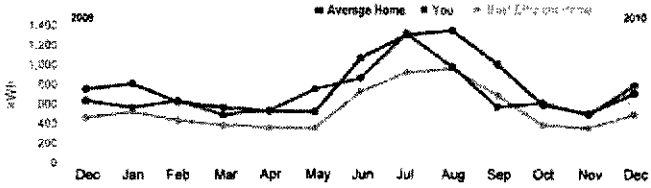
HOW AM I DOING?

2,302 Households Compared
- Single family homes
- 1600 - 2400 sq. ft.
- Built in 1949-1959



Not bad. A few changes can make a world of difference. Try one of the tips below to improve your costs.

HOW AM I DOING OVER TIME?



Higher than last year, but gaining ground. In the last 12 months, your home used 10% less energy than the average home.

HOW CAN I LOWER MY BILLS?

1. ***Leaks add up fast.*** *A dripping faucet can leak 48 gallons in a week... more than many water heater tanks hold! Fix leaks as soon as you discover them - especially hot water leaks, which waste water AND energy.*

2. ***Thank yourself all year.*** *Take an afternoon to check the caulk and weather stripping around all of the doors and windows in your home. A few minutes worth of repairs can make a huge difference in the comfort and efficiency of your home. . . year-round.*

3. ***Shrink-Wrapped Savings.*** *Drafty windows can account for up to 30% of your heating bill. Seal them with a "shrink wrap" kit available at any hardware store. All you need is a few minutes and a blow dryer.*

Appendix L: List of Self-Reported Energy Efficiency Actions

16. Since January 2010, have you done anything else to save electricity in your home that was not included as a tip contained in the Home Energy Comparison Reports?
If yes,16a. What have you done? Anything else?

- I installed CFLs in most of my lights. (N=28)
- I turn lights off when they are not needed. (N=12)
- I have been reducing drafts. (N=11)
- I replaced some windows. (N=10)
- I replaced some doors. (N=9)
- I added insulation to the attic. (N=7)
- I installed shrink wrap over the windows. (N=6)
- I lowered the temperature setting on my thermostat. (N=6)
- I added insulation to the walls. (N=5)
- I use blinds and drapes. (N=5)
- I lowered the temperature setting on my water heater. (N=4)
- I added insulation. (N=3)
- I eliminated unnecessary lights. (N=3)
- I installed a new furnace and AC. (N=3)
- I installed a new roof. (N=3)
- I replaced the water heater. (N=3)
- I installed a new furnace. (N=2)
- I installed a programmable thermostat. (N=2)
- I replaced some windows and doors. (N=2)
- I replaced the heat pump. (N=2)
- I replaced the washing machine. (N=2)
- I unplug electronics. (N=2)
- I buy only Energy Star-rated appliances. (N=1)
- I change my furnace filter more frequently. (N=1)
- I cleaned the attic vents. (N=1)
- I do the laundry with bigger and fewer loads. (N=1)
- I eliminated an electric heater. (N=1)
- I have turned down the temperature in my refrigerator and freezer. (N=1)
- I joined Duke's Power Manager program. (N=1)
- I no longer use the dishwasher to dry dishes. (N=1)
- I replaced televisions. (N=1)
- I replaced the heat pump, water heater and stove. (N=1)
- I replaced the refrigerator. (N=1)
- I turn the TV off. (N=1)
- I unplug appliances. (N=1)
- I use a wood-burning stove. (N=1)
- I use air-conditioning less often. (N=1)
- I use power strips. (N=1)

17. Have you done anything with the appliances in your home to save energy, such as removed second refrigerators or replaced old units?
If yes,17a. What have you done? Anything else?

- I bought an EE washer. (N=24)
- I bought an EE refrigerator. (N=22)
- I bought an EE dishwasher. (N=16)
- I bought an EE dryer. (N=15)
- I bought an EE stove. (N=12)
- I unplug unused appliances. (N=12)
- I bought a new microwave. (N=8)
- I bought an EE washer. (N=5)
- I bought a new freezer. (N=4)
- I bought an EE water heater. (N=3)
- I installed a new water softener. (N=1)
- I rebuilt my coffee-maker. (N=1)
- I repaired my electric range. (N=1)
- I replaced my dehumidifier. (N=1)

18. Have you done anything that affected the cooling of your home?
If yes,18a. What have you done? Anything else?

- I have adjusted the thermostat. (N=14)
- I use the AC less often. (N=11)
- I installed a new AC unit. (N=8)
- I had my HVAC serviced. (N=7)
- I use fans. (N=7)
- I had my AC serviced. (N=6)
- I installed new windows. (N=6)
- I insulated the attic. (N=6)
- I installed a new door. (N=5)
- I cover the windows to keep the sun out in summer. (N=4)
- I joined the Duke Power Manager program. (N=4)
- I use ceiling fans. (N=4)
- I added an EE window AC unit. (N=3)
- I installed a new heat pump. (N=3)
- I installed a new HVAC. (N=3)
- I installed a new roof. (N=3)
- I installed a programmable thermostat. (N=3)
- I added weatherstripping to my doors and windows. (N=2)
- I insulated the walls. (N=2)
- I replace filters regularly. (N=2)
- We changed sleeping arrangements to use cooler rooms. (N=2)

- I close off unused rooms. (N=1)
- I installed an attic fan. (N=1)
- I installed an energy barrier in the attic. (N=1)
- I installed new siding. (N=1)
- I installed shrink wrap over some windows. (N=1)
- I maintain zone heating within house. (N=1)
- I planted trees for shade in the future. (N=1)
- I use window units instead of a broken central air system. (N=1)

19. Have you done anything that affected the heating of your home?
If yes, 19a. What have you done? Anything else?

- I have adjusted the thermostat. (N=25)
- I have been reducing drafts. (N=16)
- I installed a new furnace. (N=13)
- I added insulation to the attic. (N=11)
- I replaced doors. (N=10)
- I replaced windows. (N=9)
- I had my HVAC serviced. (N=7)
- I added insulation to the walls. (N=6)
- I had the furnace serviced. (N=6)
- I installed shrink wrap over some windows. (N=6)
- I installed a new heat pump. (N=5)
- I replace furnace filters regularly. (N=5)
- I use space heaters. (N=5)
- I installed a programmable thermostat. (N=4)
- I added insulation. (N=3)
- I installed a ceiling fan. (N=1)
- I installed a new air cleaner in the furnace. (N=1)
- I installed a new HVAC. (N=1)
- I installed a new roof. (N=1)
- I installed a pellet stove. (N=1)
- I installed a wood-burning fireplace. (N=1)
- I installed an energy barrier in the attic. (N=1)
- I installed new siding. (N=1)
- I keep the drapes from blocking the vents. (N=1)
- I modified the ductwork to make heating more effective. (N=1)
- I replaced a log fireplace with a gas unit. (N=1)
- I replaced all of the ducts. (N=1)

20. Have you done anything that affected the lighting in your home?
If yes, 20a. What have you done? Anything else?

- I installed CFLs in some of my lights. (N=115)
- I installed CFLs in most of my lights. (N=24)
- I installed CFLs in all of my lights. (N=23)
- I turn off unused lights. (N=16)
- I installed CFLs using a coupon from Duke. (N=4)
- I eliminated unnecessary lights. (N=1)
- Daylighting (N=1)
- I installed dimmable recessed lights. (N=1)
- I installed halogen fixtures. (N=1)
- I installed LED light bulbs. (N=1)
- Solar lights outdoors (N=1)

21. Have you done anything with home computers or electronics?
If yes, 21a. What have you done? Anything else?

- I unplug electronics. (N=30)
- I turn off electronics. (N=15)
- I use power strips. (N=9)
- I switched to a laptop. (N=5)
- I upgraded to a more energy efficient home computer. (N=3)
- I use the power saver on my computer. (N=2)
- I bought a flat screen television. (N=1)
- I bought an Energy Star television. (N=1)
- I replaced monitors with LED displays. (N=1)

22. Have you done anything to affect hot water heating in your home?
If yes, 22a. What have you done? Anything else?

- I bought an EE water heater. (N=24)
- I lowered the water heater temperature. (N=23)
- I use less hot water. (N=7)
- Water heater blanket (N=7)
- I repaired my water heater (N=3)
- I drained my water heater. (N=3)
- I turn my water heater off when away from home. (N=1)

23a. Did you make any changes to your hot tub or pool's heating or filtering systems to make it more efficient?
If yes, 23b. What have you done? Anything else?

- I had it repaired. (N=2)

- I installed a new pump. (N=2)
- I installed a timer on the pump. (N=2)
- I shut down hot tub. (N=2)
- I change the filters every 3 weeks. (N=1)
- I installed a new filter. (N=1)
- I installed a new filtering system to reduce energy needed. (N=1)
- I installed a new insulated cover. (N=1)
- I installed a timer on the heater. (N=1)
- I turned off the filtering system. (N=1)
- I turned off the heater. (N=1)

Appendix M: Estimated Billing Data Models

Overall

kwhd	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
part	-.4799134	.113393	-4.23	0.000	-.7021597	-.2576672
tme#c.hdd						
200901	.0192862	.0015352	12.56	0.000	.0162773	.0222952
200902	.0392942	.0010194	38.54	0.000	.0372962	.0412923
200903	.0374197	.0012731	29.39	0.000	.0349245	.0399149
200904	-.0031186	.0042878	-0.73	0.467	-.0115225	.0052853
200905	.0251567	.0020433	12.31	0.000	.0211518	.0291615
200906	-.0727455	.0118849	-6.12	0.000	-.0960394	-.0494516
200907	.1092014	.0287254	3.80	0.000	.0529006	.1655022
200908	-.339489	.0381538	-8.90	0.000	-.4142692	-.2647089
200909	-.316898	.0286695	-11.05	0.000	-.3730893	-.2607067
200910	.0376492	.0040912	9.20	0.000	.0296305	.0456679
200911	.0076643	.00406	1.89	0.059	-.0002931	.0156217
200912	.0280463	.0010567	26.54	0.000	.0259752	.0301173
201001	.0364919	.0019717	18.51	0.000	.0326274	.0403564
201002	.0427612	.0023245	18.40	0.000	.0382054	.0473171
201003	.032146	.0006767	47.50	0.000	.0308196	.0334724
201004	.0058214	.0033991	1.71	0.087	-.0008406	.0124835
201005	.0125909	.0050553	2.49	0.013	.0026828	.0224991
201006	.0083108	.006373	1.30	0.192	-.0041801	.0208016
201007	.0405023	.0200202	2.02	0.043	.0012635	.0797411
201008	-.0146923	.0164461	-0.89	0.372	-.0469261	.0175415
201009	.0305319	.0016015	19.06	0.000	.027393	.0336708
201010	.0106673	.0016867	6.32	0.000	.0073614	.0139732
201011	.0111852	.0012357	9.05	0.000	.0087633	.0136072
201012	.0276645	.0007518	36.80	0.000	.026191	.029138
201101	.0331045	.0017004	19.47	0.000	.0297717	.0364373
201102	.0346774	.00099	35.03	0.000	.0327371	.0366178
tme#c.cdd						
200901	.0328109	.01375	2.39	0.017	.0058614	.0597604
200902	.1313367	.0125612	10.46	0.000	.1067171	.1559563
200903	.0772519	.0119908	6.44	0.000	.0537503	.1007534
200904	-.0112055	.0105741	-1.06	0.289	-.0319302	.0095193
200905	.0478126	.0083816	5.70	0.000	.031385	.0642403
200906	.0278484	.0079753	3.49	0.000	.0122171	.0434797
200907	.066783	.0054823	12.18	0.000	.0560379	.0775282
200908	.0450725	.0061704	7.30	0.000	.0329787	.0571664
200909	.0348145	.0058552	5.95	0.000	.0233386	.0462904
200910	.108672	.0104762	10.37	0.000	.0881391	.1292049
200911	-.0738078	.0572742	-1.29	0.198	-.1860633	.0384476
200912	.0177589	.0784023	0.23	0.821	-.1359069	.1714246
201001	1.646656	1.23753	1.33	0.183	-.7788587	4.07217
201002	1.539532	1.017199	1.51	0.130	-.454142	3.533206
201003	.8490759	.2456319	3.46	0.001	.3676463	1.330506
201004	-.1508513	.0160295	-9.41	0.000	-.1822685	-.119434
201005	.0714706	.0108288	6.60	0.000	.0502466	.0926946
201006	.0890522	.0038793	22.96	0.000	.0814489	.0966555
201007	.0711165	.0039405	18.05	0.000	.0633934	.0788397
201008	-.057653	.0045553	-12.66	0.000	-.0665813	-.0487247
201009	.0847212	.0021408	39.57	0.000	.0805253	.0889172
201010	.0709748	.0035484	20.00	0.000	.0640201	.0779296
201011	.0136954	.0482189	0.28	0.776	-.0808118	.1082027
201012	-.534134	.1242445	-4.30	0.000	-.7776487	-.2906193
tme						

