APPENDIX B

EVALUATION OF THE 2011 HOME ENERGY AUDIT PROGRAM

Final Report

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Prepared for:

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1. EXECUTIVE SUMMARY

During 2011, the Ohio operating companies The Cleveland Electric Illuminating Company (CEI), Ohio Edison Company (OE), and The Toledo Edison Company (TE), (collectively the "Companies") implemented the Home Energy Audit (HEA). The evaluation of the 2011 HEA program had three main components.

Impact Evaluation. The energy savings of the 2011 HEA program were examined for both online and telephone audits using regression analysis of monthly billing data for customers who participated in the program and for a control sample of non-participants.

Process Evaluation. Surveys were used to determine the customers use of the different home energy audit methods and to identify the actual benefits that users realize from each method. Of particular interest was determining the actions customers take as a result of a home energy audit.

Persistence Analysis. Billing data for customers who participated in the HEA program in 2010 were analyzed to determine the extent to which their savings persisted into 2011. Surveys were also used to examine the persistence of the 2010 cohort and to identify the actions they had taken to save energy.

A total of 16,037 customers participated in the Ohio HEA program in 2011. Of these customers, 9,448 (59%) conducted online audits and 6,589 (41%) participated in telephone audits. Savings achieved in 2011 were found only for participants who conducted audits at Level 2 or Level 3. Almost half (42%) of the online participants conducted level 2 or 3 audits and nearly all (97%) of the telephone audit participants conducted Level 2 or 3 audits.

As shown in Table 2, verified ex post electric savings were 4,418,826 kWh for all home energy audits combined. Significantly, *ex post* savings were achieved by participants receiving Level 2 or 3 audits. Of the total kWh savings, 1,824,801 kWh (41%) were from online audits and 2,594,025 kWh (59%) were from telephone audits. Realization rates for electric savings were 38% for telephone audits, 135% for online audits, and 54% overall.

Table 1-1 also shows that verified critical peak demand reduction was 907 kW. The *ex post* demand reduction was also achieved by participants receiving Level 2 or 3 audits. Of the total demand reductions, 396 kW (44%) was from online audits and 511 kW (56%) was from telephone audits.

Table 1-1. Summary of Annualized Ex Post Energy and Demand Savings Impacts

Program Name	Ex Ante Savings		Ex Post Savings	
	kWh	kW	kWh	kW
CEI	2,614,592	400.9	1,405,205	287.8
OE	4,642,514	711.9	2,331,073	474.5
TE	991,892	152.1	702,548	144.2
Online Audits	1,353,451	208	1,824,801	395.6
Telephone Audits	6,895,547	1,057	2,594,025	511.0
All Audits	8,248,998	1,265	4,418,826	906.6

Table 1-2 shows program-level Ex Post savings by audit type for each operating company and for the FE portfolio as a whole.

Table 1-2. Ex Post Program-Level Savings (kWh) and kW Reductions by Operating Company and Audit Method

CEI			
	Telephone	**Online**	**All Audits**
Total kWh Saved	847,665	557,540	1,405,205
Total kW Reduced	167.0	120.9	287.8
OE			
	Telephone	**Online**	**All Audits**
Total kWh Saved	1,338,120	972,953	2,311,073
Total kW Reduced	263.6	210.9	474.5
TE			
	Telephone	**Online**	**All Audits**
Total kWh Saved	408,240	294,308	702,548
Total kW Reduced	80.4	63.8	144.2
Combined Totals All Companies			
	Telephone	**Online**	**All Audits**
Total kWh Saved	2,594,025	1,824,801	4,418,826
Total kW Reduced	511.0	395.6	906.6

Key differences between an online home energy audit and a telephone home energy audit include the following:

- The online user initiates the audit and is motivated to understand how she/he can become more efficient in using electricity in the home. An approximation of the online audit procedure is administered to customers who call customer service with a high bill complaint. The telephone user does not initiate the home energy audit.

- The online audit user received a customized home energy report; the telephone audit user is asked if they are interested in receiving a brochure on energy saving tips in the mail; about half receive it.

- Over the first two years of the HEA program, it is estimated that 75% of the online users have taken energy saving actions as a result of the audit compared to 50% of telephone audit users. Online audit users are more likely to invest in high efficiency energy saving equipment as a result of the audit.

Online users learned about the *Home Energy Analyzer* primarily through EDC websites, the Energy Save Ohio website, or through a utility bill insert.

More of the online audit participants need to engage the *Home Energy Analyzer* software application at audit levels 2 and 3 in order to realize energy and demand savings. ADM Associates, Inc. ("ADM") recommends that efforts to promote online use of home energy audits emphasize the need to go beyond a Level 1 audit in order to achieve reduced electricity consumption and savings on the customer's monthly electric bill.

ADM recommends that the Companies consider increasing the frequency of bill inserts that advertise and promote the online home energy audits using the Home Energy Analyzer software.

2. INTRODUCTION AND PURPOSE OF THE STUDY

Under contract with the Companies, ADM performed evaluation, measurement, and verification (EM&V) services to determine and verify the savings being realized through HEA program that was implemented in 2011. This document is the EM&V final evaluation report for the 2011 HEA program.

The impact evaluation addressed the following research questions.

- To what extent has the Home Energy Audit program resulted in electric energy savings for participating customers (compared to similar nonparticipating customers) in each of the three operating companies, as measured by annualized energy savings (kWh) and electricity demand reductions (kW)?
- How do the two energy audit methods – online vs. telephone – compare in producing electric energy savings for customers?
- How do the three levels of audit involvement compare in producing electric energy savings?
- How effective is the program for online audit users compared to telephone audit users at each level of audit involvement?
- To what extent have energy savings persisted from 2010 into 2011?
- What are the most likely explanations for differences in savings between the telephone and online audit methods?

The goal of the process evaluation component was to determine (a) the differences in information that customers receive from the two types of audit methods (b) the differences in information that customers receive from the different levels of an online audit, (c) the actions taken by customers as a result of the different types and levels of a home energy audit, and (d) the extent to which these actions persisted from 2010 through 2011. The process evaluation was therefore framed by the following research questions.

- How is the information provided in a telephone audit different from the information provided in an online audit?
- How does online information provided in a Level 1 audit different from the online information provided to customers in a Level 2 or Level 3 audit?
- What actions did telephone audit users take to save energy and how did these actions differ from the energy saving actions of online audit users?
- How did the energy saving actions of online audit users at Level 1 differ from the energy saving actions of online audit users at Levels 2 and 3?
- To what extent did customers who initiated energy saving actions in 2010 continue with these practices in 2011?
- How did customers learn of the availability of the home energy audit?

3. DESCRIPTION OF 2011 HEA PROGRAM

This chapter provides a description of the 2011 Home Energy Audit program and summarizes data on program participation

3.1 DESCRIPTION OF PROGRAM

The Home Energy Audit (HEA) Program, first implemented in Ohio in December 2009, allows residential customers who reside in single family or multi-family housing to analyze their home energy use and billing history at no cost to themselves. The Companies' customers can take a home energy audit at any time during the year, either by accessing the online software application --referred to as the Home Energy Analyzer – through the Companies' website, or by conducting a home energy audit by telephone with the assistance of a Contact Center Representative.

The Home Energy Analyzer allows customers to get personalized assessments of their home energy use, see how their energy use compares to that of similar homes, and identify ways to improve the efficiency of their energy use. Using the Home Energy Analyzer, a customer can create a report that lists the major sources of energy usage in their home, learn how home weatherization can save money every month, and identify energy efficient appliances.

Three levels of a home energy audit are possible using the Home Energy Analyzer, depending on how deeply a customer chooses to go.

In a Level 1 audit, a customer completes a home profile and receives a Level 1 report that identifies the customer's top ways to save energy in their home. The report for a Level 1 audit also shows the customer how their electricity use compares to that of similar homes in the area. A pie chart is included in the report that shows how energy is distributed across various end uses in the home.

In a Level 2 audit, a customer completes an appliance profile in addition to completing the Level 1 audit.

In a Level 3 audit, a customer can explore in detail different ways to save energy in the home.

Customers who complete Levels 2 and 3 receive a Home Energy Analysis report. More information is provided in a Level 3 report compared to a Level 2 report. In general, a Home Energy Analysis Report provides a summary of annual energy costs associated with the customer's appliances, a monthly energy use home comparison, and specific energy saving opportunities are identified for the customer's home.

A customer can also conduct a home energy audit by telephoning the Contact Center. Customers who call the contact center to inquire about a "high bill" are also offered a home energy audit. For the telephone audit, a customer service representative (CSR) walks a customer through the

audit application, inputting the customer's data for them. There are three levels to a telephone audit, similar to that of the online audit procedure.

Once a telephone audit participant's data has been entered, the CSR can either provide the conservation and savings findings over the telephone or print and mail a report to the customer. Materials offered to telephone audit participants by mail include the following:

- A 2-page document titled "*Understanding Electricity Usage and Costs*" that shows the customer a formula for costing out kWh values and a chart of appliances with columns for Watts, average hours of use, average kWh used per month and average cost for that appliance;
- A 21-page document titled "*More than 100 ways to improve your electric bill*"; and
- A computer link to the Home Energy Analyzer.