200902	-18.73306	2.088567	-8.97	0.000	-22.82657	-14.63954
200903	-17.91744	2.02182	-8.86	0.000	-21.88013	-13.95474
200904	-.0068828	2.710226	-0.00	0.998	-5.318827	5.305062
200905	-13.50576	1.939117	-6.96	0.000	-17.30636	-9.705158
200906	.2440958	2.697849	0.09	0.928	-5.043591	5.531783
200907	-9.49607	2.410296	-3.94	0.000	-14.22016	-4.771977
200908	3.036196	2.405423	1.26	0.207	-1.678346	7.750738
200909	7.183451	2.624034	2.74	0.006	2.040438	12.32646
200910	-18.3412	2.265302	-8.10	0.000	-22.78111	-13.90129
200911	-5.770503	2.395105	-2.41	0.016	-10.46482	-1.076184
200912	-15.06848	1.906622	-7.90	0.000	-18.80539	-11.33157
201001	-21.75338	2.968846	-7.33	0.000	-27.57221	-15.93454
201002	-22.45763	2.965827	-7.57	0.000	-28.27055	-16.64472
201003	-14.66285	1.851002	-7.92	0.000	-18.29075	-11.03496
201004	.6858798	2.579637	0.27	0.790	-4.370115	5.741875
201005	-13.53968	2.407236	-5.62	0.000	-18.25778	-8.821584
201006	-16.81547	2.059631	-8.16	0.000	-20.85228	-12.77867
201007	-9.123746	2.173302	-4.20	0.000	-13.38334	-4.864152
201008	43.60984	2.545648	17.13	0.000	38.62046	48.59922
201009	-12.28083	1.838627	-6.68	0.000	-15.88447	-8.677187
201010	-10.86528	1.80744	-6.01	0.000	-14.4078	-7.32276
201011	-9.820185	1.838318	-5.34	0.000	-13.42322	-6.217148
201012	-17.07246	1.880336	-9.08	0.000	-20.75785	-13.38707
201101	-20.80151	2.803991	-7.42	0.000	-26.29723	-15.30579
201102	-17.69464	2.075499	-8.53	0.000	-21.76255	-13.62674

daily use <20 kWh

kwhd	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
part	-.2582221	.0823451	-3.14	0.002	-.4196173	-.096827
tme#c.hdd						
200901	.0031535	.0010219	3.09	0.002	.0011505	.0051565
200902	.0065566	.0006828	9.60	0.000	.0052183	.0078949
200903	.0065841	.0008575	7.68	0.000	.0049034	.0082647
200904	-.0045518	.0029816	-1.53	0.127	-.0103957	.0012921
200905	.0039896	.0013949	2.86	0.004	.0012556	.0067236
200906	.0186915	.0084859	2.20	0.028	.0020592	.0353237
200907	-.0248309	.0202108	-1.23	0.219	-.0644438	.0147819
200908	-.0988225	.0268798	-3.68	0.000	-.1515065	-.0461384
200909	-.0523655	.0210627	-2.49	0.013	-.093648	-.0110829
200910	-.0008977	.0027385	-0.33	0.743	-.0062651	.0044697
200911	-.0009491	.0027774	-0.34	0.733	-.0063927	.0044945
200912	.0060048	.0007098	8.46	0.000	.0046136	.007396
201001	.0041751	.001323	3.16	0.002	.0015821	.0067682
201002	.0019549	.0016578	1.18	0.238	-.0012944	.0052041
201003	.005161	.0004679	11.03	0.000	.004244	.006078
201004	.0017797	.002308	0.77	0.441	-.002744	.0063033
201005	-.0038023	.0033689	-1.13	0.259	-.0104052	.0028006
201006	-.0170685	.0037278	-4.58	0.000	-.0243749	-.0097621
201007	-.2839879	.0499028	-5.69	0.000	-.3817967	-.1861791
201008	-1.100734	.1236067	-8.91	0.000	-1.343002	-.8584669
201009	.014753	.0008972	16.44	0.000	.0129944	.0165116
201010	.0059122	.0009238	6.40	0.000	.0041016	.0077227
201011	.0032608	.0008266	3.95	0.000	.0016407	.0048808
201012	.005055	.0005242	9.64	0.000	.0040276	.0060825
201101	.001974	.0012134	1.63	0.104	-.0004042	.0043522
201102	.0032828	.0007003	4.69	0.000	.0019102	.0046554
tme#c.cdd						
200901	.0144123	.0079124	1.82	0.069	-.0010959	.0299205
200902	.0257146	.0068568	3.75	0.000	.0122754	.0391539
200903	.0171309	.006964	2.46	0.014	.0034816	.0307801
200904	-.0134892	.0072027	-1.87	0.061	-.0276064	.0006281

200905	.0121734	.005542	2.20	0.028	.0013111	.0230356
200906	.0534971	.0056464	9.47	0.000	.0424302	.064564
200907	.0298399	.0039001	7.65	0.000	.0221958	.0374841
200908	.0429409	.0043649	9.84	0.000	.0343858	.051496
200909	.0477046	.0041061	11.62	0.000	.0396567	.0557524
200910	.00563	.0071364	0.79	0.430	-.0083572	.0196172
200911	.0270916	.0380029	0.71	0.476	-.0473935	.1015768
200912	.0170189	.0518425	0.33	0.743	-.0845916	.1186294
201001	.1057407	.3903012	0.27	0.786	-.6592437	.8707252
201002	-.0221871	.3923994	-0.06	0.955	-.791284	.7469098
201003	.0927939	.113032	0.82	0.412	-.1287471	.3143349
201004	-.0275741	.0104433	-2.64	0.008	-.0480428	-.0071053
201005	.0082126	.0071247	1.15	0.249	-.0057517	.0221769
201006	.0409079	.002352	17.39	0.000	.036298	.0455179
201007	.0497954	.0028967	17.19	0.000	.044118	.0554729
201008	-.0074398	.0034928	-2.13	0.033	-.0142857	-.0005939
201009	.0436344	.0014817	29.45	0.000	.0407304	.0465384
201010	.0316466	.0022343	14.16	0.000	.0272674	.0360257
201011	.0067919	.0352094	0.19	0.847	-.0622179	.0758017
201012	-.0970938	.0964091	-1.01	0.314	-.2860541	.0918665
tme						
200902	-4.071038	1.392666	-2.92	0.003	-6.800643	-1.341434
200903	-4.393015	1.349866	-3.25	0.001	-7.038732	-1.747298
200904	.8823986	1.849057	0.48	0.633	-2.741725	4.506522
200905	-3.432015	1.298081	-2.64	0.008	-5.976234	-.8877948
200906	-8.964754	1.868164	-4.80	0.000	-12.62633	-5.303181
200907	-.64439	1.663164	-0.39	0.698	-3.904167	2.615387
200908	-2.391369	1.653053	-1.45	0.148	-5.631328	.8485903
200909	-4.125929	1.820139	-2.27	0.023	-7.693374	-.5584825
200910	-.9116098	1.524373	-0.60	0.550	-3.899359	2.076139
200911	-.8656398	1.610779	-0.54	0.591	-4.022743	2.291463
200912	-3.948022	1.272807	-3.10	0.002	-6.442705	-1.453339
201001	-1.758141	1.984534	-0.89	0.376	-5.647799	2.131516
201002	.4918474	2.067609	0.24	0.812	-3.560635	4.54433
201003	-3.432397	1.240183	-2.77	0.006	-5.863137	-1.001658
201004	-1.210685	1.718312	-0.70	0.481	-4.578552	2.157181
201005	-1.817971	1.604065	-1.13	0.257	-4.961915	1.325973
201006	-4.862142	1.327505	-3.66	0.000	-7.464031	-2.260253
201007	-4.347535	1.598879	-2.72	0.007	-7.481314	-1.213756
201008	18.34985	1.836457	9.99	0.000	14.75042	21.94928
201009	-3.378956	1.233512	-2.74	0.006	-5.796621	-.9612916
201010	-3.231728	1.195207	-2.70	0.007	-5.574315	-.8891412
201011	-2.956951	1.235847	-2.39	0.017	-5.379193	-.5347083
201012	-3.519991	1.262278	-2.79	0.005	-5.994037	-1.045945
201101	.5151645	1.942975	0.27	0.791	-3.293037	4.323366
201102	-1.154074	1.407107	-0.82	0.412	-3.911983	1.603834

daily use >=20 but <30 kWh

kwhd	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
part	-.1021523	.1022921	-1.00	0.318	-.3026428	.0983382
tme#c.hdd						
200901	.0069238	.0013249	5.23	0.000	.004327	.0095205
200902	.0097447	.0008965	10.87	0.000	.0079875	.0115019
200903	.0092383	.0011152	8.28	0.000	.0070525	.0114241
200904	-.0028713	.0037916	-0.76	0.449	-.0103029	.0045602
200905	.0071807	.0018079	3.97	0.000	.0036372	.0107241
200906	-.0193554	.0105223	-1.84	0.066	-.0399788	.0012681
200907	-.0363033	.0262765	-1.38	0.167	-.0878048	.0151982
200908	-.1115814	.0337685	-3.30	0.001	-.177767	-.0453958
200909	-.1739674	.0264003	-6.59	0.000	-.2257114	-.1222233
200910	.0016069	.0034135	0.47	0.638	-.0050835	.0082972

200911	.0059709	.0034138	1.75	0.080	-.0007201	.012662
200912	.0112916	.0009501	11.88	0.000	.0094294	.0131538
201001	.0021988	.0017541	1.25	0.210	-.0012392	.0056369
201002	.0040706	.0021059	1.93	0.053	-.0000569	.0081981
201003	.0076336	.0006127	12.46	0.000	.0064327	.0088346
201004	.0052847	.0031349	1.69	0.092	-.0008596	.011429
201005	-.0045441	.004534	-1.00	0.316	-.0134306	.0043423
201006	.0184834	.0073032	2.53	0.011	.0041693	.0327975
201007	.0583299	.0150602	3.87	0.000	.0288123	.0878476
201008	.0221064	.016064	1.38	0.169	-.0093788	.0535916
201009	.0184185	.0012364	14.90	0.000	.0159952	.0208418
201010	.0036897	.0012895	2.86	0.004	.0011623	.006217
201011	.003425	.0010994	3.12	0.002	.0012702	.0055798
201012	.008798	.0006819	12.90	0.000	.0074614	.0101346
201101	.0009949	.0015855	0.63	0.530	-.0021126	.0041025
201102	.005403	.000906	5.96	0.000	.0036272	.0071787
tme#c.cdd						
200901	.0243901	.0097211	2.51	0.012	.0053369	.0434434
200902	.0432409	.0090158	4.80	0.000	.0255701	.0609117
200903	.0285064	.008458	3.37	0.001	.0119289	.0450839
200904	-.0041429	.0090122	-0.46	0.646	-.0218065	.0135208
200905	.0304166	.007136	4.26	0.000	.0164302	.0444029
200906	.0513945	.0070464	7.29	0.000	.0375837	.0652053
200907	.0513625	.0050125	10.25	0.000	.0415382	.0611869
200908	.0485744	.0057081	8.51	0.000	.0373866	.0597621
200909	.0655555	.0053307	12.30	0.000	.0551075	.0760036
200910	.0297514	.0088964	3.34	0.001	.0123147	.0471881
200911	.0064796	.0506239	0.13	0.898	-.0927422	.1057015
200912	.1170888	.0704731	1.66	0.097	-.0210372	.2552147
201001	4.132828	1.984161	2.08	0.037	.2439124	8.021743
201002	.8227588	.6888241	1.19	0.232	-.5273225	2.17284
201003	.2698708	.1847461	1.46	0.144	-.0922278	.6319694
201004	-.0199899	.014485	-1.38	0.168	-.0483803	.0084004
201005	.0282381	.0096686	2.92	0.003	.0092878	.0471885
201006	.0822494	.0042315	19.44	0.000	.0739557	.0905432
201007	.0550949	.0035272	15.62	0.000	.0481816	.0620083
201008	-.0024093	.0047076	-0.51	0.609	-.0116361	.0068174
201009	.0710128	.0019037	37.30	0.000	.0672815	.0747441
201010	.0535441	.0030139	17.77	0.000	.0476369	.0594513
201011	.000034	.0448537	0.00	0.999	-.0878784	.0879464
201012	-.1729382	.1198035	-1.44	0.149	-.4077507	.0618744
tme						
200902	-3.905699	1.808757	-2.16	0.031	-7.450826	-.3605712
200903	-4.347151	1.747197	-2.49	0.013	-7.771622	-.9226794
200904	1.034193	2.368569	0.44	0.662	-3.608154	5.67654
200905	-4.183963	1.677433	-2.49	0.013	-7.471698	-.8962287
200906	-2.543687	2.360903	-1.08	0.281	-7.171009	2.083635
200907	.8216413	2.14119	0.38	0.701	-3.375049	5.018331
200908	3.00648	2.145546	1.40	0.161	-1.198746	7.211706
200909	1.488362	2.343312	0.64	0.525	-3.104482	6.081206
200910	-.6223422	1.937884	-0.32	0.748	-4.420555	3.17587
200911	-2.470556	2.048983	-1.21	0.228	-6.486521	1.54541
200912	-5.576168	1.663205	-3.35	0.001	-8.836017	-2.31632
201001	4.786289	2.612972	1.83	0.067	-.3350834	9.907662
201002	1.854577	2.6487	0.70	0.484	-3.33682	7.045975
201003	-3.052221	1.607191	-1.90	0.058	-6.202282	.0978403
201004	-1.92493	2.302555	-0.84	0.403	-6.437891	2.588031
201005	-1.96286	2.118385	-0.93	0.354	-6.114852	2.189132
201006	-11.00184	1.960949	-5.61	0.000	-14.84526	-7.158422
201007	.8478202	1.904988	0.45	0.656	-2.885918	4.581558
201008	25.83194	2.441641	10.58	0.000	21.04637	30.6175
201009	-3.377608	1.594407	-2.12	0.034	-6.502613	-.2526025
201010	-2.129321	1.554482	-1.37	0.171	-5.176074	.9174316

201011	-2.119549	1.602801	-1.32	0.186	-5.261007	1.021909
201012	-4.471515	1.640158	-2.73	0.006	-7.686191	-1.256839
201101	5.419075	2.534543	2.14	0.033	.4514218	10.38673
201102	-.4800925	1.820436	-0.26	0.792	-4.04811	3.087925

daily use >=30 but <40 kWh

kwhd	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
part	-.147533	.1588607	-0.93	0.353	-.458897	.163831
tme#c.hdd						
200901	.0076927	.0021302	3.61	0.000	.0035176	.0118678
200902	.0201281	.0014252	14.12	0.000	.0173348	.0229215
200903	.0160353	.0017875	8.97	0.000	.0125318	.0195389
200904	.0025023	.005971	0.42	0.675	-.0092008	.0142054
200905	.0084489	.0028596	2.95	0.003	.0028442	.0140536
200906	-.0667249	.0167422	-3.99	0.000	-.0995393	-.0339106
200907	-.0413668	.0403031	-1.03	0.305	-.12036	.0376264
200908	-.1151847	.0533326	-2.16	0.031	-.2197156	-.0106538
200909	-.1589163	.0401591	-3.96	0.000	-.2376273	-.0802053
200910	-.001421	.0053862	-0.26	0.792	-.0119779	.0091359
200911	.0034295	.0055965	0.61	0.540	-.0075395	.0143985
200912	.0165352	.001483	11.15	0.000	.0136286	.0194419
201001	.0111128	.0027405	4.06	0.000	.0057414	.0164841
201002	.0110812	.0032953	3.36	0.001	.0046224	.0175401
201003	.0145373	.0009462	15.36	0.000	.0126828	.0163919
201004	.0144634	.00475	3.04	0.002	.0051535	.0237733
201005	-.0078235	.0071547	-1.09	0.274	-.0218466	.0061997
201006	-.0356739	.0075773	-4.71	0.000	-.0505252	-.0208226
201007	-.408708	.1601655	-2.55	0.011	-.7226294	-.0947866
201008	-1.114197	.2803645	-3.97	0.000	-1.663706	-.5646878
201009	.028499	.0022744	12.53	0.000	.0240413	.0329567
201010	.0070856	.0023645	3.00	0.003	.0024511	.01172
201011	.0056466	.0017103	3.30	0.001	.0022945	.0089986
201012	.0146716	.001064	13.79	0.000	.0125861	.0167571
201101	.0123206	.0023558	5.23	0.000	.0077033	.016938
201102	.0112019	.0013827	8.10	0.000	.0084918	.013912
tme#c.cdd						
200901	.0139649	.0202424	0.69	0.490	-.0257098	.0536397
200902	.0924779	.0190445	4.86	0.000	.0551509	.1298048
200903	.0373956	.0173719	2.15	0.031	.0033469	.0714443
200904	-.002908	.0149076	-0.20	0.845	-.0321266	.0263107
200905	.0232037	.0113273	2.05	0.041	.0010024	.045405
200906	.0361714	.0112142	3.23	0.001	.0141917	.0581512
200907	.066254	.0076473	8.66	0.000	.0512653	.0812426
200908	.0661979	.0086548	7.65	0.000	.0492347	.083161
200909	.0734157	.0082118	8.94	0.000	.0573206	.0895107
200910	.0263758	.0139002	1.90	0.058	-.0008683	.05362
200911	.0211955	.0807107	0.26	0.793	-.136996	.179387
200912	.0579454	.1104837	0.52	0.600	-.1586005	.2744913
201001	1.375737	1.975487	0.70	0.486	-2.496181	5.247655
201002	1.560899	1.987165	0.79	0.432	-2.333906	5.455705
201003	.5687452	.5034594	1.13	0.259	-.4180258	1.555516
201004	-.0067533	.022368	-0.30	0.763	-.0505941	.0370874
201005	.0245006	.0151941	1.61	0.107	-.0052795	.0542807
201006	.0672872	.0047677	14.11	0.000	.0579426	.0766318
201007	.0523158	.0071586	7.31	0.000	.0382851	.0663465
201008	-.0540359	.0062536	-8.64	0.000	-.0662929	-.0417789
201009	.0872134	.003019	28.89	0.000	.0812963	.0931305
201010	.0699472	.0048899	14.30	0.000	.060363	.0795314
201011	-.014064	.069098	-0.20	0.839	-.1494949	.1213668
201012	-.5649112	.1777021	-3.18	0.001	-.9132039	-.2166184
tme						

200902	-14.14786	2.909643	-4.86	0.000	-19.85071	-8.445013
200903	-11.17509	2.819825	-3.96	0.000	-16.70189	-5.648283
200904	-5.885255	3.770008	-1.56	0.119	-13.2744	1.50389
200905	-9.086813	2.687802	-3.38	0.001	-14.35486	-3.818772
200906	-.7483079	3.775904	-0.20	0.843	-8.14901	6.652394
200907	-5.294634	3.353934	-1.58	0.114	-11.86828	1.279013
200908	-3.413412	3.348146	-1.02	0.308	-9.975716	3.148892
200909	-3.726978	3.662446	-1.02	0.309	-10.9053	3.451349
200910	-4.760227	3.085082	-1.54	0.123	-10.80693	1.286476
200911	-6.308182	3.310286	-1.91	0.057	-12.79628	.1799167
200912	-12.14633	2.650238	-4.58	0.000	-17.34074	-6.95191
201001	-5.318619	4.123062	-1.29	0.197	-13.39974	2.762506
201002	-4.944945	4.173174	-1.18	0.236	-13.12429	3.234398
201003	-10.57763	2.574528	-4.11	0.000	-15.62366	-5.531605
201004	-10.95185	3.586951	-3.05	0.002	-17.98221	-3.921496
201005	-6.569821	3.377383	-1.95	0.052	-13.18943	.0497867
201006	-8.219662	2.74408	-3.00	0.003	-13.59801	-2.841317
201007	2.112813	3.900539	0.54	0.588	-5.532172	9.757797
201008	45.18117	3.510334	12.87	0.000	38.30098	52.06136
201009	-10.65297	2.56116	-4.16	0.000	-15.67279	-5.63314
201010	-8.888349	2.50909	-3.54	0.000	-13.80612	-3.97058
201011	-8.255589	2.554465	-3.23	0.001	-13.26229	-3.248885
201012	-11.85888	2.617965	-4.53	0.000	-16.99004	-6.727715
201101	-8.651475	3.888099	-2.23	0.026	-16.27208	-1.030874
201102	-6.765086	2.890109	-2.34	0.019	-12.42965	-1.100526

daily use >=40 but <50 kWh

kwhd	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
part	-.127578	.2435258	-0.52	0.600	-.6048853	.3497293
tme#c.hdd						
200901	.0185523	.0033566	5.53	0.000	.0119733	.0251312
200902	.0357923	.0021765	16.45	0.000	.0315265	.0400581
200903	.0336483	.0028064	11.99	0.000	.0281477	.0391488
200904	.0039212	.0091653	0.43	0.669	-.0140427	.0218851
200905	.015558	.0044619	3.49	0.000	.0068127	.0243034
200906	-.0313595	.0252001	-1.24	0.213	-.0807513	.0180323
200907	-.1457333	.0601011	-2.42	0.015	-.2635307	-.0279359
200908	-.3204807	.0827766	-3.87	0.000	-.4827217	-.1582397
200909	-.3027006	.0608151	-4.98	0.000	-.4218975	-.1835038
200910	.0098707	.0091017	1.08	0.278	-.0079685	.0277098
200911	.0154596	.0084233	1.84	0.066	-.00105	.0319692
200912	.029398	.0022695	12.95	0.000	.0249499	.0338462
201001	.0213058	.0042748	4.98	0.000	.0129273	.0296843
201002	.0207789	.0048263	4.31	0.000	.0113194	.0302385
201003	.0325873	.0014399	22.63	0.000	.0297652	.0354095
201004	.0115779	.0071062	1.63	0.103	-.0023501	.0255059
201005	.0000595	.0108271	0.01	0.996	-.0211614	.0212804
201006	-.0116203	.0128995	-0.90	0.368	-.0369032	.0136626
201007	-1.227732	.242536	-5.06	0.000	-1.703099	-.7523647
201008	-.3067698	.1634751	-1.88	0.061	-.6271788	.0136392
201009	.030922	.0043274	7.15	0.000	.0224403	.0394038
201010	.0075621	.0044644	1.69	0.090	-.0011881	.0163124
201011	.012714	.0026878	4.73	0.000	.0074458	.0179821
201012	.0264202	.0016046	16.47	0.000	.0232752	.0295652
201101	.0254872	.0036035	7.07	0.000	.0184244	.0325499
201102	.0331129	.0020774	15.94	0.000	.0290412	.0371846
tme#c.cdd						
200901	-.0024207	.0455939	-0.05	0.958	-.091784	.0869426
200902	.1174682	.0345324	3.40	0.001	.0497852	.1851512
200903	.0039174	.0313189	0.13	0.900	-.0574672	.0653021
200904	-.0210103	.0233278	-0.90	0.368	-.0667325	.0247119

200905	.0196248	.0192798	1.02	0.309	-.0181634	.057413
200906	.0646653	.01711	3.78	0.000	.0311299	.0982008
200907	.0559819	.0115682	4.84	0.000	.0333084	.0786554
200908	.0568613	.0129465	4.39	0.000	.0314864	.0822363
200909	.0512831	.0125788	4.08	0.000	.0266288	.0759373
200910	.038773	.0231037	1.68	0.093	-.0065098	.0840559
200911	.1779195	.1225747	1.45	0.147	-.0623252	.4181642
200912	.0888702	.1673125	0.53	0.595	-.2390599	.4168004
201003	1.09806	.5946768	1.85	0.065	-.067498	2.263619
201004	-.1081169	.0339176	-3.19	0.001	-.1745949	-.0416389
201005	.0475058	.0234643	2.02	0.043	.0015161	.0934955
201006	.0885804	.0080242	11.04	0.000	.0728529	.1043078
201007	.0492553	.0111273	4.43	0.000	.0274459	.0710648
201008	-.0347803	.0097141	-3.58	0.000	-.0538197	-.0157409
201009	.0815495	.0045584	17.89	0.000	.072615	.090484
201010	.0650831	.0082903	7.85	0.000	.0488341	.0813321
201011	-.0085895	.1009977	-0.09	0.932	-.2065436	.1893646
201012	-.4697485	.260106	-1.81	0.071	-.9795526	.0400556
tme						
200902	-17.0097	4.559742	-3.73	0.000	-25.94673	-8.072663
200903	-15.02247	4.447274	-3.38	0.001	-23.73906	-6.305872
200904	-2.497928	5.865055	-0.43	0.670	-13.99336	8.9975
200905	-8.620371	4.261104	-2.02	0.043	-16.97208	-.2686659
200906	-6.419952	5.820968	-1.10	0.270	-17.82897	4.989065
200907	.0831626	5.181444	0.02	0.987	-10.0724	10.23872
200908	3.344436	5.150498	0.65	0.516	-6.75047	13.43934
200909	6.221042	5.676179	1.10	0.273	-4.904192	17.34628
200910	-6.612631	4.973988	-1.33	0.184	-16.36158	3.136317
200911	-9.793406	5.120691	-1.91	0.056	-19.82989	.243079
200912	-16.0114	4.138361	-3.87	0.000	-24.12253	-7.90027
201001	-4.797608	6.464002	-0.74	0.458	-17.46696	7.871748
201002	-1.406308	6.233244	-0.23	0.822	-13.62338	10.81076
201003	-15.77753	4.045057	-3.90	0.000	-23.70579	-7.849277
201004	-2.514194	5.513865	-0.46	0.648	-13.32129	8.292906
201005	-8.360584	5.232288	-1.60	0.110	-18.6158	1.894629
201006	-13.22667	4.404768	-3.00	0.003	-21.85995	-4.593381
201007	8.598958	6.077239	1.41	0.157	-3.312347	20.51026
201008	38.42568	5.497735	6.99	0.000	27.6502	49.20117
201009	-8.44402	4.01762	-2.10	0.036	-16.3185	-.5695397
201010	-8.299261	4.001192	-2.07	0.038	-16.14154	-.4569794
201011	-9.614831	3.992705	-2.41	0.016	-17.44048	-1.789185
201012	-16.49122	4.078834	-4.04	0.000	-24.48567	-8.496759
201101	-12.79098	6.030111	-2.12	0.034	-24.60992	-.9720493
201102	-18.06889	4.500285	-4.02	0.000	-26.88939	-9.248393

daily use >=50 but <60 kWh

kwhd	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
part	-1.060065	.3392042	-3.13	0.002	-1.724903	-.3952273
tme#c.hdd						
200901	.0339115	.0047772	7.10	0.000	.0245482	.0432748
200902	.0554405	.0030863	17.96	0.000	.0493913	.0614897
200903	.0563419	.0038642	14.58	0.000	.0487681	.0639158
200904	-.0201123	.0132609	-1.52	0.129	-.0461035	.0058789
200905	.0363377	.0059438	6.11	0.000	.0246879	.0479876
200906	-.0257532	.0351068	-0.73	0.463	-.0945623	.0430559
200907	.1732911	.0819454	2.11	0.034	.0126786	.3339035
200908	-.4475658	.1132399	-3.95	0.000	-.6695153	-.2256162
200909	-.3140371	.0834117	-3.76	0.000	-.4775235	-.1505507
200910	.0459473	.0128877	3.57	0.000	.0206875	.0712071
200911	-.0806565	.0124875	-6.46	0.000	-.1051318	-.0561811
200912	.045882	.0031504	14.56	0.000	.0397071	.0520568