3.2 PARTICIPATION IN 2011 HEA PROGRAM

A combined total of 16,037 customers participated in the HEA program in 2011. Table 3-1 shows how the numbers of customers who participated were distributed by operating company and by type and level of audit.

Table 3-1. Participation Levels for 2011 HEA Program by Utility and Type and Level of Audit

Utility Company	***Online Audits***			***Telephone Audits***			***All Audits***
	Level 1 only	***Level 2 or 3***	***All Online***	***Level 1 only***	***Level 2 or 3***	***All Telephone***	
CEI	1,738	1,220	2,958	57	2,093	2,150	5,108
OE	2,825	2,129	4,954	98	3,304	3,402	8,356
TE	892	644	1,536	29	1,008	1,037	2,573
Total Program	5,455	3,993	9,448	184	6,405	6,589	16,037

Note. Participation counts are for January 1 through December 31, 2011.

4. EVALUATION METHODOLOGY

This chapter describes the methods used in the impact evaluation of the 2011 HEA program, the process evaluation methods used with participants from both the 2010 and 2011 programs, and the methods used for analyzing the persistence of savings for the 2010 participants into 2011.

4.1 METHODS FOR IMPACT EVALUATION

The activities involved in conducting the impact evaluation of energy and demand savings included the following.

Specifying a regression model with which to analyze monthly energy consumption of households and how participation in the HEA program affected electricity use;

Preparing billing and weather data;

Estimating the coefficients of regression models, using customer billing data and actual weather data for Ohio locations in 2011;

Using the results from the regression analysis to determine weather-sensitive and non-weather sensitive kWh savings and annual kWh savings;

Applying kW factors independently to weather sensitive kWh and non-weather sensitive kWh savings values to determine peak kW reductions.

Each of these activities is discussed in turn.

4.1.1 Specification for Regression Modeling

To determine the savings resulting from the 2011 HEA program, a "difference in differences" method was used for the analysis, in which changes in energy use for customers receiving an audit are compared to changes in energy use for customers in a comparison group who did not participate in the program, with both groups being compared against a baseline "pre" period occurring prior to the participants' receipt of an audit. The changes in energy use for the different groups are determined using the results from regression analysis of the energy usage data for participants and non-participants. ADM used the regression analysis to estimate the amounts of electricity used and to quantify the impacts of receiving an audit on energy consumption after controlling for the effects of weather and other factors. The regression analysis isolates and quantifies the effects of different factors on the changes in energy usage. The technique also lends itself to the analysis of interactions of savings with weather, operating practices, etc.

The basic specification for the regression modeling can be illustrated as follows. Consider modeling the energy use of a customer who received an audit. In simplest terms, average daily electricity use can be separated between weather-sensitive and non-weather-sensitive factors. A model to represent this is:

$$AEC_t = \alpha_0 + \alpha_1 WV_t + E_{et}$$

where

AEC_t is average daily use of electricity for period t for a customer (determined by dividing total usage over a billing period by number of days in that period);

WV_t is a variable measuring weather conditions during period t;

E_{et} is an error term;

α_0 is the intercept term;

α_1 is a coefficient showing the changes in use that occurs for a change in weather variable;

The working hypothesis for the analysis is that customers receiving an audit will make changes that affect their electricity usage. For the illustrative model above, these changes will affect either the intercept term or the responsiveness to changes in weather conditions (as measured by the coefficient α_1). To capture this effect, α_1 can be specified as follows:

$$\alpha_0 = \alpha_{01} + \alpha_{02} POST;$$

$$\alpha_1 = \alpha_{11} + \alpha_{12} POST;$$

where POST is a dummy variable that is 0 if the monthly period is before the customer received an audit and 1 if the monthly period is after the customer received the audit. With this formulation, the model for the regression analysis becomes:

$$AEC_t = \alpha_{01} + \alpha_{02} POST + \alpha_{11} WV_t + \alpha_{12} POST*WV_t + E_{et}$$

The simple model is expanded to include a sample of participants and non-participants. Expanding the model in this manner allows for a "difference-in-differences" estimation of savings. The implicit assumption for the difference-in-differences analysis is that a change in energy use in response to a change in weather conditions would be the same for the non-participant (control) group and the participant (audit) group in the absence of the program. If this assumption holds, then the change in energy usage of the non-participant group in response to a change in weather conditions can be applied to predict what the (counterfactual) energy use of the participant group would have been under the changed weather conditions in the absence of the program. This allows the difference between actual post-audit energy use of the audit group and the counterfactual predicted energy use to be calculated as the savings attributable to the program.

When a non-participant group is added, the specification for the simple model becomes:

$$AEC_t = \alpha_{01} + \alpha_{02} POST + \alpha_{03} AUDIT + \alpha_{11} WV_t + \alpha_{12} POST*WV_t + \alpha_{13} AUDIT*WV_t + \beta_1 POST*AUDIT + \beta_2 POST*AUDIT*WV_t\, E_{et}$$

where AUDIT is a dummy variable that is 1 if a customer has received an audit (i.e., is a participant) and 0 if customer has not received an audit (i.e., is a non-participant). The coefficients β_1 and β_2 are the coefficients of interest for measuring savings.

In application, the simple model is expanded in several ways.

- As discussed below, in estimation each customer is considered to have a unique constant term. The purpose of including a unique constant term for each customer is to capture the determinants of each customer's energy use that are constant over time, but are unique from participant to participant. This approach controls for the variation in kWh consumption levels between customers.
- Several weather variables are included in the regression. Ambient weather conditions are represented in the regression models using heating and cooling degree-hours calculated for different base temperatures. Degree-hours are used instead of degree-days because degree-hours provide a more representative measure of the effects of weather conditions. For example, the degree hour variables account for the non-linear response of electricity usage to changes in weather conditions. The heating and cooling degree hours used for each customer are calculated to match the periods of time covered in the energy use billing periods for that customer.

Depending on their energy-efficiency characteristics and the magnitudes of their solar and internal heat gains, houses differ in the temperatures at which they begin to require heating or cooling. By performing individual regression calculations for heating degree hours and cooling degree hours at different base temperatures, the results can be used to identify the "best" combination of base temperatures, selected according to the statistical fit of the estimated equations (as measured by the R-squared values for the regressions).

4.1.2 Preparation of Billing and Weather Data

The Companies provided ADM with billing data on monthly electricity use for participants in the HEA program who had initiated a home energy audit either online or by telephone during 2011. These data included:

Monthly kWh consumption billed for each customer for 36 months (Jan 2009 – Dec 2011);

Beginning and end dates for each monthly electric bill, and number of days billed;

The Companies also supplied data for the following variables for each participant.

Utility customer ID and premise ID;

Service address zip code;

Audit method (online or telephone); and

Dates of completion for each audit level (three possible).

The data were prepared for analysis through the following activities.

Any customer with a zero, negative or excessively high (>10,000 kWh/Month) kWh entry was removed from the analysis file.

A customer was also expunged from the analysis file if they had less than 23 or greater than 26 monthly observations.

For the regression analysis, billing data for the 60 days immediately preceding the date of a customer's audit were also excluded to account for any unusual changes in billed energy use that might have prompted a customer to decide to have an audit.

This data cleaning process removed customers from the analysis data set. The final analysis file was composed of a sample of 5,823 participants who passed all data screening checks. Customers removed from the regression were still accounted for in the final kWh and kW savings calculations, since the data errors detected were simply billing related and had nothing to do with their participation in the program.

Similar data, except for audit method and date, were supplied by the Companies for a random sample of customers who did not participate in the HEA program; these customers represented a control group. The cleaning procedures applied to the billing data for program participants were also applied to the billing data for the control group. This cleaning resulted in 9,301 control group members out of 15,991 (58%) being deleted from the regression analysis. The final control group sample consisted of 6,690 customers.

4.1.3 Estimating Coefficients of Regression Models

The coefficients of the regression models were estimated by applying estimation procedures that took into account both the cross-sectional and the time-series dimensions of the data. In particular, regression models were estimated by pooling cross-sectional observations (i.e., customers) with time-series observations (i.e., monthly consumption).

A "fixed-effects" specification was used for the panel regression modeling. The purpose of this specification is to control for those determinants of a household's electricity use that are constant over time. The basic idea underlying this specification is that each customer household acts as its own control, both for household characteristics that are easily measured (like house size and age) and for characteristics more difficult to measure (like interest in conservation, etc.) Time-varying variables are handled by measuring and putting them as covariates in a "fixed effects" regression model.

Conceptually, a "fixed effects" regression analysis involves applying a least squares dummy variable (LSDV) covariance estimate procedure. In this approach, as described in Allison[1], a binary dummy variable is created for each customer in the sample, with the variable assigned a value of 1 for each observation that is associated with the customer and a value of 0 for each observation that is not. The full set of these dummy variables is included in the regression analysis. In effect, the equation estimated contains a unique constant term for each customer that

[1] Allison, P. 2006. "Fixed Effects Regression Methods in SAS." *SAS Conference Proceedings: SAS Users Group International 31*, Paper 184-31, March.

captures the effects of all the determinants of that customer's electricity use that are constant over time. This approach automatically controls for differences among households that influence the average level of consumption across customer households. The specification of customer-specific effects allows the regression model to capture much of the baseline differences across customers while obtaining reliable estimates of the effects of the audits.