201001	.0391574	.0059639	6.57	0.000	.0274682	.0508467
201002	.0746738	.0069453	10.75	0.000	.0610612	.0882865
201003	.049131	.0019697	24.94	0.000	.0452704	.0529916
201004	.0051219	.0100123	0.51	0.609	-.0145022	.0247459
201005	.0137485	.0140416	0.98	0.328	-.013773	.0412699
201006	.0367801	.017767	2.07	0.038	.0019568	.0716034
201007	.0637403	.0237978	2.68	0.007	.0170968	.1103837
201008	.0074933	.0174901	0.43	0.668	-.0267871	.0417737
201009	.0325635	.0060058	5.42	0.000	.0207921	.0443349
201010	.0149791	.0064661	2.32	0.021	.0023055	.0276527
201011	.0225502	.0036816	6.13	0.000	.0153343	.0297662
201012	.0408859	.0021884	18.68	0.000	.0365967	.0451751
201101	.0313939	.004912	6.39	0.000	.0217663	.0410214
201102	.0460747	.0028672	16.07	0.000	.0404551	.0516944
tme#c.cdd						
200901	.1574382	.0636545	2.47	0.013	.0326758	.2822007
200902	.2818231	.0527024	5.35	0.000	.1785268	.3851195
200903	.1182566	.0453228	2.61	0.009	.0294242	.2070889
200904	-.0462027	.0322917	-1.43	0.152	-.1094943	.0170888
200905	.0855387	.025226	3.39	0.001	.0360959	.1349816
200906	.0764217	.0237805	3.21	0.001	.0298121	.1230314
200907	.0562928	.0159078	3.54	0.000	.0251137	.087472
200908	.0646247	.0179755	3.60	0.000	.0293928	.0998566
200909	.0310832	.0173761	1.79	0.074	-.0029738	.0651402
200910	.1109364	.0323173	3.43	0.001	.0475946	.1742781
200911	.2108431	.1687477	1.25	0.212	-.1199012	.5415875
200912	.0139954	.2287871	0.06	0.951	-.4344259	.4624167
201003	2.076962	.8233334	2.52	0.012	.463234	3.690691
201004	-.2101985	.0482261	-4.36	0.000	-.3047214	-.1156757
201005	.1039486	.0308788	3.37	0.001	.0434264	.1644708
201006	.1163775	.0114035	10.21	0.000	.0940268	.1387283
201007	.0837088	.0115937	7.22	0.000	.0609851	.1064325
201008	-.1822118	.0112457	-16.20	0.000	-.2042532	-.1601703
201009	.0733169	.0063124	11.61	0.000	.0609446	.0856892
201010	.0604568	.0119284	5.07	0.000	.0370772	.0838365
201011	.0261977	.1355857	0.19	0.847	-.2395493	.2919448
201012	-.90174	.334747	-2.69	0.007	-1.557842	-.2456379
tme						
200902	-17.889	6.500871	-2.75	0.006	-30.63067	-5.147335
200903	-19.77195	6.298003	-3.14	0.002	-32.116	-7.427908
200904	14.78273	8.397439	1.76	0.078	-1.676196	31.24166
200905	-14.05183	5.963942	-2.36	0.018	-25.74112	-2.362546
200906	-7.193802	8.168463	-0.88	0.378	-23.20394	8.816335
200907	-3.708245	7.245364	-0.51	0.609	-17.90911	10.49262
200908	4.773592	7.216639	0.66	0.508	-9.370975	18.91816
200909	11.74118	7.938153	1.48	0.139	-3.817547	27.29991
200910	-16.6632	7.030534	-2.37	0.018	-30.443	-2.883394
200911	34.88231	7.348122	4.75	0.000	20.48004	49.28458
200912	-18.70127	5.844207	-3.20	0.001	-30.15588	-7.246666
201001	-7.189306	9.071113	-0.79	0.428	-24.96863	10.59002
201002	-37.62821	8.911521	-4.22	0.000	-55.09474	-20.16168
201003	-15.01384	5.73353	-2.62	0.009	-26.25152	-3.776155
201004	9.424238	7.830927	1.20	0.229	-5.924329	24.77281
201005	-11.97739	7.12975	-1.68	0.093	-25.95166	1.99687
201006	-20.34867	6.23228	-3.27	0.001	-32.56389	-8.133436
201007	-9.896662	6.518737	-1.52	0.129	-22.67335	2.880023
201008	98.40644	7.095881	13.87	0.000	84.49856	112.3143
201009	-5.556075	5.693301	-0.98	0.329	-16.71491	5.602759
201010	-7.674509	5.693144	-1.35	0.178	-18.83304	3.484016
201011	-10.58005	5.622952	-1.88	0.060	-21.601	.4409044
201012	-18.26025	5.7456	-3.18	0.001	-29.52159	-6.998905
201101	-.9313857	8.397416	-0.11	0.912	-17.39027	15.5275
201102	-12.69054	6.373219	-1.99	0.046	-25.182	-.1990676

daily use >=60 but <70 kWh

kwhd	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
part	-.6743034	.4079416	-1.65	0.098	-1.473871	.1252638
tme#c.hdd						
200901	.050692	.0058661	8.64	0.000	.0391945	.0621895
200902	.0705968	.0038141	18.51	0.000	.0631211	.0780725
200903	.0710278	.0050276	14.13	0.000	.0611737	.0808819
200904	-.0141059	.0158689	-0.89	0.374	-.045209	.0169971
200905	.034092	.0075481	4.52	0.000	.0192977	.0488862
200906	.0147246	.0446776	0.33	0.742	-.0728436	.1022929
200907	.0971316	.1029937	0.94	0.346	-.1047364	.2989996
200908	-.1947332	.1379823	-1.41	0.158	-.4651791	.0757127
200909	-.228369	.1005074	-2.27	0.023	-.4253639	-.031374
200910	.059192	.0177504	3.33	0.001	.0244011	.0939828
200911	.0201952	.0168559	1.20	0.231	-.0128424	.0532329
200912	.0588511	.0038917	15.12	0.000	.0512233	.0664789
201001	.0430965	.0073593	5.86	0.000	.0286721	.0575208
201002	.103826	.0085259	12.18	0.000	.0871151	.1205369
201003	.0618665	.0024559	25.19	0.000	.057053	.06668
201004	.0156722	.0121606	1.29	0.197	-.0081626	.039507
201005	.0117301	.0187868	0.62	0.532	-.0250921	.0485523
201006	.0154734	.0292484	0.53	0.597	-.0418535	.0728004
201007	-.3756429	.416202	-0.90	0.367	-1.1914	.4401147
201008	-.0521178	.6967788	-0.07	0.940	-1.417807	1.313571
201009	.030328	.0077555	3.91	0.000	.0151273	.0455288
201010	.0024935	.0081734	0.31	0.760	-.0135264	.0185134
201011	.0315859	.0046997	6.72	0.000	.0223744	.0407973
201012	.0583332	.0026994	21.61	0.000	.0530424	.0636241
201101	.0103734	.0059623	1.74	0.082	-.0013127	.0220596
201102	.0551488	.0035502	15.53	0.000	.0481903	.0621073
tme#c.cdd						
200901	.0214836	.1823632	0.12	0.906	-.335949	.3789162
200902	.2766123	.0737848	3.75	0.000	.1319937	.4212308
200903	.0154988	.0762465	0.20	0.839	-.1339447	.1649423
200904	-.053598	.0413066	-1.30	0.194	-.134559	.027363
200905	.0003432	.0330945	0.01	0.992	-.0645222	.0652086
200906	.0976878	.030205	3.23	0.001	.0384859	.1568897
200907	.0615812	.0196258	3.14	0.002	.0231145	.1000479
200908	.0543832	.0218605	2.49	0.013	.0115365	.0972299
200909	.0720685	.0210631	3.42	0.001	.0307847	.1133523
200910	.1401586	.044117	3.18	0.001	.0536891	.2266281
200911	.2499571	.2106777	1.19	0.235	-.162972	.6628862
200912	.0110558	.2798992	0.04	0.968	-.5375477	.5596593
201004	-.2620825	.0585867	-4.47	0.000	-.3769128	-.1472523
201005	.0438619	.040106	1.09	0.274	-.034746	.1224699
201006	.095863	.0168956	5.67	0.000	.0627476	.1289784
201007	.0552836	.0186208	2.97	0.003	.0187867	.0917805
201008	-.056803	.0154169	-3.68	0.000	-.0870201	-.0265858
201009	.0922818	.0078455	11.76	0.000	.0769047	.1076589
201010	.0610454	.0150044	4.07	0.000	.0316368	.090454
201011	.1422997	.1665776	0.85	0.393	-.1841931	.4687925
201012	-1.720729	.4093098	-4.20	0.000	-2.522978	-.9184804
tme						
200902	-13.26549	8.014547	-1.66	0.098	-28.97403	2.443054
200903	-16.6481	7.91629	-2.10	0.035	-32.16407	-1.132144
200904	19.30191	10.18483	1.90	0.058	-.6604091	39.26422
200905	-3.81349	7.423775	-0.51	0.607	-18.36412	10.73714
200906	-10.15803	10.25612	-0.99	0.322	-30.26006	9.944008
200907	-1.104078	9.005213	-0.12	0.902	-18.75433	16.54618
200908	5.881748	8.847631	0.66	0.506	-11.45965	23.22314

200909	3.574716	9.685173	0.37	0.712	-15.40826	22.5577
200910	-17.79033	9.094079	-1.96	0.050	-35.61476	.0341035
200911	-2.587197	9.504988	-0.27	0.785	-21.21701	16.04262
200912	-19.33531	7.220936	-2.68	0.007	-33.48838	-5.182246
201001	6.300443	11.20635	0.56	0.574	-15.66405	28.26493
201002	-48.1636	10.98761	-4.38	0.000	-69.69935	-26.62785
201003	-11.69251	7.08716	-1.65	0.099	-25.58337	2.198352
201004	12.56505	9.573825	1.31	0.189	-6.199686	31.32979
201005	-4.909698	9.107881	-0.54	0.590	-22.76118	12.94179
201006	-12.18494	8.329332	-1.46	0.144	-28.51047	4.140582
201007	4.677126	10.3894	0.45	0.653	-15.68613	25.04039
201008	49.09365	9.141459	5.37	0.000	31.17635	67.01095
201009	-8.103282	7.03355	-1.15	0.249	-21.88907	5.682504
201010	-3.263464	7.058946	-0.46	0.644	-17.09903	10.5721
201011	-10.4523	6.951944	-1.50	0.133	-24.07814	3.173533
201012	-22.57713	7.109014	-3.18	0.001	-36.51083	-8.643433
201101	43.21841	10.27407	4.21	0.000	23.08118	63.35563
201102	-5.03063	7.877714	-0.64	0.523	-20.47098	10.40972

daily use >=70 but <80 kWh

kwhd	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
part	-.8262222	.5365381	-1.54	0.124	-1.877848	.2254032
tme#c.hdd						
200901	.0684709	.0078834	8.69	0.000	.0530193	.0839225
200902	.07728	.0051859	14.90	0.000	.0671156	.0874445
200903	.0793945	.0070049	11.33	0.000	.0656647	.0931244
200904	-.0033097	.0193399	-0.17	0.864	-.0412163	.034597
200905	.0586185	.0099888	5.87	0.000	.0390402	.0781968
200906	-.0712753	.0555741	-1.28	0.200	-.1802017	.037651
200907	.1061345	.1359056	0.78	0.435	-.1602432	.3725122
200908	-.6658965	.1784075	-3.73	0.000	-1.015579	-.3162143
200909	-.354641	.1308306	-2.71	0.007	-.6110716	-.0982104
200910	.1083489	.0231325	4.68	0.000	.0630088	.153689
200911	.0333963	.0210605	1.59	0.113	-.0078827	.0746753
200912	.0732491	.0050078	14.63	0.000	.0634338	.0830644
201001	.0327537	.0096752	3.39	0.001	.0137902	.0517172
201002	.1559792	.0107447	14.52	0.000	.1349194	.1770391
201003	.0729188	.0032638	22.34	0.000	.0665216	.079316
201004	.0078796	.0171983	0.46	0.647	-.0258294	.0415886
201005	.0298851	.0259745	1.15	0.250	-.0210254	.0807955
201006	.070382	.0397286	1.77	0.076	-.0074868	.1482508
201007	-.7282209	.5390732	-1.35	0.177	-1.784815	.3283733
201008	-1.461122	1.029018	-1.42	0.156	-3.478018	.5557749
201009	.0437385	.0113085	3.87	0.000	.0215736	.0659033
201010	.0088522	.0103664	0.85	0.393	-.0114661	.0291705
201011	.0394827	.006045	6.53	0.000	.0276344	.0513311
201012	.0671637	.0035393	18.98	0.000	.0602266	.0741008
201101	.0055305	.0079517	0.70	0.487	-.010055	.021116
201102	.0620604	.0047478	13.07	0.000	.0527547	.0713661
tme#c.cdd						
200901	.2264483	.1624254	1.39	0.163	-.0919088	.5448053
200902	.2199562	.1581608	1.39	0.164	-.0900421	.5299546
200903	.118463	.1067193	1.11	0.267	-.0907089	.3276349
200904	-.0465213	.0552042	-0.84	0.399	-.1547227	.06168
200905	.1084793	.0430501	2.52	0.012	.0241002	.1928583
200906	.0451018	.037209	1.21	0.225	-.0278286	.1180322
200907	.0543612	.025631	2.12	0.034	.004124	.1045985
200908	.0224376	.0282519	0.79	0.427	-.0329366	.0778118
200909	.0539959	.0276574	1.95	0.051	-.0002131	.108205
200910	.2496176	.0576566	4.33	0.000	.1366095	.3626256
200911	.4227199	.297955	1.42	0.156	-.1612778	1.006718

200912	-.0331841	.3936519	-0.08	0.933	-.8047496	.7383815
201004	-.334999	.0859219	-3.90	0.000	-.5034076	-.1665905
201005	.1097998	.0562719	1.95	0.051	-.0004942	.2200938
201006	.1351399	.0227829	5.93	0.000	.090485	.1797949
201007	.0564674	.0242304	2.33	0.020	.0089754	.1039595
201008	-.0529738	.0228698	-2.32	0.021	-.0977989	-.0081486
201009	.1016697	.0103821	9.79	0.000	.0813206	.1220188
201010	.0656487	.0194857	3.37	0.001	.0274564	.1038411
201011	.0516744	.2161376	0.24	0.811	-.3719595	.4753083
201012	-1.892563	.5345907	-3.54	0.000	-2.940372	-.8447551
tme						
200902	2.243933	10.80919	0.21	0.836	-18.9423	23.43017
200903	-7.424959	10.79187	-0.69	0.491	-28.57724	13.72732
200904	25.57555	12.96479	1.97	0.049	.1643059	50.9868
200905	-6.605655	9.927336	-0.67	0.506	-26.06343	12.85212
200906	14.42309	13.13707	1.10	0.272	-11.32584	40.17201
200907	11.38389	11.90136	0.96	0.339	-11.94302	34.7108
200908	31.05056	11.67906	2.66	0.008	8.159374	53.94175
200909	21.04746	12.8095	1.64	0.100	-4.059418	46.15434
200910	-24.88081	12.02779	-2.07	0.039	-48.45551	-1.306117
200911	.8434788	12.40482	0.07	0.946	-23.47021	25.15716
200912	-16.30202	9.612905	-1.70	0.090	-35.14351	2.539463
201001	40.77782	14.88954	2.74	0.006	11.59403	69.9616
201002	-80.3477	14.13323	-5.69	0.000	-108.0491	-52.64628
201003	-3.583875	9.503753	-0.38	0.706	-22.21142	15.04367
201004	29.29956	13.3893	2.19	0.029	3.056275	55.54285
201005	-3.296198	12.43173	-0.27	0.791	-27.66264	21.07024
201006	-13.7337	11.17715	-1.23	0.219	-35.64113	8.17373
201007	17.07007	13.69709	1.25	0.213	-9.776505	43.91665
201008	58.99838	12.98673	4.54	0.000	33.54413	84.45263
201009	-.9075262	9.425472	-0.10	0.923	-19.38164	17.56659
201010	4.129092	9.424811	0.44	0.661	-14.34372	22.60191
201011	-4.215059	9.315434	-0.45	0.651	-22.47349	14.04338
201012	-16.49946	9.506359	-1.74	0.083	-35.13211	2.133192
201101	70.52619	13.75558	5.13	0.000	43.56497	97.4874
201102	7.821021	10.56367	0.74	0.459	-12.88399	28.52603

daily use >=80 but <90 kWh

kwhd	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
part	-.9541315	.7775961	-1.23	0.220	-2.47827	.5700068
tme#c.hdd						
200901	.084567	.0117981	7.17	0.000	.0614419	.1076922
200902	.078803	.00761	10.36	0.000	.0638869	.0937192
200903	.0851008	.0093014	9.15	0.000	.0668694	.1033322
200904	-.1488198	.0293863	-5.06	0.000	-.2064188	-.0912208
200905	.0656042	.0146598	4.48	0.000	.0368701	.0943384
200906	-.0426629	.0850642	-0.50	0.616	-.2093941	.1240684
200907	.2437077	.1980269	1.23	0.218	-.1444377	.631853
200908	-.4879962	.2739477	-1.78	0.075	-1.024951	.0489588
200909	-1.21375	.1776564	-6.83	0.000	-1.561968	-.8655323
200910	.1377936	.0341388	4.04	0.000	.0708794	.2047079
200911	.0138163	.0352917	0.39	0.695	-.0553576	.0829903
200912	.0959266	.0076204	12.59	0.000	.0809902	.110863
201001	.0125851	.0141426	0.89	0.374	-.0151353	.0403055
201002	.2031481	.0166785	12.18	0.000	.1704572	.235839
201003	.0783177	.0048926	16.01	0.000	.068728	.0879075
201004	.0144019	.0235664	0.61	0.541	-.0317899	.0605936
201005	-.0056555	.0378632	-0.15	0.881	-.0798698	.0685587
201006	.0158935	.0565428	0.28	0.779	-.094934	.1267209
201007	-.2111686	.708785	-0.30	0.766	-1.600433	1.178096
201008	-2.533391	1.475591	-1.72	0.086	-5.425643	.3588621