In practice, with a large number of customers participating in the Home Energy Analyzer program, an analysis where an explicit dummy variable could be created for each household was problematic. The computational requirement in estimating coefficients for all the dummy variables would have been burdensome for the large sample. Accordingly, the estimation was accomplished using a mean deviation method that is described in Allison (2006). This procedure was implemented using PROC GLM in SAS, with customer ID being used as a variable in an ABSORB statement.[2]

The regression analysis also took account of the possible energy savings associated with the participation of 2011 HEA participants in other Company residential energy conservation programs. Lists of participants for other residential programs were used to flag HEA participants with dual enrollments. The residential conservation programs that were considered in this flagging exercise were the following:

- Appliance Turn-In Program
- Easy Cool Rewards Program
- Energy Efficient Products Program
- CFL Distribution Program
- Community Connections Program

With a flag variable created that identified dual enrollments, the regression model was run with dual enrollment participants excluded. The HEA program impact would likely be biased if the regression were to include the participants who also were enrolled in other programs, which is the reason for their exclusion from the model.

4.1.4 Method for Calculating kWh Savings

Once an appropriate regression model was estimated, the regression results were used in the calculation of per-participant and program-level kWh savings. Summarized, the steps in the calculation are as follows.

- For Step 1, assume the estimated regression model represents "typical" customer behavior. Use the results of regression analysis to determine the split in monthly kWh usage between weather-sensitive and non-

[2] The procedure for the mean deviation approach is as follows. For each customer, means over time are first computed for each time-varying variable (both response and predictor variables). The customer-specific means are then subtracted from the observed values of each variable for that customer. The resulting variables are then used in the regression analysis. As noted in the text, the ABSORB statement in SAS PROC GLM accomplishes this.

weather-sensitive usage. Apply the estimated regression coefficients representing savings to calculate kWh savings per month, both in absolute terms and as a percentage of monthly usage. Perform this calculation separately for customers receiving online audits and those receiving telephone audits.

- In Step 2, apply the monthly kWh savings percentages calculated in Step 1 to the monthly billing data for all customers for whom such data was provided. This gives month-by-month kWh savings for each customer in the data set.
- In Step 3, aggregate the monthly kWh savings calculated in Step 2 according to the following groups defined by type and level of audit.

- Telephone audits, Level 1
- Telephone audits, Levels 2 and 3 together
- Online audits, Level 1
- Online audits, Levels 2 and 3 together

Divide the aggregated kWh savings for a group by the number of customers represented in the analysis data set for that group to determine per-participant annual kWh savings.

- In Step 4, determine program-level kWh savings for each audit group for each utility company by multiplying the per-participant kWh savings value for a group by the number of customers who were participants in that group for a utility company.

4.1.5 Method for Calculating kW Reductions

The calculation of kW reductions is based on the per-participant kWh savings values, as calculated per the discussion in Section 4.1.4. The steps in the calculation of kW reductions are as follows.

- In Step 1, determine the amount of annual per-participant kWh savings that occurs in the critical period months of June, July, and August. This is determined by using the data on monthly kWh savings that are calculated during Step 1 of the kWh savings calculations. Also use that data to allocate kWh savings during the critical peak months between heating-related and cooling-related savings.
- In Step 2, using TMY weather data, calculate the percentage of heating degree hours and cooling degree hours during the critical peak months that occur during the critical peak hours for those months (i.e., during the hours from 3 PM to 6 PM on non-holiday weekdays). Use these percentages to determine how much of the heating-related and cooling-related kWh savings calculated in Step 1 occurred during the critical peak hours.
- In Step 3, divide the sum of heating-related and cooling-related kWh savings during critical peak hours by the number of critical peak hours to determine the per-participant per-hour kW reduction occurring during critical peak hours.[3]

[3] For June, July, and August, there are 65 non-holiday weekdays. With 3 critical peak hours for each of these days, the total number of critical peak hours is 195.

- In Step 4, determine program-level kW reductions for each audit group for each utility company by multiplying the per-participant kW reduction value for a group by the number of customers who were participants in that group for a utility company.

4.2 METHODS FOR PROCESS EVALUATION

The process evaluation of the 2011 HEA program was based on data collected through telephone surveys of samples of customers from three groups of residential customers in Ohio. These groups were as follows:

2011 online audit participants

2011 telephone audit participants

2011 comparison group customers

4.2.1 Collection of Data for 2011 Online Audit Participants

Data were collected from two random samples of 2011 online audit participants. One sample included participants who conducted an online audit at level 1, while the other sample included participants who conducted an online audit at levels 2 or 3. The sampling plan for conducting the telephone survey of 2011 online audit participants is shown in Table 4-1. The sample sizes for each audit method meet the requirement for ±10 percent precision at the 90 percent confidence level for the utilities combined. The total sample was allocated to the individual utilities at the proportions shown in Table 4-1.

Table 4-1. Sampling Plan for Telephone Survey of 2011 HEA Online Audit Participants

Utility Company	*Sampling Proportion*	*Level 1 Audit*	*Level 2/3 Audit*	*Sample Size (Completes)*
OE	.51	n = 35	n = 35	n = 70
CEI	.34	n = 24	n = 24	n = 48
TE	.15	n = 11	n = 11	n = 22
Total	1.00	n = 70	n = 70	n = 140

Telephone surveys of customers in these samples of online audit participants were conducted to obtain information with which to determine customers' reasons for seeking only a Level 1 audit or for going beyond a Level 1 audit to a Level 2 or 3 audit. For each level of audit, the survey questionnaire was structured to include questions with which to determine the kind of information customers received and to assess how well the information met their needs. Customers were also asked about actions, if any, they took after completing the audit. Actions taken were characterized as either structural (i.e., primarily equipment upgrades) or behavioral.

Examples of interview questions included the following:

Why did you conduct an online energy audit? What were your concerns?

What information did you get from the online energy audit?

How well did this information meet your needs? How or why? Or why not?

What were you able to do with this information? What actions did you take as a result of the online audit, if any, to conserve energy in your home?

A copy of the survey administered to the 2011 online audit group is provided in Appendix A.

After the survey was completed, responses to open-end questions were coded according to structured response categories.

4.2.2 Collection of Data for 2011 Telephone Audit Participants

Data were collected from a random sample of 2011 HEA participants who received telephone audits. The sampling plan for conducting telephone surveys with the customers in this sample is shown in Table 4-2. The sample size was calculated to meet the requirement for ±10 percent precision at the 90 percent confidence level for the utilities combined. The total sample was allocated to the individual utilities at the proportions shown in Table 4-2.

Table 4-2. Telephone Survey Sampling Plan for Cohort 2 Phone Audit Users

Utility Company	***Sampling Proportion***	***Sample Size (Completes)***
OE	.51	n = 35
CEI	.34	n = 24
TE	.15	n = 11
Total	1.00	n = 70

In the telephone surveys, customers in the sample of telephone audit participants were asked questions with which to determine the kind of information that was provided by Contact Center Representatives to help address customer concerns about high energy bills. Customers were also asked questions about the usefulness of this information to them and the actions customers took in response to the information provided.

Examples of interview questions for telephone audit participants included the following:

Why did you call the contact center? What were your concerns?

What did the customer service representative discuss with you?

Did you receive any information by mail or email as a follow-up?

How helpful was the information provided?

What were you able to do with this information? What actions did you take as a result of the telephone audit, if any, to conserve energy in your home?

A copy of the survey that was administered to telephone audit participants is provided in Appendix A.

After the survey was completed, responses to open-end questions were coded according to structured response categories. In particular, open-ended information on actions taken was coded to identify actions as either structural (i.e., primarily equipment upgrades) or behavioral.

4.2.3 Collection of Data from Non-Participants

Data were collected from a random sample of residential customers who had not participated in the HEA program in 2010 or 2011. The sampling plan for conducting telephone surveys with the sample of non-participants is shown in Table 4-3. The total sample size was calculated to meet the requirement for ±10 percent precision at the 90 percent confidence level across the three service territories combined. The total sample was allocated to the individual utilities at the proportions shown in Table 4-3.

Table 4-3. Sampling Plan for Telephone Survey of Non-Participants

Utility Company	***Sampling Proportion***	***Control Sample***
OE	.52	n = 36
CEI	.32	n = 22
TE	.16	n = 12
Total	1.00	n = 70

The telephone survey of non-participants was used to collect information with which to determine the actions that non-participant customers took in 2011 to save energy. Actions taken were characterized either as structural (i.e., primarily equipment upgrades) or behavioral. The non-participants surveyed were explicitly asked whether they had participated in other Company energy conservation programs.

A copy of the survey that was administered to non-participants is provided in Appendix A.

4.2.4 Analysis of Survey Data for 2011 Participants and Non-Participants

The telephone survey data were analyzed using descriptive statistics and cross tabulations. Responses to open-end questions were content analyzed and coded using a set of structured response categories. The data for online and telephone audit participants and nonparticipants were analyzed to determine whether they had made behavioral or structural changes as a result of the audit and whether they were doing things differently now to save energy in hot and cold weather. For online audit participants, data comparisons were made by audit level (i.e., Level 1 vs. Levels 2/3).

4.3 METHODS FOR PERSISTENCE ANALYSIS

This section describes the methods used to analyze the persistence of savings for customers who participated in the HEA program in 2010.

4.3.1 Analysis of Billing Data

To analyze the persistence of savings, data for the original treatment and control group samples from the evaluation of the 2010 HEA program were updated with 2011 billing data to enable a 36-month analysis.

The persistence analysis compares energy consumption in 2011 for the sample of 2010 HEA participants with their consumption for the 12 months prior to their 2010 audit. The amount of persistence data available will depend on the time of year in 2010 when the audit occurred. The original treatment effect will encompass the 12 months post audit, and the persistence period will include all available data for 13 or more months after the audit.

The final regression specification chosen for the analysis of savings for the 2011 program is also used as the specification for the model used to develop savings estimates for analyzing persistence. Using the regression results, persistence effects will be analyzed for those customers who participated in an energy audit in 2010 by comparing their average energy consumption 13+ months post audit to their consumption in the baseline year (i.e., the 12 months prior to their energy audit).

4.3.2 Survey Data Collection

Additional data with which to analyze the persistence of savings from customers who participated in the HEA Program in 2010 were collected through telephone surveys of samples of customers from three groups of the Companies' residential customers in Ohio. These groups were as follows:

2010 online audit participants

2010 telephone audit participants

2010 non-participants

4.3.2.1 Collection of Data for 2010 Online Audit Participants

Four purposive samples of 70 customers each were selected from among participants in the 2010 HEA program who received online audits and who had been found to have substantially reduced their energy consumption in 2010. One sample included "high savers" drawn from the fourth quartile of savings and the other sample included "low savers" drawn from the second quartile of savings. Both sets of participants included those who had conducted Level 1 audits in 2010 or audits at Level 2 or 3in 2010.

The sampling plan for conducting telephone surveys with 2010 high saver participants who were online audit users is shown in Table 4-4. The sample sizes for each level of audit were calculated to meet the requirement for ±10 percent precision at the 90 percent confidence level for the three utility service territories combined. The total sample for each audit level was allocated to the individual utilities at the proportions shown in Table 4-4.

Table 4-4. Telephone Survey Sampling Plan for Online Audit Users from among High Saver Participants in 2010 HEA Program

Utility Company	*Sampling Proportion*	*Level 1 Audit*	*Level 2/3 Audit*	*Sample Size (Completes)*
OE	.51	n = 35	n = 35	n = 70
CEI	.34	n = 24	n = 24	n = 48
TE	.15	n = 11	n = 11	n = 22
Total	1.00	n = 70	n = 70	n = 140

The sampling plan for conducting telephone surveys with 2010 low saver participants who were online audit users is shown in Table 4-5. The sample sizes for each level of audit were calculated to meet the requirement for ±10 percent precision at the 90 percent confidence level for the three utility service territories combined. The total sample for each audit level was allocated to the individual utilities at the proportions shown in Table 4-5.

Table 4-5. Telephone Survey Sampling Plan for Online Audit Users from among Low Saver Participants in 2010 HEA Program

Utility Company	*Sampling Proportion*	*Level 1 Audit*	*Level 2/3 Audit*	*Sample Size (Completes)*
OE	.51	n = 35	n = 35	n = 70
CEI	.34	n = 24	n = 24	n = 48
TE	.15	n = 11	n = 11	n = 22
Total	1.00	n = 70	n = 70	n = 140

The telephone surveys with "saver" customers in the two samples of online audit users were directed at obtaining information with which to determine the extent to which any energy saving actions (either structural or behavioral changes) that were taken by these groups in 2010 were still in place or were continuing to be practiced by these customers in 2011.

Interview questions for these online audit savers from 2010 included not only the same questions asked of 2011 online audit users but also included the following:

- For structural changes: *How is that working out? Is it still installed?*
- For behavioral changes: *Are you still continuing to do that or are you doing something else now?*
- *Have you made any other energy saving changes?*

4.3.2.2 Collection of Data for 2010 Telephone Audit Participants

Two samples of 70 customers each were also selected from among participants in the 2010 HEA program who received telephone audits and who had been found to have substantially reduced their energy consumption in 2010. The sampling plan for conducting telephone surveys with 2010 participants who were telephone audit savers is shown in Table 4-6 and Table 4-7. Again, there was a sample of high savers and a sample of low savers, both defined as previously

described. Sample sizes were calculated to meet the requirement for ±10 percent precision at the 90 percent confidence level for the three utility service territories combined. The total sample was allocated to the individual utilities at the proportions shown in Table 4-6 for high savers and in Table 4-7 for low savers.

Table 4-6. Telephone Survey Sampling Plan for Telephone Audit High Savers from among Participants in 2010 HEA Program

Utility Company	***Sampling Proportion***	***Sample Size (Completes)***
OE	.51	n = 35
CEI	.34	n = 24
TE	.15	n = 11
Total	1.00	n = 70

Table 4-7. Telephone Survey Sampling Plan for Telephone Audit Low Savers from among Participants in 2010 HEA Program

Utility Company	***Sampling Proportion***	***Sample Size (Completes)***
OE	.51	n = 35
CEI	.34	n = 24
TE	.15	n = 11
Total	1.00	n = 70

Interview questions for these telephone audit savers from 2010 included the same questions asked of 2010 online audit users but also included the following:

- For structural changes: *How is that working out? Is it still installed?*
- For behavioral changes: *Are you still continuing to do that or are you doing something else now?*
- *Have you made any other energy saving changes?*

4.3.2.3 Analysis of Telephone Survey Data to Determine Persistence Effects

The telephone survey data were analyzed using descriptive statistics and cross tabulations. Responses to open-end questions were content analyzed and coded using a set of structured response categories. The data for online and telephone audit savers were analyzed to determine whether the behavioral and structural changes they reported in 2010 had persisted through 2011. For online audit savers, persistence rates for behavioral and structural changes were compared by audit level.

5. DETAILED EVALUATION FINDINGS

This chapter presents and discusses the findings from the impact and process evaluation of the 2011 Home Energy Analyzer Program and the analysis of persistence for savings from the 2010 HEA program.

5.1 FINDINGS FROM IMPACT EVALUATION OF 2011 HEA PROGRAM

This section presents and discusses the results from the regression analysis and the application of those results to determine the savings from the 2011 HEA program.

5.1.1 Results of Regression Analysis

For the regression analysis, several different regression models were examined. The results for these various models are included in the Excel model included as Appendix B.

The results of the regression analysis (estimated coefficients and their corresponding standard errors) for the model used for determining savings are reported in Table 5-1. Definitions for the variables in the model are provided in Table 5-2.

Table 5-1. Results of Regression Analysis of Billing Data
for Model Used to Estimate Savings for Participants in the 2011 HEA Program

Variable	***Estimated Coefficient***	***Standard Error***
HDD67	0.0130	0.0001*
CDD68	0.0852	0.0005*
HDD67*Level 2/3	0.0013	0.0017
CDD68*Level 2/3	0.0063	0.0003*
Level 2/3*Post	0.0797	0.0133*
Post*Online	0.0170	0.0051*
CDD68*Level 2/3*Post	-0.0104	0.0024*
HDD67*Level 2/3*Post	-0.0026	0.0005*
Dependent Variable:	Natural log of average daily kWh for billing period	
Mean of dependent variable	3.2831	
Number of observations	278,557	
R-Squared	0.7564	

Table 5-2. Definitions for Variables in Regression Model

Variable Name	***Variable Definition***	***Measurement Scale***
Ln kWh	Natural log of average daily kWh for a customer	Continuous variable
CustID	Customer contract account number	Continuous variable
CDD68	Cooling degree days referenced to base temperature of 68°F	Continuous variable
HDD67	Heating degree days referenced to base temperature of 67°F	Continuous variable
Level 2 / 3	If customer had Level 2 or 3 audit (1=Had Level 2/3 Audit, 0 = Did not have Level 2/3 Audit)	Binary variable
Post	Treatment or control group indicator (1=HEA participant, 0 = Control)	Binary variable
Online	Phone or Online Method (1=Online, 0=Phone)	Binary Variable

5.1.2 kWh Savings and kW Reductions for Participants in 2011 HEA Program

The results from the regression reported in Table 5-1 were used to determine annual kWh savings and kW reductions per participant for the 2011 HEA program. All coefficients of interest that were significant at the 90% confidence level were used for this purpose.

The regression analysis results indicated that customers receiving only a Level 1 audit either by telephone or online had no savings. There were savings for customers who received Level 2 or 3 audits. The annualized electricity savings (kWh) per participant are presented in Table 5-3 by type and level of audit.

Table 5-3. Annualized Electric Energy Savings (kWh per year) per Participant Summarized by Audit Method and Level of Audit

Level of Audit	***Audit Method***	
	Telephone	***Online***
Level 1 only	0	0
Level 2 / 3	405 kWh	457 kWh

The average kW reductions during critical peak hours per participant are reported in Table 5-4. As defined by the PUCO, critical peak hours occur on weekdays during June, July, and August from 3 PM to 6 PM.