201009	.0524962	.0195851	2.68	0.007	.0141081	.0908843
201010	.0039798	.0190035	0.21	0.834	-.0332684	.0412279
201011	.0553449	.0095673	5.78	0.000	.0365924	.0740973
201012	.0817908	.005135	15.93	0.000	.0717259	.0918556
201101	.0073242	.012139	0.60	0.546	-.0164689	.0311173
201102	.0658537	.0072902	9.03	0.000	.0515645	.080143
tme#c.cdd						
200901	.367003	.0996139	3.68	0.000	.1717534	.5622526
200902	.2863662	.1008397	2.84	0.005	.0887139	.4840184
200903	.1096192	.1068283	1.03	0.305	-.0997711	.3190095
200904	-.2786474	.0741166	-3.76	0.000	-.4239208	-.133374
200905	.1375243	.062746	2.19	0.028	.0145381	.2605105
200906	.0628996	.0565404	1.11	0.266	-.0479232	.1737223
200907	.080214	.0373648	2.15	0.032	.0069767	.1534514
200908	.0486281	.042012	1.16	0.247	-.033718	.1309743
200909	-.1061286	.0366999	-2.89	0.004	-.1780628	-.0341944
200910	.3143938	.0846017	3.72	0.000	.148569	.4802186
200911	.582098	.4203497	1.38	0.166	-.2418144	1.40601
200912	.6021013	.5697138	1.06	0.291	-.5145743	1.718777
201004	-.3192213	.1156264	-2.76	0.006	-.5458565	-.092586
201005	.0478891	.0787312	0.61	0.543	-.1064291	.2022073
201006	.1129297	.0329211	3.43	0.001	.0484022	.1774572
201007	.0166665	.0292574	0.57	0.569	-.0406799	.0740129
201008	-.0790145	.0289856	-2.73	0.006	-.1358282	-.0222008
201009	.1026435	.0152788	6.72	0.000	.072696	.132591
201010	.0538258	.0318043	1.69	0.091	-.0085126	.1161643
201011	.2570148	.3155302	0.81	0.415	-.3614445	.8754742
201012	-2.506518	.7849588	-3.19	0.001	-4.045088	-.9679483
tme						
200902	20.18919	16.02479	1.26	0.208	-11.22043	51.5988
200903	4.176629	15.41126	0.27	0.786	-26.03042	34.38368
200904	106.8043	19.51021	5.47	0.000	68.56302	145.0455
200905	-1.511147	14.67262	-0.10	0.918	-30.27043	27.24813
200906	18.11455	19.80633	0.91	0.360	-20.70713	56.93623
200907	12.67033	17.58823	0.72	0.471	-21.80374	47.14439
200908	31.62384	17.35177	1.82	0.068	-2.386748	65.63442
200909	89.16526	17.98984	4.96	0.000	53.90402	124.4265
200910	-25.79867	17.79077	-1.45	0.147	-60.66971	9.072376
200911	17.48299	19.42969	0.90	0.368	-20.60044	55.56643
200912	-22.31492	14.34787	-1.56	0.120	-50.43767	5.807824
201001	85.34219	21.88084	3.90	0.000	42.45434	128.23
201002	-108.875	21.59027	-5.04	0.000	-151.1933	-66.55666
201003	9.28135	14.15035	0.66	0.512	-18.45424	37.01694
201004	35.25703	18.94697	1.86	0.063	-1.880245	72.3943
201005	15.87023	18.22409	0.87	0.384	-19.85015	51.5906
201006	3.058035	16.42405	0.19	0.852	-29.13415	35.25022
201007	38.71859	18.12619	2.14	0.033	3.190095	74.24708
201008	80.29177	17.82786	4.50	0.000	45.34803	115.2355
201009	8.915523	13.99772	0.64	0.524	-18.52091	36.35196
201010	13.92625	14.27761	0.98	0.329	-14.05877	41.91128
201011	-2.599286	13.94664	-0.19	0.852	-29.93559	24.73702
201012	-16.14381	14.01016	-1.15	0.249	-43.60463	11.31701
201101	87.11359	20.75887	4.20	0.000	46.42488	127.8023
201102	23.33655	15.84685	1.47	0.141	-7.724281	54.39739

daily use >=90 kWh

kwhd	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
part	-2.298924	1.11875	-2.05	0.040	-4.491726	-.1061226
tme#c.hdd						
200901	.0450476	.017329	2.60	0.009	.0110821	.0790132
200902	.1545176	.0114257	13.52	0.000	.1321227	.1769125

200903	.1389621	.0146665	9.47	0.000	.1102151	.1677092
200904	.0356199	.0450768	0.79	0.429	-.0527327	.1239726
200905	.0534514	.0221443	2.41	0.016	.0100475	.0968554
200906	-1.0427	.1074721	-9.70	0.000	-1.25335	-.8320495
200907	.7017528	.3072436	2.28	0.022	.0995413	1.303964
200908	-1.484474	.3744571	-3.96	0.000	-2.218427	-.7505211
200909	-.1760566	.2794937	-0.63	0.529	-.7238769	.3717637
200910	.07999	.0420909	1.90	0.057	-.0025102	.1624901
200911	.0560051	.041353	1.35	0.176	-.0250486	.1370589
200912	.0885689	.0113528	7.80	0.000	.066317	.1108209
201001	.0324434	.0217353	1.49	0.136	-.0101587	.0750455
201002	.0573268	.0221444	2.59	0.010	.0139227	.1007309
201003	.1361271	.0072608	18.75	0.000	.1218955	.1503587
201004	.0329387	.0361205	0.91	0.362	-.0378591	.1037366
201005	-.0516502	.0571006	-0.90	0.366	-.1635699	.0602696
201006	.1594716	.0906819	1.76	0.079	-.0182691	.3372123
201007	-3.43732	1.002514	-3.43	0.001	-5.402293	-1.472348
201008	-5.006274	2.579219	-1.94	0.052	-10.06166	.0491122
201009	.0301057	.0172404	1.75	0.081	-.0036862	.0638976
201010	.0167959	.0188872	0.89	0.374	-.0202239	.0538157
201011	.0578777	.0137118	4.22	0.000	.031002	.0847533
201012	.0963763	.0080585	11.96	0.000	.0805812	.1121714
201101	.0133027	.0171462	0.78	0.438	-.0203046	.04691
201102	.1015062	.0101756	9.98	0.000	.0815615	.1214509
tme#c.cdd						
200901	-.0270766	.1834036	-0.15	0.883	-.386556	.3324028
200902	.5002435	.2357703	2.12	0.034	.038123	.9623639
200903	.0023316	.1831245	0.01	0.990	-.3566007	.3612638
200904	.0638715	.1174546	0.54	0.587	-.1663449	.2940878
200905	.088108	.0901962	0.98	0.329	-.0886806	.2648965
200906	-.4440747	.0709818	-6.26	0.000	-.5832022	-.3049473
200907	-.0150144	.0557105	-0.27	0.788	-.1242095	.0941806
200908	.2127787	.0630488	3.37	0.001	.0892002	.3363571
200909	-.0768505	.0609984	-1.26	0.208	-.1964101	.0427092
200910	.1354631	.1074161	1.26	0.207	-.0750773	.3460034
200911	.3254266	.6743791	0.48	0.629	-.9963871	1.64724
200912	-1.093375	.9240747	-1.18	0.237	-2.904604	.717853
201003	6.019505	1.916733	3.14	0.002	2.262621	9.776389
201004	-.4287167	.1754319	-2.44	0.015	-.7725711	-.0848622
201005	.0159874	.1220059	0.13	0.896	-.2231497	.2551246
201006	.3384805	.0510512	6.63	0.000	.2384178	.4385433
201007	.2434522	.0420493	5.79	0.000	.1610337	.3258707
201008	-.0097266	.047139	-0.21	0.837	-.1021213	.082668
201009	.0468545	.0234293	2.00	0.046	.000932	.092777
201010	.0510547	.0389454	1.31	0.190	-.02528	.1273895
201011	.1477819	.462001	0.32	0.749	-.7577611	1.053325
201012	-.855651	1.23392	-0.69	0.488	-3.27419	1.562888
tme						
200902	-103.5557	23.77495	-4.36	0.000	-150.1557	-56.95572
200903	-85.18252	23.19917	-3.67	0.000	-130.6539	-39.71109
200904	-44.16128	29.60595	-1.49	0.136	-102.1903	13.86773
200905	-56.12047	21.71466	-2.58	0.010	-98.68219	-13.55875
200906	111.5947	26.96073	4.14	0.000	58.75048	164.439
200907	-24.89658	26.15643	-0.95	0.341	-76.16438	26.37121
200908	-42.17024	25.77449	-1.64	0.102	-92.68941	8.348933
200909	-4.557239	28.15195	-0.16	0.871	-59.73635	50.62187
200910	-64.95493	24.60633	-2.64	0.008	-113.1845	-16.7254
200911	-59.32585	26.21105	-2.26	0.024	-110.7007	-7.950992
200912	-67.36104	21.35191	-3.15	0.002	-109.2117	-25.51034
201001	16.78158	33.2758	0.50	0.614	-48.44049	82.00366
201002	4.646106	29.98528	0.15	0.877	-54.12641	63.41862
201003	-89.54542	20.92695	-4.28	0.000	-130.5632	-48.52765
201004	-26.87792	28.50431	-0.94	0.346	-82.74767	28.99183

201005	-34.35889	27.22976	-1.26	0.207	-87.73045	19.01267
201006	-112.7722	24.89639	-4.53	0.000	-161.5703	-63.97418
201007	-72.78747	26.24689	-2.77	0.006	-124.2326	-21.34238
201008	2.284615	27.59195	0.08	0.934	-51.79685	56.36608
201009	-31.87132	20.78823	-1.53	0.125	-72.61719	8.874556
201010	-48.17256	20.47489	-2.35	0.019	-88.30428	-8.040838
201011	-64.61779	20.64232	-3.13	0.002	-105.0777	-24.15792
201012	-83.63137	21.06506	-3.97	0.000	-124.9198	-42.3429
201101	35.7652	29.91031	1.20	0.232	-22.86037	94.39077
201102	-58.81164	23.03232	-2.55	0.011	-103.956	-13.66725

Final Report

Evaluation of Duke Energy's 2009-2011 "Get Energy Smart" Program in Ohio

An Impact Evaluation Report

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

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Executive Summary

Key Findings and Recommendations

This section presents the key findings and recommendations identified through this evaluation. Table 1 presents the estimated overall impacts from the billing analysis

Table 1. Estimated Overall Impacts

	Gross Savings	Net Savings
Per Participant Annual Savings		
kWh	113	87
kW	0.010	0.007
Therms	4.10	3.14

The kWh impacts in this table are from the statistical analysis of participants' monthly electricity billing data. Since the billing data cannot provide estimates of either demand (kW) or gas (therms) savings as well as the net to gross ratio, these impact estimates were based upon the engineering analysis impacts, adjusted by the ratio of the overall kWh savings between the billing analysis and the engineering analysis (41%). The engineering analysis also provides insight into impacts by measures (the billing analysis only produces an overall number). Therefore, while the overall result is driven by the billing analysis, an engineering analysis is required as well, so both approaches will be discussed in the report.

The variance between the engineering estimates and the billing analysis can be explained by customer behavioral and psychological effects that are not accounted for in the engineering analysis. These effects include survey biases such as customers' inability to accurately estimate operating hours and imperfect recall regarding the wattage of the incandescent lamps replaced. For example, the Ohio Residential Smart $aver CFL study, dated June 29, 2010, compared customers' self reported hours of operation to the actual hours of operation, measured with lighting loggers, and discovered that customers responding to the survey overestimated their lighting usage by about 40%.

Significant Impact Evaluation Findings

- CFLs account for 70% of total program kWh savings
- These savings were statistically significant at the 95% level of confidence.
- While the realization rate was relatively low (41%), it is not reasonable given the measures involved and the characteristics of the program. Note however that the 95% confidence interval about the savings estimate extends from 76% to 6%.

Freeridership

CFL Freeridership for Duke Energy Customers

TecMarket Works utilized two questions from the student family survey to estimate CFL freeridership. The first question asked survey respondents whether or not they had installed CFLs

prior to participating in the program, and if so, how many they had installed. The second question asked respondents if they had planned on buying any CFLs before participating in the program.