Table 5-4. kW Reduction per Hour per Participant during Critical Peak Hours Summarized by Audit Method and Level of Audit

Level of Audit	***Audit Method***	
	Telephone	***Online***
Level 1 only	0	0
Level 2 / 3	0.0798 kW	0.0991 kW

5.1.3 Program-Level kWh Savings

Program-level savings for the 2011 HEA program were determined by multiplying the per audit savings results from Table 5-3 by the number of participants who received Level 2 or 3 audits in the different service territories. The program-level kWh savings by utility and audit method are shown in Table 5-5. Total kWh savings for the 2011 HEA program were determined to be about 4,420 MWh.

Table 5-5. Program-Level Electric Energy Savings (kWh) by Utility for Participants Who Had Audit at Levels 2 or 3

CEI			
	Telephone	**Online**	**Combined**
kWh Saved per Participant	405	457	-
Number of Participants	2,093	1,220	3,313
Total kWh Saved	847,665	557,540	1,405,205
OE			
	Telephone	**Online**	**Combined**
kWh Saved per Participant	405	457	-
Number of Participants	3,304	2,129	5,433
Total kWh Saved	1,338,120	972,953	2,311,073
TE			
	Telephone	**Online**	**Combined**
kWh Saved per Participant	405	457	-
Number of Participants	1,008	644	1,652
Total kWh Saved	408,240	294,308	702,548
Combined Totals All Companies			
	Telephone	**Online**	**Combined**
Number of Participants	6,405	3,993	10,398
Total kWh Saved	2,594,025	1,824,801	4,418,826

5.1.4 Program-Level Critical Peak Demand Impacts

Program-level savings for the 2011 HEA program were determined by applying the per audit kW reduction values from Table 5-4 for the customers who received Level 2 or 3 audits in the

different service territories. The program-level kW reductions by utility for the participants who received Level 2 or 3 audits are shown in Table 5-6. Total kW reductions for the 2011 HEA program were determined to be about 907 kW.

Table 5-6. Program-Level kW Reductions during Critical Peak Hours by Utility for Participants Who Had Audits at Levels 2 or 3

CEI			
	Telephone	**Online**	**Combined**
kW Reduction per Participant	0.0798	0.0991	-
Number of Participants	2,093	1,220	3,313
Total kW Reduction	167.0	120.9	287.8
OE			
	Telephone	**Online**	**Combined**
kW Reduction per Participant	0.0798	0.0991	-
Number of Participants	3,304	2,129	5,433
Total kW Reduction	263.6	210.9	474.5
TE			
	Telephone	**Online**	**Combined**
kW Reduction per Participant	0.0798	0.0991	-
Number of Participants	1,008	644	1,652
Total kW Reduction	80.4	63.8	144.2
Combined Totals All Companies			
	Telephone	**Online**	**Combined**
Number of Participants	6,405	3,993	10,398
Total kW Reduction	511.0	395.6	906.6

5.2 FINDINGS FROM PROCESS EVALUATION OF 2010 AND 2011 HEA PROGRAMS

This section presents findings from the process evaluation of the 2010 and 2011 HEA Programs. Findings are based on telephone survey interviews that were completed with samples of customers who participated in the 2010 (Cohort 1) and 2011 (Cohort 2) HEA programs. The findings also draw on telephone survey interviews completed with two samples of nonparticipants. Table 5-7 shows the number of completions for each survey group.

As indicated in Table 5-7, the process evaluation's findings are based on the results of five telephone surveys administered to 770 of the Companies' customers. Two surveys were administered to 420 participants from Cohort 1 (2010) of the HEA program; two surveys were administered to 210 participants from Cohort 2 (2011) of the HEA program; and two control surveys were administered to 140 nonparticipants matched to the online and telephone audit participant samples.

Table 5-7. Process Evaluation Surveys Completed

Survey Group	***Surveys Completed***
Online audits, Cohort 2	140
Online audits, Cohort 1	280
Telephone audits, Cohort 2	140
Telephone audits, Cohort 1	70
Non-participants	140
Total	770

The telephone interviews were designed to collect data to answer the following six research questions.

1. How did customers learn of the availability of the home energy audit?
2. How is the information provided in a telephone audit different from the information provided in an online audit?
3. How is online information provided in a Level 1 audit different from the online information provided to customers in Level 2 or Level 3 audits?
4. What actions did telephone audit users take to save energy and how did these actions differ from the energy saving actions of online audit users or a control group?
5. How did the energy saving actions of online audit users at Level 1 differ from the energy saving actions of online audit users at Levels 2 and 3?
6. To what extent did customers who initiated energy saving actions in 2010 continue with these practices in 2011?

5.2.1 Process Evaluation Findings

This section presents findings from the telephone surveys that address the seven research questions posed above.

5.2.1.1 How Customers Learned of the Availability of Home Energy Audits

Customers who participated in the telephone version of a home energy audit called the Customer Service Center of their local utility company because of financial concerns regarding their electric bills. They did not call in expecting or seeking a home energy audit. Rather, they generally called in to register a "high bill complaint" or to inquire about their meter reading.

Customers who participated in the online version of a home energy audit also generally had financial concerns about their electric bill but they were actively seeking a solution to their "high bill" problem. In other words, the online users were also motivated to understand how they could be more efficient in using electricity in their home. The online users wanted to find out what they could control and how they could be better (more efficient) consumers of residential electricity.

About twelve percent of the online users were simply interested in energy conservation and were curious about how the *Home Energy Analyzer* worked as a conservation tool.

The online version of the home energy audit – the *Home Energy Analyzer* – was advertised in several ways: online, by mail, and to a small degree through mass media. As can be seen in Table 5-8, online advertising accounted for over half of the participants who heard of the *Home Energy Analyzer* in some way or another. Most often, customers heard of the *Home Energy Analyzer* through their local electric company's website. Bill inserts were also an effective means of getting the word out about the opportunity to do a home energy audit online.

Table 5-8. How Customers Heard of the Home Energy Analyzer

Response	***Cohort 1 Count***	***Cohort 2 Count***	***Total Count***	***Percent***
EDC Website	99	34	133	38%
Bill Insert	65	42	107	31%
Energy Save Ohio Website	38	21	59	17%
Word of Mouth	17	6	23	7%
Print/Newspaper Ad	3	3	6	2%
Radio/TV Ad	0	4	4	1%
Other	11	6	17	5%
Total	233	116	349	100%

5.2.1.2 Differences between a Telephone Audit and an Online Audit

In a telephone audit, a customer typically calls customer service to complain about their electricity bill. The customer service representative typically attempts to explain the bill to the customer in terms of the key factors that contribute to the customer's energy use.[4] This is achieved by reviewing the customer's billing history and attempting to engage the customer in a dialogue to profile the customer's home and appliances, which, if successful, may result in identifying the major uses of electricity in the home. The customer service representative will also suggest ways in which the customer can save energy, given identification of the main energy uses in the home. Finally, the customer service representative will estimate what the customer's bill should be in light of the billing history review and the home/appliance profile, and offer a judgment as to whether the customer's electric bill is reasonable or not. The phone audit typically concludes with the customer service representative offering to send the customer literature[5] on how to save energy in the home.

A phone audit resembles a Level 1 or Level 2 online audit in that the customer gets a review of their usage history and feedback on basic ways to save energy, but the customer does not get a written, customized home energy analysis report. Rather, they are offered a brochure on tips for saving energy in the home. The survey data indicate that 52-57% of the phone audit participants

[4] ADM reviewed a sample of 12 telephone audit recordings.

[5] *Understanding Electricity Usage and Costs*

receive the energy saving tips brochure and that 70-88% of the phone participants who receive the energy saving tips material find this information helpful. The phone audit participants are also offered a computer link to the *Home Energy Analyzer*. The survey data suggest, however, that only 2-5% of the telephone audit participants receive the link and very few actually use it.

Activities similar to a Level 1 and Level 2 online audit can occur in a telephone audit. That is, both online and telephone audits provide the opportunity to review changes in usage over time and to answer questions about home appliance usage. However, proportionately more online participants engaged in these activities in 2010 and 2011 compared to telephone audit participants. This can be seen in Table 5-9.

Table 5-9. Participation in Level 1 and Level 2 Audit Activities

Audit Activities	***Telephone Audit***	***Online Audit***
Review changes in usage: Level 1	60-68%	73-79%
Home Appliance Profile: Level 2	63-66%	81-84%
Sample Size	n =179	n = 369

The online audit users also tended to view the online audit procedure as consistently more helpful compared to the telephone audit users. During the 2010 and 2011 program years, 66-88% of the telephone audit participants found the energy audit procedure to be helpful compared to 87-90% of the online audit users. Those who found the audit procedure to be useful most often described it as educative and informative about helping them understand energy use.

At the other extreme, only four percent of the online users found the audit procedure not to be helpful whereas 7-18% of the telephone participants found the audit procedure to be unhelpful. Those who did not find the audit procedure helpful generally described it as not providing any new or actionable information about energy use and energy conservation or that they did not understand the information provided.

5.2.1.3 Differences between Level 1 and Level 2/3 Online Audits

In an online audit, the customer controls the depth of the investigation into home energy use and the exploration into ways to save energy. The online software provides for three levels of energy usage analysis. In a Level 1 audit, the customer can get a bill comparison report for the home and answer questions in the software program to complete a home profile. The software automatically analyzes the answers given on the home profile and generates a Level 1 report that provides the customer with basic energy saving ideas and the customer's top ways to save energy.

At Level 2, the customer completes a home appliance profile and the software generates a more detailed Level 2 report on ways to save energy. Alternatively, the customer can engage in a Level 3 online audit which allows the customer to explore a multitude of topics on saving energy in the home. Level 3 topics include weatherization, heating, cooling, hot water, lighting, kitchen uses, etc. The software also allows the user to explore no-cost/low-cost ways to save energy

immediately, ways to save energy that require some financial investment but which will pay off in time, and ways to save that would not be cost-justified for the customer. A Level 2 or Level 3 audit will provide the customer with a customized Home Energy Analysis Report in which estimates of energy costs and savings and energy saving options are based on the information the customer provided. A Level 3 Home Energy Analysis Report is more detailed than a Level 2 Report

5.2.1.4 Energy Saving Actions of Online vs. Phone Audit Participants vs. Controls

The survey data clearly show that the online audit participants were substantially more likely to take energy saving actions as a result of the home energy audit experience compared to the telephone audit participants. Table 5-10 presents data indicating that 75% of the online audit participants made energy saving changes over the two-year period spanning 2010 and 2011 compared to 50% of the telephone audit participants. The online audit participants were particularly more likely to take energy saving actions involving structural changes that required financial investment in energy efficient equipment.

Table 5-10. Energy Saving Actions Taken by Phone vs. Online Audit Participants

Type of Energy Saving Action	***Percent of Phone Audit Participants***	***Percent of Online Audit Participants***
Structural (Equipment)	16%	29%
Behavioral	27%	28%
Structural & Behavioral	7%	17%
No Changes Made	50%	25%
Sample Size	n=203	n=411

The survey data also show that both the phone and online audit participants were substantially more likely to take particular actions to save energy in hot weather and in cold weather compared to nonparticipating control customers. Table 5-11 shows that, proportionately, home energy audit customers were about twice as likely as control customers to make particular changes in response to hot weather. Both types of audit participants were also considerably more likely than nonparticipants to do particular things to save energy in response to cold weather.

Table 5-11. Taking Particular Actions to Save Energy in Response to Hot and Cold Weather

Doing particular things to save energy in hot weather?			
Response	***Phone Audit***	***Online Audit***	***Controls***
Yes	68%	58%	30%
No	32%	42%	70%
Sample Size	n=66	n=184	n=137
Doing particular things to save energy in cold weather?			
Response	***Phone Audit***	***Online Audit***	***Controls***
Yes	70%	75%	43%
No	30%	25%	57%
Sample Size	n=61	n=185	n=139

Energy saving changes articulated by the audit participants focused on using air conditioning less in hot weather, using fans more, and opening windows and doors to allow natural ventilation to achieve cooling effects. In colder weather, the audit participants emphasized turning down the thermostat, wearing more clothes, installing various types of insulation such as weather-stripping around windows and doors, and decreasing the use of expensive electric heaters

5.2.1.5 Did Energy Saving Actions Differ among Online Audit Users?

The survey data suggest that the proportion of online audit participants taking energy saving actions was similar across levels of audit intensity. That is, there was no evidence that online audit participants at levels 2 or 3 were more involved in taking energy saving actions than online audit participants at level 1. Specifically, the data in Table 5-12 show that 76% of the online audit participants at levels 2 and 3 made energy saving changes compared to 74% of the online audit participants at level 1. The proportion of online audit participants taking energy saving actions was about the same across audit level for each category of energy saving action.

Table 5-12. Energy Saving Actions: Online Audit Participants at Level 1 vs. Levels 2/3

Type of Energy Saving Action	***Percent of Level 1 Online Audit Participants***	***Percent of Level 2/3 Online Audit Participants***
Structural (Equipment)	28%	31%
Behavioral	29%	28%
Structural & Behavioral	17%	17%
No Changes Made	26%	24%
Sample Size	n=206	n=205

Online audit participants were more likely to make energy saving changes in response to cold weather in northern Ohio than in response to hot weather. However, audit level did not differentiate between those online participants who were likely to make these changes. As can be seen in Table 5-13, level 1 online audit participants were about as likely as online participants at

levels 2/3 to make energy saving changes in hot weather (56% vs. 59%) or in cold weather (74% vs. 75%).

Table 5-13. Energy Saving Changes in Hot and Cold Weather: Online Audit Participants at Level 1 vs. Levels 2/3

Energy Saving Changes: Weather Condition	***Percent of Level 1 Online Audit Participants***	***Percent of Level 2/3 Online Audit Participants***
Making Changes Hot Weather	56%	59%
Making Changes Cold Weather	74%	75%
Sample Size	n=184	n=185

5.3 FINDINGS FROM THE PERSISTENCE ANALYSIS

The third major aspect of the 2011 evaluation was to examine the degree to which the savings achieved by participants in the HEA program in 2010 persisted from 2010 through 2011.

5.3.1 Findings on Persistence from Analysis of Billing Data

The same procedures used to determine kWh savings for 2011 HEA participants were also applied to 2010 HEA participants to obtain kWh savings numbers for 2010 participants that could be used to examine savings persistence. The results of the regression analysis for savings persistence are reported in Table 5-14.

Table 5-14. Results of Regression Analysis of Billing Data to Determine Persistence of Savings for Participants in the 2010 HEA Program

Variable	***For 2010 Post Period***		***For 2011 Post Period***	
	Estimated Coefficient	***Standard Error***	***Estimated Coefficient***	***Standard Error***
HDD67	0.0182	0.0001*	0.0168	0.0001*
CDD68	0.0788	0.0008*	0.0698	0.0008*
Post*Online	0.0052	0.0031	(0.0124)	0.0030*
HDD67*Level 2/3*Post	(0.0007)	0.0001*	0.0001	0.0001
CDD68*Level 2/3*Post	(0.0028)	0.0007*	0.0034	0.0008*
Mean of dependent variable	3.3860		3.4182	
Number of Observations	182,688		216,433	
R-Squared	0.7276		0.7047	

The regression results reported in Table 5-14 were used to determine kWh savings in 2010 and 2011 for 2010 HEA participants. The estimated kWh savings are reported in Table 5-15. Note that these estimates of kWh saved per participant are calculated over all participants, so that participants who realized no savings are included.

Table 5-15. kWh Savings for 2010 and 2011 for 2010 HEA Participants

	Online Audit Customers	***Telephone Audit Customers***
kWh Savings, 2010	141	171
kWh Savings, 2011	98	0
Percent Savings Persistence	69%	0%

The kWh savings reported in Table 5-15 show persistence of savings from customers who received audits online but not from telephone audit customers. For the online audit customers, savings in 2011 were about 69 percent of their savings from 2010.

5.3.2 Findings on Persistence from Telephone Survey Data

Samples of customers who received an audit during the 2010 HEA program who had indicated that they had made behavioral changes to save energy were re-interviewed. Most indicated that they continued to practice those energy saving habits. The percentage of online audit participants in the 2010 HEA program who indicated behavioral persistence was 99% (n=131). The percentage of telephone audit participants in the 2010 HEA program who indicated behavioral persistence was 100% (n=51).

6. CONCLUSIONS AND RECOMMENDATIONS

This chapter provides conclusions and recommendations from the evaluation of the 2011 Home Energy Audit program.

6.1 CONCLUSIONS

A total of 16,037 customers participated in the HEA program in Ohio in 2011. Of these participants, 59% used the online audit method and 41% used the telephone audit method. This concluding section of the report summarizes ADM's answers to each of the impact and process evaluation questions that guided our efforts in the 2011 evaluation of the HEA Program. We turn first to a summary of the major impact evaluation findings.

6.2 IMPACT EVALUATION FINDINGS

6.2.1 Electricity and Demand Savings

For all home energy audits combined in 2011, e*x ante* expected annual electricity savings were 8,248,998 kWh. Similarly, the *ex post* verified annual electricity savings for all home energy audits combined in 2011 were 4,418,826 kWh. The ratio of ex post to ex ante total electricity savings yields an overall realization rate of 54% for the 2011 HEA program.

For all home energy audits combined in 2011, *ex ante* expected critical peak demand reduction was 1,265 kW. Similarly, the *ex post* verified critical peak kW reduction for all home energy audits combined in 2011 was 907 kW. The ratio of ex post to ex ante total demand savings yields an overall realization rate of 72% for the 2011 HEA program.

Table 6-1 shows program-level results for kWh savings and kW reductions for the 2011 HEA program for each of the Ohio Companies.

Table 6-1. Program-Level Savings (kWh) and kW Reductions by Utility and Audit Method

CEI			
	Telephone	**Online**	**Combined**
Total kWh Saved	847,665	557,540	1,405,205
Total kW Reduced	167.0	120.9	287.8
OE			
	Telephone	**Online**	**All Audits**
Total kWh Saved	1,338,120	972,953	2,311,073
Total kW Reduced	263.6	210.9	474.5
TE			
	Telephone	**Online**	**All Audits**
Total kWh Saved	408,240	294,308	702,548
Total kW Reduced	80.4	63.8	144.2
Totals for All Three Companies			
	Telephone	**Online**	**All Audits**
Total kWh Saved	2,594,025	1,824,801	4,418,826
Total kW Reduced	511.0	395.6	906.6

6.2.2 Audit Method Contributions to Electricity Savings

Of the total electricity savings, 1,824,801 kWh (41%) were from online audits and 2,594,025 kWh (59%) were from telephone audits.