Quantities of pre-installed CFLs range from one to 40 among those respondents who indicated having pre-installed CFLs.

Freeridership ratios based on survey responses are assigned using a Bass curve based on diffusion of innovation product adoption concepts. Zero pre-installed CFLs correspond to an assigned freeridership score of zero percent. Fourteen or more CFLs correspond to a freeridership level of 100 percent. This allows higher credit for savings to participants with the lowest pre-existing use of CFLs and lower savings to those with a history of CFLs. The inflection point of the curve is seven CFLs, which is the typical level of CFL penetration among these participants. A graph of this curve is located in Figure 1 with the corresponding freeridership levels by CFL count shown in Table 2. This approach to estimating freeridership is consistent with the field of product adoption and diffusion research and represents a standard approach within the field of product adoption research. It also recognizes that the more CFLs a home has, the less likely the addition of new Duke Energy CFLs will have an impact on product adoption and use behaviors.

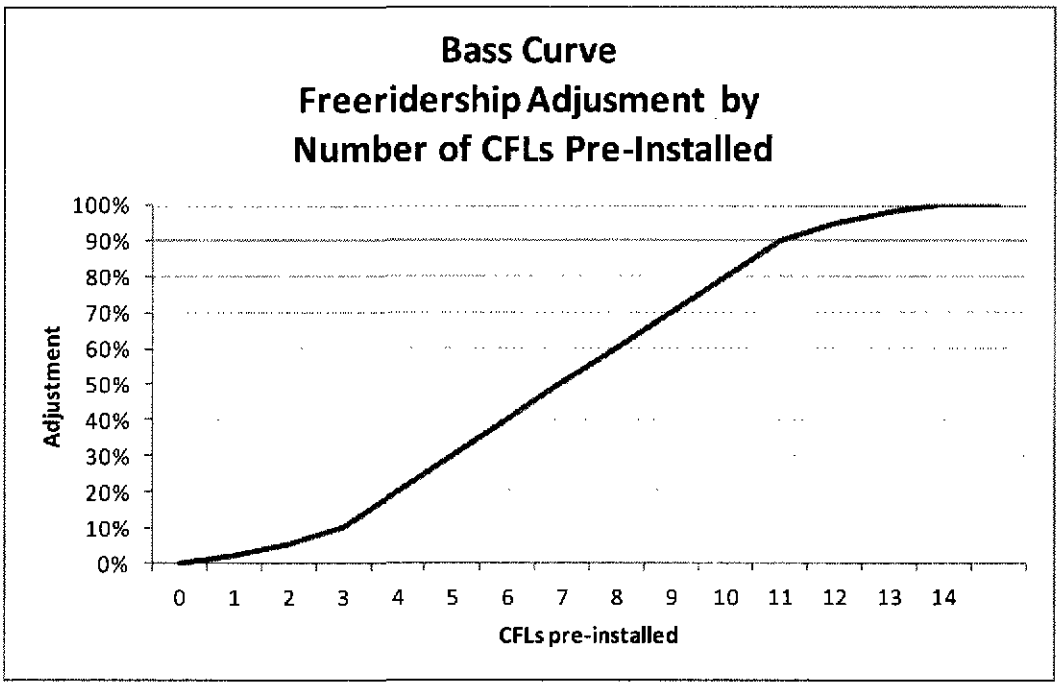

Figure 1. Bass Curve Freeridership Adjustment by Number of CFLs Pre-Installed

Table 2. CFL Freeridership Adjustment Determined by Bass Curve

Number of CFLs pre-installed	Freeridership pre-installation adjustment factor	Number of customers with number of pre-installed CFLs
0	0%	45
1	2%	6

2	5%	16
3	10%	6
4	20%	3
5	30%	4
6	40%	6
7	50%	6
8	60%	9
9	70%	0
10	80%	3
11	90%	0
12	95%	3
13	98%	2
14 or more	100%	11

In addition to the pre-installation adjustment factor, TecMarket Works applied a freeridership multiplier based on whether or not respondents indicated they had planned on purchasing measures before receiving the K-12 energy efficiency kit. These multipliers are shown in Table 3.

Table 3. Freeridership Multiplier Based on Measure Purchasing Plans

Did you plan on purchasing <measure> before receiving the K-12 kit?	Freeridership multiplier*
Yes	1.25 (result cannot exceed 100%) (reduces program savings)
Maybe	1
Don't Know	1
No	0.25 (results cannot be lower than 0%) (increases program savings)
No, already installed in all possible places	Automatic 100% freeridership score

*The values used to modify freeridership (1.25 and .25) represent best practices within the field of evaluation. They are consistant with standard practices requiring an adjustment approach that can reasonably be expected to reflect how technology innovation and diffusion algorithms are modified to compensate for customer preferences and intent as they relate to technology adoption rates.

Combining Table 2 with Table 3 produces Table 4.

Table 4. Number of Participants Cross-Referenced by Freeridership Adjustment and Multiplier

Number of CFLs pre-installed	Freeridership Pre-installation adjustment factor	Number of Participants per Freeridership Multiplier				
		1.25	1	0.25	Automatic 0%	Automatic 100%
0 (N=34)	0%	NA	NA	NA	45	0
1 (N=6)	2%	3	3	0	0	0
2 (N=9)	5%	7	7	2	0	0
3 (N=3)	10%	3	2	1	0	0
4 (N=3)	20%	2	1	0	0	0

5 (N=4)	30%	1	3	0	0	0
6 (N=6)	40%	4	2	0	0	0
7 (N=6)	50%	5	1	0	0	0
8 (N=9)	60%	7	1	0	0	1
9 (N=0)	70%	0	0	0	0	0
10 (N=3)	80%	2	0	1	0	0
11(N=0)	90%	0	0	0	0	0
12 (N=3)	95%	3	0	0	0	0
13 (N=2)	98%	2	0	0	0	0
14 or more (N=11)	100%	8	0	1	0	2

TecMarket Works then multiplied the freeridership adjustment factor by the freeridership multiplier for each survey respondent. An average of the resulting freeridership percentage across all 120 respondents that installed CFLs produced a freeridership level of 28.54% per participant.

Low-flow Showerhead Freeridership for Duke Energy Customers
Nineteen percent (14 out of 72) of the respondents who installed the low-flow showerhead indicated that they already had a low-flow showerhead installed in their home before receiving the K-12 kit.

The 54 respondents that indicated that they had not previously installed a low-flow showerhead were assigned a freeridership of zero. Two survey respondents did not answer the question and two indicated that they did not know.

Seven of the respondents who indicated that they already had a low-flow showerhead (but not that low-flow showerheads had been installed in all showers) also indicated that they had not been planning to purchase or use another low-flow shower head before receiving the K-12 kit. These respondents were assigned 25% freeridership. The other seven survey respondents who indicated pre-installed low-flow showerheads were assigned 100% freeridership.

An average of the resulting freeridership percentage across all 72 respondents with an installed kit low-flow showerhead produced a freeridership level of 12.15% per participant.

Faucet Aerator Freeridership for Duke Energy Customers
Twenty-eight percent (21 out of 75) of the respondents who installed the kitchen or bath aerators indicated that they already had an aerator installed in their home before receiving the K-12 kit.

The 54 respondents that indicated that they had not previously installed a faucet aerator were assigned a freeridership of zero.

Eighteen of the respondents who indicated that they already had an aerator (but not that aerators had been installed in all faucets) also indicated that they had not been planning to purchase or use another aerator before receiving the K-12 kit. These respondents were assigned 25%

freeridership. The other three survey respondents who indicated pre-installed aerators were assigned 100% freeridership.

An average of the resulting freeridership percentage across all 75 respondents with an installed kit aerators produced a freeridership level of 10.0% per participant.

Gasket Freeridership for Duke Energy Customers
Twenty-two percent (10 out of 46) of the respondents who installed outlet or switch gaskets to exterior walls indicated that they already had gaskets installed in their home before receiving the K-12 kit.

The 36 respondents that indicated that they had not previously installed any gaskets were assigned a freeridership of zero.

Two of the respondents who indicated that they already had installed gaskets (but not that gaskets had been installed in all available outlets or switches) also indicated that they had not been planning to purchase or use more gaskets before receiving the K-12 kit. These respondents were assigned 25% freeridership. The other eight survey respondents who indicated pre-installed gaskets were assigned 100% freeridership.

An average of the resulting freeridership percentage across all 46 respondents with installed kit gaskets produced a freeridership level of 18.48% per participant.

Introduction and Purpose of Study

Summary Overview

This document presents the evaluation report for Duke Energy's K-12 Curriculum, or "Get Energy Smart" Program as it was administered in Ohio.

Summary of the Evaluation

The Get Energy Smart Program provides energy efficiency informational and educational support and resources to 3rd and 4th grade teachers for them to incorporate into their lesson plans. Students are given Duke Energy's home energy audit survey to complete. These surveys can be returned to the teacher to be mailed back to Duke Energy in a large prepaid envelope or students can return them themselves in their own individual prepaid envelopes. The survey can also be taken online. Once the surveys are received and processed, Energy Efficiency Starter kits containing low-cost, energy efficiency measures are sent to the home. The kit also contains a business reply card that asks the family to indicate which of the measures in the kit were installed.

An impact analysis was performed for each of the measures in the Energy Efficiency Starter Kit. The impacts are based on a billing analysis comparing the pre and post program energy consumption levels of all program participants between July 2009 to March 2011. To increase the reliability of the study findings, additional confirmative analysis was performed using an engineering analysis of the impacts associated with the self-reported measure installs identified through a participant survey.

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 134 surveyed participants extrapolated to the program's total participants. The engineering estimates include participants from June 2009 through mid-September of 2010 (n=5,002). The data for the billing analysis spans the time period from July 2009 to March 2011 and includes 6,271 participants.

Note that the participant sample size is larger for the billing analysis than it is for the engineering estimates. This is primarily because the analyses are performed at different times. The billing analysis was subsequent to the engineering estimates. As part of the process study, customer surveys are completed. Data from these surveys feed the engineering algorithms used to estimate savings. The billing analysis does not require survey data and, for this reason, can be completed at any time. Typically, the billing analysis is started as late as possible to allow for the largest possible number of participants to be included in the sample. Added participants yield more accurate results with higher statistical significance.

Description of Program

"The "Get Energy Smart" program goal is to educate children and their families about wise energy usage in their homes and personal choices they can make to save money, protect the environment and address climate change. The curriculum was designed to allow teachers to incorporate the materials into their existing math/science instructional schedules with supplemental activities on the Web.

The lessons are short, but relevant, and create opportunities for interactive, hands-on learning. Students and families can perform an on-line energy audit of their own homes, which creates an energy report for each participating family. After students perform the audit, those that live in Duke Energy territory receive a free energy efficiency starter kit containing information and the following items:

- 2 CFLs: a 13 Watt (60 Watt Equivalent), and a 20 Watt (100 Watt Equivalent)
- Efficient showerhead
- 2 low flow aerators: one kitchen and one bathrooom
- Weather stripping
- Duke Energy Labeled DOE Energy Savers Booklet
- Duke Energy Supplied Product Information and Instruction Sheet
- Personalized Energy Survey report
- Business reply card (BRC)
- Water flow meter bag
- 12 Outlet and light switch gasket insulators
- Refrigerator magnet
- Night light
- Duke Energy Supplied Toy (Glow Ring)
- Hot Water Temperature Guage Card
- Teflon Tape

Students that do not live in Duke Energy territory receive a kit containing the following Items:

- 13 Watt CFL (60 Watt Equivalent)
- Duke Energy Labeled DOE Energy Savers Booklet
- Water Flow Meter Bag
- Duke Energy Supplied Toy (Glow Ring)
- 8 Outlet Gasket Insulators
- Duke Energy Supplied Product Information and Instruction Sheet

Program Participation

Program	Impact Type	Participation Count
K-12 "Get Energy Smart"	Engineering	5,002
K-12 "Get Energy Smart"	Billing	6,271

Methodology

Overview of the Evaluation Approach

This impact evaluation has components: billing analysis and engineering estimates.

Study Methodology

Engineering Estimates

Engineering algorithms taken from the Draft Ohio TRM were used to estimate savings from all measures. Building energy simulation models of prototypical residential buildings were used to develop unit energy and demand savings estimates for outlet/switch gaskets. These unit energy savings values were applied to customers in the engineering analysis sample.

Billing Analysis

Program tracking data was used to pull billing data from all participants. The billing data was combined with information on participation date and whether the customer completed the mail or online version. This was in turn linked to weather data (temperature) to form the dataset used in the regression analysis.

Data collection methods, sample sizes, and sampling methodology

Engineering Estimates

Surveys were sent to 377 of the 3,619 K-12 participant families. Families in Duke territory returned a total of 126 surveys. Eight surveys were returned by non-Duke Energy customers. The survey asked the customer for information specific to each of the measures included in the Energy Efficiency Starter Kit.

Billing Analysis

The results from the billing analysis represent the entire population of participants in Duke territory with usable billing data, 6,271.

Number of completes and sample disposition for each data collection effort

Engineering Estimates

Families in Duke territory returned a total of 126 surveys. Eight surveys were returned by non-Duke Energy customers.

Billing Analysis

Program tracking data was used to pull billing data from all participants. The billing data was combined with information on participation date and whether the customer completed the mail or online version. This was in turn linked to weather data (temperature) to form the dataset used in the regression analysis.

Expected and achieved precision

Engineering Estimates

Engineering Estimates rely on participant survey responses. Sampling procedures for the participant survey had an expected and achieved precision of 90% ± 10%.

Billing Analysis

All savings estimates from the billing analysis were statistically significant at the 95% confidence level.

Description of baseline assumptions, methods and data sources

Baseline assumptions for all measures were taken from the Draft Ohio TRM. Impact analysis for the outlet/switch gaskets is based on unit energy savings derived from DOE-2.2 simulations of a set of prototypical residential buildings.

Description of measures and selection of methods by measure(s) or market(s)

The measures and methods are shown below. All customers are in the residential market.