Of the total demand reduction, 396 kW (44%) were from online audits and 511 kW (56%) were from telephone audits.

6.2.3 Audit Level Contributions to Electricity Savings

Ex post verified savings were achieved in 2011 only for those participants who engaged in a Level 2 or Level 3 audits. No electricity savings were observed for participants who engaged in a Level 1 audit.

Ex post verified kW reduction was also achieved only by participants who engaged in a Level 2 or Level 3 audit. No demand reduction was observed for participants who engaged in a Level 1 audit.

For those participants using the online method, 42% engaged in a Level 2 or Level 3 audit. For participants using the telephone method, nearly all (97%) were engaged in a Level 2 or Level 3 audit.

6.2.4 Persistence of Electricity Savings

Persistence effects were observed for customers who engaged in online audits but not for customers who engaged in telephone audits. The magnitude of the 2011 persistence effect for online audit participants was approximately 69 percent of the savings from 2010.

6.3 PROCESS EVALUATION FINDINGS

6.3.1 Differences between an Online Audit and a Telephone Audit

Customers may receive a home energy audit by telephone as part of the process of resolving a high bill complaint; however, home energy audits by telephones are not initiated by the customer. In contrast, online energy audits are initiated by customers who are generally motivated to understand how they can be more efficient in using electricity in their home.

Customers who receive a home energy audit by telephone may receive literature on how to save energy in the home, but they do not receive a customized, written home energy report like the online audit participants do.

Proportionately more online audit users engage in Level 1 and Level 2 audit activities compared to telephone audit users and proportionately more of the online audit users found the home energy audit helpful compared to telephone audit users.

6.3.2 Differences between a Level 1 Audit and a Level 2/3 Audit

Telephone audits and online audits can be conducted at any of three levels of audit intensity. A Level 1 home energy audit is essentially limited to an examination of the customer's billing history and does not help the customer discover ways to save energy in the home. The impact evaluation documented this fact in that energy savings were not associated with a Level 1 audit.

A level 2 audit allows the customer to complete a home appliance assessment and a Level 3 audit allows the customer to explore additional ways to save energy in the home, including weatherization options, cooling and heating options, lighting options, no-cost/low cost ways to save energy, options that require financial investment, and analysis of the returns on investment.

6.3.3 Energy Saving Actions of Online vs. Telephone Audit Participants

The online audit participants were substantially more likely to take energy saving actions as a result of the home energy audit experience compared to telephone audit participants. Considering both cohorts over the two-year period spanning 2010 and 2011, 75% of the online audit participants reported taking energy saving actions as a result of the home energy audit compared to 50% of the telephone audit participants. The online audit participants were particularly more likely to take energy saving actions involving structural changes that required financial investment in energy efficient equipment.

Both types of audit participants were more likely to have taken particular steps to save energy in hot weather and cold weather compared to customers who had not participated in a home energy audit.

6.3.4 Energy Saving Actions of Level 1 vs. Level 2/3 Online Audit Participants

The survey data did not show any substantial differences in energy saving actions for participants reporting behavioral persistence between participants engaging in a Level 1 online audit and participants engaging in a Level 2 or 3 online audit. This finding from the surveys is at odds with the statistical results of the billing analysis. The survey analysis does not include persisters whose savings are attributed to structural or equipment changes, which could explain the discrepancy. ADM will examine this issue further in the 2012 evaluation.

6.3.5 Evidence of Persistence in Savings Actions

Both online and telephone audit participants reported continuing the behavioral changes they had initially made in 2010 as a result of their home energy audit experience to save energy.

6.3.6 How Customers learned about the Opportunity to do a Home Energy Audit

Customers who participated in a home energy audit by telephone called customer service to register a high bill complaint. They were not aware of the telephone audit procedure when they called and they were not expecting or seeking a home energy audit when they called.

Online audit participants learned about the opportunity to take a home energy audit online primarily by visiting their local utility company's website (38%), or by visiting the Energy Save Ohio website (17%) or by receiving notification of the *Home Energy Analyzer* through a utility bill insert (31%).

6.4 RECOMMENDATIONS

More of the online audit participants need to engage the *Home Energy Analyzer* software application at audit levels 2 and 3 in order to realize energy and demand savings. Consequently, ADM recommends that efforts to promote online use of home energy audits emphasize the need to go beyond a Level 1 audit in order to achieve reduced electricity consumption and savings on the customer's monthly electric bill.

ADM recommends that the Companies consider increasing the frequency of bill inserts that advertise and promote the online home energy audits using the Home Energy Analyzer software.

APPENDIX A
PRO RATA EX POST SAVINGS AND LIFETIME SAVINGS

Pro Rata Savings were calculated based on the audit date for each customer and then summed up to reach the program level savings number. For example if a participant had an implementation date of January 17th, 2011 their Pro Rata savings would be calculated as follows:

$$Pro\ Rata\ kWh = \frac{365 - 17}{365} * Annualized\ kWh\ Savings$$

The same methodology applies to kW savings.

The program lifetime has been determined to be 2 years. Given the persistence study performed as part of the 2011 evaluation, there is evidence that the savings tend to persist over a period greater than one year. The second year savings were 69% of the first year savings, and it is reasonable to assume that the savings would persist into year 3 in some capacity. A two year lifetime is a conservative but fair estimate based on current data. The Lifetime savings are calculated as:

$$Lifetime\ Savings = Measure\ Life \times Annualized\ Savings$$

Table A-1 below, tabulates the results by operating company for Pro Rata and Lifetime savings.

Table A-1 Pro Rata Ex Post Savings and Lifetime Savings

	Pro Rata Ex Post kWh	Pro Rata Ex Post kW	Lifetime kWh	Lifetime kW
CE	915,886	187.3	2,810,410	575.6
OE	1,407,437	289.1	4,662,146	949
TE	415,294	85.2	1,405,096	288.4
Combined	2,738,617	561.6	8,877,652	1,813.0

APPENDIX B
PROCESS EVALUATION TELEPHONE SURVEYS

Ohio Edison, The Illuminating Company and Toledo Edison

2011 Home Energy Audit Program
Online Audit Participant Survey: Cohort 1

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

Customer Account Number: _____ Customer Zip Code: _____

Date of Interview: _____/_____/_____

EDC:

Ohio Edison ……. 01

Illuminating Company …… 02

Toledo Edison …….. 03

Hello. I am calling on behalf of (NAME OF EDC), your electric utility company. You have been randomly selected to participate in this survey about your experience with the (NAME OF EDC) online Home Energy Analyzer. You will receive a $10 gas card from Shell for participating in this survey. Is now a good time to talk with you about your experience with the Home Energy Analyzer? This will only take about 10 minutes.

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

1. *First, could you tell me how you heard about the Home Energy Analyzer?* [DO NOT READ; INDICATE ALL THAT APPLY]

Bill Insert	01
Energy Save Ohio website	02
FirstEnergy Utility website	03
Print/Newspaper Ad	04
Radio	05
Word-of-Mouth	06
Other (specify)	07

Specify Other: _____

2. *Our records indicate that you used the Home Energy Analyzer on _____ (month/date) 2010. Can you tell me why you decided to do an online home energy audit? What were your concerns?*

RECORD VERBATIM: _____

_____

_____

_____

_____

Don't know/don't recall…….. 98
Refused ……99

3. *Can you tell me what you did online with the Home Energy Analyzer? Did you …*

ASK A-E

		Yes	No	DK	Refused
a.	Review changes in your bill/usage over time?	1	2	98	99
b.	Answer questions about your home appliances?	1	2	98	99
c.	Answer questions about weatherizing your home?	1	2	98	99
d.	Get detailed energy saving ideas for your home?	1	2	98	99
e.	Do something else?	1	2	98	99
f.	Don't recall	1			

Specify *"something else"*:

_____

ASK Q4 IF DETAILED ENERGY SAVING IDEAS RECEIVED

4. *What kind of detailed energy saving ideas did you receive? Did they involved:*

		Yes	No	DK	Refused
a.	No-cost/low cost ways to save energy immediately?	1	2	98	99
b.	Ways to save requiring investment but will pay off?	1	2	98	99
c.	Ways to save that would not be cost-justified?	1	2	98	99
d.	Other ways to save?	1	2	98	99

Specify Other: _____

5. *How helpful was the information provided by the Home Energy Analyzer? Would you say it was "Very Helpful, Somewhat Helpful, Neither Helpful nor Unhelpful, Somewhat Unhelpful, or Not at all Helpful"?*

Very Helpful ……...01
Somewhat Helpful ……..…..02
Neither Helpful nor Unhelpful…….03
Somewhat Unhelpful ……..04
Not at all Helpful ……..…..05
Don't Know/don't recall……98
Refused ……..…99

ASK Q6 IF Q5 = SOMEWHAT UNHELPFUL OR NOT HELPFUL

6. *What aspects were not helpful? Why?*

RECORD VERBATIM: _____

_____

_____

_____

_____

Don't know……...98
Refused ……99

7. *What aspect of the Home Energy Analyzer was most helpful to you? Why?*

RECORD VERBATIM: _____

_____

_____

_____

_____

Don't know……...98
Refused ……99

8. *What energy saving actions were you able to take, if any, as a result of using the Home Energy Analyzer?*