Measure	Method
CFLs	Draft Ohio TRM
Low-flow showerheads	Draft Ohio TRM
Faucet aerators	Draft Ohio TRM
Outlet/switch gaskets	Draft Ohio TRM with DOE-2.2 simulation
Water temperature card	Draft Ohio TRM
Night light	Draft Ohio TRM

Billing Analysis

The billing analysis computed the overall savings associated with the program. There was no measure-level investigation.

Use of TRM values and explanation if TRM values not used

Engineering Estimates

The TRM was used for all measures. In the case of the outlet/switch gaskets, DOE-2.2 simulations were used to supplement the TRM. This was necessary because existing air leakage was not measured. The baseline condition of a building significantly impacts the opportunity for energy savings through air-sealing. Without this information, accurate savings calculations using engineering algorithms alone are impossible. Instead, DOE-2.2 simulations were performed, adding the indicated improvement to a set of prototypical residential buildings, and attributing equal savings to each incidence.

Billing Analysis

The billing analysis provides estimate of the savings that were actually achieved by participation households, thus there was no need to use TRM values.

Threats to validity, sources of bias and how those were addressed

Engineering Estimates

Measure adoptions were self-reported by the customers. There is a potential for social desirability bias[1] but the customer has no vested interest in their reported measure adoptions, so,

[1] Social desirability bias occurs when a respondent gives a false answer due to perceived social pressure to "do the right thing."

this bias is expected to be minimal. There is a potential for bias in the engineering algorithms, which was minimized through the use of building energy simulation models, which are considered to be state of the art for building shell and HVAC system analysis.

Billing Analysis

The specification of the model used in the billing analysis was designed specifically to avoid the potential of omitted variable bias by including monthly variables that capture any non-program effects that affect energy usage. The model did not correct for self-selection bias because there is no reason to as long as the program remains voluntary.

Snapback and Persistence

The theoretical additional energy and capacity used by customers that may occur from implementing an energy efficiency product, often called "snapback" if it occurs, is by design already captured in the impact evaluation through the billing analysis approach. The billing analysis approach uses actual energy use between the pre and post condition compared to what would occur without the program (control). All market or program effects conditions, including snapback, are already accounted for in this evaluation method. Further, there is little to no literature or snapback analysis within the evaluation industry that has been able to identify a snapback condition. The so-called snapback that has recently been referenced in the press has been the impact of normal electric demand growth that shows up in all customers as new products, services, and technologies are acquired and used. However, as noted above, any snapback that does occur would be captured in the evaluation design because of the use of pre and post billing analysis.

The billing data analysis, by using usage data from customers who participated as long as over two years ago, indicates that the impacts of the K-12 program are likely to persist for at least two years. However, the evaluation did not address how long these savings are likely to persist over time because the time span of the available data was not sufficient to address this issue. Both persistence and technical degradation are included in the calculation of each measure's effective useful life shown in Appendix D: DSMore Table.

Evaluation Findings

Billing Analysis

This section of the report presents the results of a billing analysis conducted over the participants in the Ohio K-12 program. Billing data was obtained for all participants in the K-12 program between July, 2009 and March, 2011 and that had accounts with Duke Energy. After processing, there were a total of 6,271 usable accounts.[2] A panel model was used to determine program impacts, where the dependent variable was monthly electricity consumption from January 2009 to March 2011. The results of the billing analysis are presented in Table 5.

Table 5. Estimated Ohio K-12 Impacts: Billing Analysis

	kWh	t-value
Per Participant Annual Savings (Gross)	113	2.33
Per Participant Annual Savings (Net)	87	

This table shows that the K-12 program produced statistically significant savings for participants in Ohio. The variance between the engineering estimates and the billing analysis can be explained by customer behavioral and psychological effects that are not accounted for in the engineering analysis. These effects include survey biases such as customers' inability to accurately estimate operating hours and imperfect recall regarding the wattage of the incandescent lamps replaced. For example, the Ohio Residential Smart $aver CFL study, dated June 29, 2010, compared customers' self reported hours of operation to the actual hours of operation, measured with lighting loggers, and discovered that customers responding to the survey overestimated their lighting usage by about 40%. The remainder of this section discusses the procedure used in the billing analysis.

For this analysis, data were 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-

[2] In order to maximize the use of the data, a single model was estimated over all states (Ohio, North Carolina, South Carolina and Kentucky). Therefore, the actual sample size in the model included 6,271 households in Ohio,10,503 in North Carolina, 3,251 in South Carolina and 398 in Kentucky, for a total sample size of 20,423 households.

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 K-12 program is captured by including a variable which is equal to one for all months after the household participated in the program. The coefficient on this variable is the savings associated with the program. 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 6.[3]

Table 6. Estimated Savings Model – dependent variable is log (daily kwh usage), June 2009 through March 2011 (savings are negative)

[3] As stated previously, a single model was estimated over participants in all states. Thus, this table presents the impacts for the Carolinas and Kentucky in addition to the impacts for Ohio.

Independent Variable	Coefficient (percentage / 100)	t-value
K-12 participation – Ohio	-0.0067	-2.33
K-12 participation - Carolina	-0.0125	-6.00
K-12 participation - Kentucky	-0.0227	-1.79
Sample Size	478,093 observations (20,423 homes)	
R-Squared	74%	

Note that in this table, the dependent variable is the natural log of the monthly energy use. In this specification, the coefficient represents the savings as a percentage of the participant's usage. To derive the kWh savings, the coefficient in the table was multiplied by the average annual usage per participating household in Ohio (16,842 kWh/year) to give the 113.2 kWh/year savings estimate. The complete estimate model, showing the weather and time factors, is presented in Appendix B: Estimated Statistical Model.

Since some participating customers received an additional six-pack of CFLs, this analysis investigated both the effect of these additional CFLs on the overall impact estimates, as well as the impact associated with these additional CFLs. The results are presented in Appendix E: Effect of Additional CFLs. The finding that there is no statistical difference in the savings may be a result of the small sample size for the six-pack customers. These customers were such a small part of the population of customers that they essentially had no impact on the savings analysis.

Engineering Estimates

The K-12 program required participants to fill out and return a pre-participation questionnaire to Duke Energy before becoming eligible to participate. The K-12 program provided an Energy Efficiency Starter Kit to each participant that filled out and returned their questionnaire. Participation was not limited to Duke Energy customers, however, Non-Duke Energy customers received an abbreviated kit containing only one 13-watt CFL and four outlet and four switch gaskets. A mail-in survey was later mailed to a randomly selected sample of 395 participants, 377 Duke Energy customers and 18 Non-Duke Energy customers.

The results of this survey with the associated energy impact estimations for each of the kit items are presented below. Responses were received from 134 of the 395 participants, 126 from Duke Energy customers and eight from Non-Duke Energy customers. For the purpose of calculating overall savings estimates, the responses and estimated energy savings of these 134 respondents from the Ohio participants have been extrapolated to the full population of 5,002 participants that received an Energy Efficiency Starter Kit through the K-12 program between June 2009 and mid-September 2010. All algorithms used in the calculation of the savings estimates herein can be found in Appendix C: Impact Algorithms. The results are summarized in Table 7 and Table 8.

Table 7. Total Program Savings by Measure for Duke Energy Customers

Measure	kWh	kW	therms
CFLs	963,976	76.1	-1,643
Low-Flow Showerheads	314,413	34.5	43,437
Faucet Aerators	53,368	0.6	5,306
Outlet/Switch Gaskets	22,162	4.3	606
Water Temperature Card	13,502	1.5	1,865
Night Light	93	0.0	0
DUKE ENERGY	**1,367,514**	**117**	**49,570**

Table 8. Total Program Savings by Measure for Non-Duke Energy Customers

Measure	kWh	kW	therms
CFLs	6,452	0.5	-11
Outlet/Switch Gaskets	292	0.1	8
NON-DUKE ENERGY	**6,745**	**0.6**	**-3**

Table 9. Net Program Savings by Measure for Duke Energy Customers

Measure	NTG %	kWh	kW	therms
CFLs	28.54%	688,857	54.4	-1,174
Low-Flow Showerheads	12.15%	276,212	30.3	38,159
Faucet Aerators	10.00%	48,031	0.58	4,775
Outlet/Switch Gaskets	18.48%	18,066	3.54	494
Water Temperature Card	0.00%	13,502	1.54	1,865
Night Light	0.00%	93	0.00	0
DUKE ENERGY	**23.6%**	1,044,761	90	44,120

Table 10. Net Program Savings by Measure for Non-Duke Energy Customers

Measure	NTG %	kWh	kW	therms
CFLs	28.54%	4,611	0.356	-7.86
Outlet/Switch Gaskets	18.48%	238	0.047	6.51
NON-DUKE ENERGY	**28.1%**	**4,849**	**0.402**	**-1.35**

There were a total of 4,905 kits distributed to Duke Energy customers and 97 distributed to Non-Duke Energy customers. A net savings of 1,051,506 kWh was achieved, 1,044,761 kWh by Duke Energy customers and 4,849 kWh by Non-Duke Energy customers. The savings from CFL installations is responsible for the majority (66%) of the total program kWh savings. Low-flow showerheads contribute another 26% and are also the only measure supplying an appreciable amount of therm savings, 86% of the program total. Together, these two measures comprise 92% of the total program kWh savings.

Table 11. Net Program Savings Per Participant by Measure for All Duke Energy and Non-Duke Energy Participants

Measure	kWh	kW	therms
CFLs	138.6	0.0109	-0.2364
Low-Flow Showerheads	56.3	0.0062	7.7796
Faucet Aerators	9.79	0.0001	0.9735
Outlet/Switch Gaskets	3.66	0.0007	0.1000
Water Temperature Card	2.75	0.0003	0.3803
Night Light	0.02	0.0000	0.0000
TOTAL PER PARTICIPANT	**212**	**0.0183**	**9.07**

The combined net to gross percentage is 23.6% for Duke Energy customers and 28.1% for Non-Duke Energy customers. The comprehensive net to gross percentage is 23.62%. These percentages, along with net program savings, are broken down by measure in Table 9 and Table 10. Program-wide per-participant kWh savings with all Duke Energy and Non-Duke Energy customers combined is 212 kWh, as shown in Table 11.

CFLs

The standard Energy Efficiency Starter Kit included one 13-watt CFL and one 20-watt CFL. The kit received by Non-Duke Energy customers contained just the 13-watt CFL. Duke Energy customers that indicated that they had fewer than seven CFLs currently installed in their home when they filled out their pre-participation questionnaire and that had not exceeded the twelve CFL threshold within the CFL tracker, a database used by Duke to track CFL program participation, also received an additional six pack of CFLs[4] containing three 13-watt CFLs and three 20-watt CFLs; 1,142 such kits were given away. Non-Duke Energy customers were ineligible to receive this supplement.

A total of 224 13-watt CFLs and 180 20-watt CFLs were installed by 120 Duke Energy customers, an install rate of 87% and 70%, respectively. A total of 16,759 CFLs were given

[4] An analysis of the additional 6 pack is in "Appendix E: Effect of Additional CFLs".

away, 8,331 each of 13 and 20-watt CFLs to Duke Energy customers, and 97 13-watt CFLs to Non-Duke Energy customers. As presented in Table 12, a total of 7,233 13-watt and 5,812 20-watt CFLs were installed by Duke Energy customers. Another 84 13-watt CFLs were installed by Non-Duke Energy customers. To avoid inaccuracy due to insufficient sample size, the install rate for Duke Energy customers, 87%, was carried over to the non-customers.

Table 12. Total Number of CFLs Installed with Gross Annual Savings Estimates

	Total Installed	Install Rate	kWh	kW	therms
13W CFL	7,233	87%	554,172	42.7	-945
20W CFL	5,812	70%	409,804	33.4	-698
NON-DUKE ENERGY	84	87%	6,452	0.5	-11
TOTAL	13,130	78%	970,428	76.6	-1,654

From the mail-in survey, it was determined that, on average, participants use the 13-watt CFL to replace a 64-watt incandescent bulb and the 20-watt CFL to replace a 69-watt incandescent bulb. On average, customers reported that these bulbs are operated for 4.03 and 3.82 hours per day, respectively. The savings from installing each wattage of CFL are presented in Table 12. Extrapolating the data collected from the survey to the full population of program participants, K-12 participants reduced their gross annual kWh consumption by 970,428 kWh, or 203 kWh per household/participant per year. Mean values are shown in Table 13. Of the total savings, 554,172 kWh (58%) is from 13-watt CFLs and the other 409,804 kWh (42%) comes from 20-watt CFLs. This results in gross per-installation annual savings achievements of 76.6 kWh and 70.5 kWh, respectively. The slight increase in therm consumption occurs because incandescent bulbs burn much hotter than CFLs and consequently, homeowners must use a little more gas heating their homes in the winter.

Table 13. Mean Gross Annual Savings Estimates per Participant from Participants Installing CFLs

	kWh	kW	therms
13W CFL	122	0.009	-0.21
20W CFL	98	0.008	-0.17
COMBINED	203	0.016	-0.35

Outlet and Switch Gaskets

The standard Energy Efficiency Starter Kit contained 12 gaskets. The kit received by Non-Duke Energy customers contained only eight gaskets. Forty-one out of the 126 Duke Energy customers surveyed combined to install a total of 224 outlet and/or switch gaskets out of the 1,512 provided to them in the kit (15%) into exterior walls. Applying the same implementation rate to the Non-Duke Energy customers yields another 10 gaskets installed. Gasket installations in interior walls will realize zero savings and are therefore not counted. Projecting these numbers onto the entire participant base yields 8,720 gaskets installed by Duke Energy customers and 115 installations by Non-Duke Energy customers. Table 14 shows this installation information along with the savings estimates. From Table 15, each Duke Energy participant installed 5.46 gaskets and each Non-Duke Energy participant installed 3.59 gaskets in exterior walls. The outlet and switch gaskets installed by Duke Energy customers provided gross energy savings of 22,162 kWh, for

an average of 13.9 kWh per participant per year. Non-Duke Energy customers saved 292 kWh, an average of 9.1 kWh per participant per year.

Table 14. Total Gaskets Installed in Exterior Walls with Gross Savings Estimates

	Total Installed	Install Rate	kWh	kW	Therms
DUKE ENERGY	8,720	15%	22,162	4.35	606
NON-DUKE ENERGY	115	15%	292	0.06	17
TOTAL	8,835	15%	22,454	4.41	623

Table 15. Mean Gaskets Installed in Exterior Walls with Mean Gross Savings Estimates

	Average Installed	kWh	kW	therms
DUKE ENERGY	5.46	13.9	0.003	0.38
NON-DUKE ENERGY	3.59	9.1	0.002	0.53
TOTAL	5.43	13.8	0.003	0.38

Low-Flow Showerheads

A total of 72 out of 126 (57%) low-flow showerheads were installed from the kits. Given that 57% of the participant population has installed their showerheads, it can be assumed that 2,803 have been installed in total. Low-flow showerheads were not provided to Non-Duke Energy customers. Participants that installed the showerhead lowered their daily hot water consumption for showers from 20.3 gallons before the installation to 9.8 gallons after the installation. Table 16 shows the installation figures along with estimates of their savings. An estimated gross 314,413 kWh is saved, an average of 112 kWh and 15.5 therms per installation per year, as seen in Table 17. In Ohio, 74% of participants have a gas water heater and 26% have an electric water heater.

Table 16. Total Low-Flow Showerheads Installed with Gross Savings Estimates

Total Installed	Install Rate	kWh[5]	kW	therms
2,803	57%	314,413	34.46	43,437

Table 17. Mean Gross Savings Estimates for Installed Low-Flow Showerheads

kWh	kW	therms
112	0.012	15.5

[5] All numbers and savings for water-related measures presented in the tables are program-wide. For example, participants with electric water heaters achieve electric and demand savings, while participants with gas heaters achieve only therm savings. This applies to low-flow showerheads, faucet aerators, and water temperature cards.

Faucet Aerators

One kitchen and one bathroom faucet aerator were given out in each Duke Energy customer kit. A total of 111 aerators were installed by 73 people with a 44% installation rate. Extrapolating this data to fit the participant population, 4,321 aerators are estimated to be installed. Faucet aerators were not provided to Non-Duke Energy customers. Table 18 shows that the aerators provided by the kit have saved 52,860 gross kWh. In Table 19, it is shown that per installation, this is about 12.35 kWh annually. In Ohio, 74% of participants have a gas water heater and 26% have an electric water heater.

Table 18. Total Faucet Aerators Installed with Gross Savings Estimates

Total Installed	Install Rate	kWh	kW	Therms
4,321	44%	53,368	0.64	5,306

Table 19. Mean Gross Savings Estimates for Installed Faucet Aerators

kWh	kW	therms
12.35	0.0001	1.228

Water Temperature Cards

A total of 48 out of the 126 participants (38%) reported using their water temperature card. However, only ten of these 48 people (21%) changed their water heater temperature based on the card's result. This means that approximately 8% of people have adjusted their water heater. Applying this number to the full population returns 389 adjustments made. Water temperature cards were not provided to Non-Duke Energy customers. For participants that made an adjustment, their average hot water temperature went from 135 degrees before the change to 124 degrees after the change. As shown in Table 20, an estimated 13,502 kWh per year was saved as a result of these changes, an average of 34.7 kWh per participant per year, as seen in Table 21. In Ohio, 74% of participants have a gas water heater and 26% have an electric water heater.

Table 20. Total Water Temperature Cards Used with Savings Estimates for Adjustments

Total Used	Usage Rate	kWh	kW	therms
389	8%	13,502	1.54	1,865

Table 21. Mean Savings Estimates for Water Temperature Adjustments

kWh	kW	therms
34.7	0.0040	4.792

LED Night Lights

Out of the 126 participants, 100 installed the LED night light, an installation rate of 79%. Just over half of these night lights, 54%, replaced an existing night light, meaning that the other 46% were used in a socket where there was previously no night light, this subtracts a small amount of savings from the measure. In all, there were 2,113 replacement night lights and 1,781 new night lights. Table 22 shows a total savings of 93 kWh per year. There were no kW or therm savings, and the LED night lights were not provided to Non-Duke Energy customers.

Table 22. Total LED Night Lights installed with Savings Estimates

Total Installed	Install Rate	kWh
3,893	79%	93

Appendix A: Required Savings Tables

The required table showing measure-level participation counts and savings for each program is below.

Measure	Participation Count	Verified Per unit kWh impact	Verified Per unit kW impact	Gross Verified kWh Savings	Gross Verified kW Savings
CFLs	5,002	79.79	0.0630	399,116	315
Low-Flow Showerheads	5,002	26.02	0.0071	130,177	35.7
Faucet Aerators	5,002	4.42	0.0001	22,096	0.62
Outlet/Switch Gaskets	5,002	1.83	0.0004	9,176	1.78
Water Temperature Card	5,002	1.12	0.0001	5,590	0.62
Night Light	5,002	0.01	0.0000	39	0.00

Appendix B: Estimated Statistical Model

This appendix show the complete model estimated for the billing analysis. The model includes indicators for each month (the yearmonth variable), temperature, the state the participant resides, and the participation variables.

Variable	Coefficient	Std. Err.	t-value	P>|t|	[95% Conf.	Interval]
Ohio Part	-.0067198	.00289	-2.33	0.020	-.0123841	-.0010555
Carolina Part	-.0124677	.0020794	-6.00	0.000	-.0165433	-.0083921
Kentucky Part	-.0227276	.0126868	-1.79	0.073	-.0475933	.0021381
yearmonth (time variables)						
200902	-.052312	.033756	-1.55	0.121	-.1184726	.0138487
200903	-.0715763	.0421097	-1.70	0.089	-.1541099	.0109574
200904	-.1556293	.0601211	-2.59	0.010	-.2734648	-.0377938
200905	-1.063964	.0581443	-18.30	0.000	-1.177925	-.9500025
200906	-3.438992	.0869149	-39.57	0.000	-3.609343	-3.268641
200907	-3.606707	.1163904	-30.99	0.000	-3.834829	-3.378586
200908	-3.965954	.1196231	-33.15	0.000	-4.200411	-3.731496
200909	-2.858674	.0768451	-37.20	0.000	-3.009288	-2.708059
200910	-1.481454	.0436092	-33.97	0.000	-1.566927	-1.395982
200911	-.3275281	.0653933	-5.01	0.000	-.455697	-.1993592
200912	.1987411	.033256	5.98	0.000	.1335604	.2639217
201001	.1349608	.0392585	3.44	0.001	.0580153	.2119063
201002	.1203595	.0412687	2.92	0.004	.0394741	.2012449
201003	.5782756	.0409695	14.11	0.000	.4979767	.6585745
201004	.1993842	.0500427	3.98	0.000	.1013021	.2974663
201005	-2.783248	.0815696	-34.12	0.000	-2.943122	-2.623374
201006	-3.55006	.0763178	-46.52	0.000	-3.699641	-3.40048
201007	-4.569939	.1307381	-34.95	0.000	-4.826182	-4.313697
201008	-3.825948	.1096061	-34.91	0.000	-4.040772	-3.611123
201009	-2.843417	.0753555	-37.73	0.000	-2.991111	-2.695722
201010	-2.341425	.0447405	-52.33	0.000	-2.429115	-2.253735
201011	-.0632438	.044417	-1.42	0.154	-.1502997	.0238121
201012	.1765302	.029746	5.93	0.000	.118229	.2348314
201101	.2212299	.0471835	4.69	0.000	.1287518	.313708
201102	.555201	.0426248	13.03	0.000	.4716578	.6387442
201103	.5683593	.047679	11.92	0.000	.47491	.6618087
temperature interacted with monthly indicator						
200901	-.0138686	.0007626	-18.19	0.000	-.0153632	-.0123739
200902	-.0143049	.0007527	-19.00	0.000	-.0157802	-.0128296
200903	-.0135311	.0007972	-16.97	0.000	-.0150937	-.0119686
200904	-.0127076	.0010832	-11.73	0.000	-.0148307	-.0105844
200905	.0039433	.0008611	4.58	0.000	.0022555	.0056311
200906	.0410536	.0011429	35.92	0.000	.0388135	.0432937
200907	.0456421	.0016258	28.07	0.000	.0424556	.0488285
200908	.0485673	.0016261	29.87	0.000	.0453803	.0517543
200909	.0363371	.0010932	33.24	0.000	.0341945	.0384798
200910	.0143571	.0006964	20.61	0.000	.0129921	.0157221
200911	-.0096781	.0012833	-7.54	0.000	-.0121934	-.0071629
200912	-.0224782	.0006526	-34.45	0.000	-.0237572	-.0211991
201001	-.0170185	.0011085	-15.35	0.000	-.019191	-.014846
201002	-.0198193	.0012126	-16.34	0.000	-.0221959	-.0174426
201003	-.0270605	.0006987	-38.73	0.000	-.0284299	-.0256911
201004	-.0167514	.0007344	-22.81	0.000	-.0181907	-.0153121
201005	.0289119	.0011713	24.68	0.000	.0266162	.0312077
201006	.0417506	.000957	43.63	0.000	.0398749	.0436262
201007	.0565541	.001666	33.95	0.000	.0532889	.0598194
201008	.0473564	.0013879	34.12	0.000	.0446361	.0500767
201009	.0368167	.0010226	36.00	0.000	.0348125	.038821
201010	.0286051	.0006504	43.98	0.000	.0273304	.0298798
201011	-.0166427	.0008261	-20.15	0.000	-.0182618	-.0150236
201012	-.0249429	.0005702	-43.75	0.000	-.0260605	-.0238254
201101	-.0209974	.0014676	-14.31	0.000	-.0238737	-.018121
201102	-.0273321	.0009304	-29.38	0.000	-.0291557	-.0255085
201103	-.0281919	.0008984	-31.38	0.000	-.0299527	-.0264311
state interacted with monthly indicator						
2 200901	.2404777	.0146982	16.36	0.000	.2116695	.2692858
2 200902	.3097867	.0141364	21.91	0.000	.2820798	.3374936

2	200903	.2506665	.0114111	21.97	0.000	.228301	.273032
2	200904	.1930738	.0116537	16.57	0.000	.1702328	.2159147
2	200905	.1268657	.011327	11.20	0.000	.104665	.2490663
2	200907	-.200628	.0153021	-13.11	0.000	-.2306198	-.1706363
2	200908	-.1056397	.0147499	-7.16	0.000	-.134549	-.0767304
2	200909	-.246503	.0145415	-16.95	0.000	-.2750039	-.2180021
2	200910	-.1033328	.0149927	-6.89	0.000	-.132718	-.0739476
2	200911	.1851111	.0165659	11.17	0.000	.1526424	.2175797
2	200912	.4145755	.014596	28.40	0.000	.3859679	.4431832
2	201001	.304861	.0152787	19.95	0.000	.2749152	.3348068
2	201002	.4098067	.0175765	23.32	0.000	.3753573	.4442562
2	201003	.2172948	.011091	19.59	0.000	.1955568	.2390328
2	201004	.1113218	.0107755	10.33	0.000	.0902021	.1324416
2	201005	.2296814	.0108011	21.26	0.000	.2085116	.2508512
2	201006	.055609	.0108398	5.13	0.000	.0343633	.0768547
2	201007	-.1511093	.012124	-12.46	0.000	-.174872	-.1273467
2	201008	-.1792477	.0123959	-14.46	0.000	-.2035433	-.1549521
2	201009	-.2885355	.0135805	-21.25	0.000	-.3151528	-.2619181
2	201010	-.2003509	.0132729	-15.09	0.000	-.2263653	-.1743364
2	201011	.3172147	.015395	20.61	0.000	.287041	.3473884
2	201012	.5328833	.0148749	35.82	0.000	.5037289	.5620377
2	201101	.3508014	.0162304	21.61	0.000	.3189903	.3826126
2	201102	.2363542	.0114875	20.57	0.000	.2138391	.2588694
2	201103	.2976398	.0121518	24.49	0.000	.2738228	.3214569
3	200901	-.0335729	.0287799	-1.17	0.243	-.0899807	.0228348
3	200902	.0026508	.0297882	0.09	0.929	-.0557332	.0610348
3	200903	-.0168359	.029722	-0.57	0.571	-.0750901	.0414184
3	200904	-.0211797	.0283686	-0.75	0.455	-.0767813	.0344219
3	200905	-.1413398	.0286474	-4.93	0.000	-.1974879	-.0851918
3	200907	-.0015518	.0282434	-0.05	0.956	-.0569081	.0538044
3	200908	.0572144	.0280412	2.04	0.041	.0022546	.1121742
3	200909	-.0861749	.0279939	-3.08	0.002	-.1410422	-.0313077
3	200910	-.0843118	.0279604	-3.02	0.003	-.1391133	-.0295103
3	200911	-.0351205	.0280048	-1.25	0.210	-.090009	.0197681
3	200912	.0872507	.0281925	3.09	0.002	.0319942	.1425072
3	201001	-.0360286	.0285158	-1.26	0.206	-.0919187	.0198614
3	201002	.0130815	.0287192	0.46	0.649	-.0432074	.0693703
3	201003	-.0435733	.0286941	-1.52	0.129	-.0998129	.0126662
3	201004	-.0587561	.0284881	-2.06	0.039	-.114592	-.0029202
3	201005	.0058591	.029481	0.20	0.842	-.0519228	.0636409
3	201006	.1033168	.0295559	3.50	0.000	.0453882	.1612453
3	201007	.0270181	.0294907	0.92	0.360	-.0307827	.0848188
3	201008	.0084112	.0295064	0.29	0.776	-.0494203	.0662427
3	201009	-.0501598	.0295561	-1.70	0.090	-.1080889	.0077693
3	201010	-.0750878	.0309838	-2.42	0.015	-.135815	-.0143606
3	201011	.0130509	.0310657	0.42	0.674	-.0478369	.0739386
3	201012	.1036032	.0310394	3.34	0.001	.042767	.1644394
3	201101	-.0131601	.0311165	-0.42	0.672	-.0741474	.0478272
3	201102	-.0180948	.0312241	-0.58	0.562	-.0792932	.0431035
3	201103	-.0268983	.0311963	-0.86	0.389	-.0880421	.0342456

Appendix C: Impact Algorithms

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 = 0.023625
$HVAC_d$ = HVAC system interaction factor for demand = 0.1628
$HVAC_g$ = HVAC system interaction factor for annual gas consumption = -0.0017

13 W CFL Measure