RECORD VERBATIM THEN CODE RESPONSE:

_____

_____

_____

_____

Structural changes taken……. 01
Behavioral changes taken…….. 02
Both structural and behavioral changes taken…… ……..03
No changes made yet……..04
Don't Know/don't recall ……98
Refused ……99

ASK Q9 IF STRUCTURAL CHANGES WERE MADE

9. *How is that working out? Is the ___ (equipment/materials) that you purchased still installed?*

Yes, it's still installed……01
No, I removed it/took it out……..02
Don't Know……. ……98
Refused ……..……99

ASK Q10 IF Q9= YES

10. *How satisfied are you with your new ____ (equipment/materials)? Would you say you are "Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied"?*

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

*ASK Q11- Q15 IF **BEHAVIORAL** CHANGES MADE; OTHERWISE SKIP TO Q16*

11. *Do you do things differently now to save energy in **hot weather**?*

Yes ……..01
No…… ……02
Don't know ……..98
Refused ……..….…99

12. *(IF YES) What do you do differently now?*
*RECORD VERBATIM RESPONSE*_____
_____
_____
_____

13. *Do you do things differently now to save energy in **cold weather**?*

Yes ……..01
No…… ……02
Don't know ……..98
Refused ……..….…99

14. *(IF YES) What do you do differently now?*
*RECORD VERBATIM RESPONSE*_____
_____
_____
_____

15. *Are you continuing to do the changes you identified (the behavior changes identified in Q8, Q12 or Q14)?*

Yes, behavior still practiced……01
No, I stopped doing that…..……..……..02
Don't Know……. ……..…….98
Refused ……..……99

ASK Q16 IF <u>ANY CHANGES</u> WERE MADE; OTHERWISE SKIP TO Q18

16. *Have you noticed any savings on your electric bill since you made these changes?*

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

ASK Q17 IF Q16 = YES

17. *How satisfied are you with the savings you noticed on your electric bill since making these changes? Would you say you are "Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied"?*

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

18. *Overall, how satisfied are you with the (NAME OF EDC) Home Energy Audit Program? Would you say you are "Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied"?*

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

19. *Why do you give it that rating?*

RECORD VERBATIM: _____

_____

_____

20. *Do you have any suggestions to improve the (NAME OF EDC) Home Energy Analyzer?*

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

21. IF YES, RECORD VERBATIM RESPONSE:

_____

_____

_____

_____

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

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

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

Specify Other: _____

23. *Do you own or rent this residence?*

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

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

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

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

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

ASK Q26 IF Q25 = DON'T KNOW OR REFUSED

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

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

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

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

ASK Q28 IF Q27 = DON'T KNOW OR REFUSED

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

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

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

Ohio Edison, The Illuminating Company and Toledo Edison

2011 Home Energy Audit Program
Online Audit Participant Survey: Cohort 2

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

Customer Account Number: _____ Customer Zip Code: _____

Date of Interview: _____/_____/_____

EDC:

Ohio Edison ……. 01

Illuminating Company …… 02

Toledo Edison …….. 03

Hello. I am calling on behalf of (NAME OF EDC), your electric utility company. You have been randomly selected to participate in this survey about your experience with (NAME OF EDC) online Home Energy Analyzer. You will receive a $10 gas card from Shell for participating in this survey. Is now a good time to talk with you about your experience with the Home Energy Analyzer? This will only take about 10 minutes.

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

4. *First, could you tell me how you heard about the Home Energy Analyzer?* [DO NOT READ; INDICATE ALL THAT APPLY]

Bill Insert	01
Energy Save Ohio website	02
FirstEnergy utility website	03
Print/Newspaper Ad	04
Radio	05
Word-of-Mouth	06
Other (specify)	07

Specify Other: _____

30. Our records indicate that you used the Home Energy Analyzer on _____ (month/date) 2011. Can you tell me why you decided to do an online home energy audit? What were your concerns?

RECORD VERBATIM: _____

_____

_____

_____

_____

Don't know/don't recall…….. 98
Refused ……99

3. *Can you tell me what you did online with the Home Energy Analyzer?* Did you …
ASK A-E

		Yes	No	DK	Refused
g.	Review changes in your bill/usage over time?	1	2	98	99
h.	Answer questions about your home appliances?	1	2	98	99
i.	Answer questions about weatherizing your home?	1	2	98	99
j.	Get detailed energy saving ideas for your home?	1	2	98	99
k.	Do something else?	1	2	98	99
l.	Don't recall	1			

Specify *"something else"*:

_____

ASK Q4 IF <u>DETAILED ENERGY SAVING IDEAS RECEIV</u>ED

19. What kind of detailed energy saving ideas did you receive? Did they involved:

		Yes	No	DK	Refused
a.	No-cost/low cost ways to save energy immediately?	1	2	98	99
b.	Ways to save requiring investment but will pay off?	1	2	98	99
c.	Ways to save that would not be cost-justified?	1	2	98	99
d.	Other ways to save?	1	2	98	99

Specify Other: _____

10. How helpful was the information provided by the Home Energy Analyzer? Would you say it was "Very Helpful, Somewhat Helpful, Neither Helpful nor Unhelpful, Somewhat Unhelpful, or Not at all Helpful"?

Very Helpful ……...01
Somewhat Helpful ……....02
Neither Helpful nor Unhelpful…….03
Somewhat Unhelpful ……..04
Not at all Helpful ……....05
Don't Know/don't recall……98
Refused ……..…99

ASK Q6 IF Q5 = SOMEWHAT UNHELPFUL OR NOT HELPFUL

21. What aspects were not helpful? Why?

RECORD VERBATIM: _____

_____

_____

_____

_____

Don't know……...98
Refused ……99

22. What aspect of the Home Energy Analyzer was most helpful to you? Why?

RECORD VERBATIM: _____

_____

_____

_____

_____

Don't know……...98
Refused ……99

23. What energy saving actions were you able to take, if any, as a result of using the Home Energy Analyzer?

*RECORD VERBATIM THEN CODE RESPONSE*_____

_____

_____

_____

Structural changes taken……. 01
Behavioral changes taken…….. 02
Both structural and behavioral changes taken…… ……..03
No changes made yet……..04
Don't Know/don't recall ……..…….98
Refused ……99

*ASK Q9- Q12 IF **BEHAVIORAL** CHANGES MADE; OTHERWISE SKIP TO Q12*

*24. Do you do things differently now to save energy in **hot weather**?*

Yes ……..01
No…… ……02
Don't know ……..98
Refused ……..…..….99

25. (IF YES) What do you do differently now?
*RECORD VERBATIM RESPONSE*_____

_____

_____

_____

*26. Do you do things differently now to save energy in **cold weather**?*

Yes ……..01
No…… ……02
Don't know ……..98
Refused ……..…..…99

27. (IF YES) What do you do differently now?
*RECORD VERBATIM RESPONSE*_____
_____
_____
_____

ASK Q13 IF ANY CHANGES HAVE BEEN MADE; OTHERWISE SKIP TO Q14

28. Have you noticed any savings on your electric bill since you made these changes?

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

[ASK Q14 IF Q13 = YES]

29. How satisfied are you with the savings you noticed on your electric bill since making these changes? Would you say you were Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied?

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

30. *Overall, how satisfied are you with the (NAME OF EDC) Home Energy Audit Program? Would you say you are Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied?*

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

31. *Why do you give it that rating?*

RECORD VERBATIM: _____

_____

_____

32. *Do you have any suggestions to improve the (NAME OF EDC) Home Energy Analyzer?*

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

33. IF YES, RECORD VERBATIM RESPONSE:

_____

_____

_____

_____

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

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

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

Specify Other: _____

35. Do you own or rent this residence?

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

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

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

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

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

ASK Q23 IF Q22 = DON'T KNOW OR REFUSED

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

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

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

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

ASK Q25 IF Q24 = DON'T KNOW OR REFUSED

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

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

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

Ohio Edison, The Illuminating Company and Toledo Edison

2011 Home Energy Audit Program
Phone Audit Participant Survey: Cohort 1

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

Customer Account Number: _____ Customer Zip Code: _____

Date of Interview: _____/_____/_____

EDC:

Ohio Edison ……. 01

The Illuminating Company …… 02

Toledo Edison …….. 03

Hello. I am calling on behalf of (NAME OF EDC), your electric utility company. You have been randomly selected to participate in this survey about your experience with (NAME OF EDC) Customer Service Center. You will receive a $10 gas card from Shell for participating in this survey. May I to talk with you now about how things went with the Customer Service Center? This will only take about 10 minutes.

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

1. *Our records indicate that you called the Customer Service Center on _____ (month/date) 2010. Can you tell me why you called the Customer Service Center? What were your concerns?*

   High bill complaint……01
   Other……....02
   Don't know/don't recall…….. 98
   Refused ……99

   SPECIFY OTHER:_____
_____
_____
_____
_____

2. W*hat did the Customer Service Center Representative discuss with you? Did you …*
ASK A-E;

	Yes	No	DK	Refused
m. Review changes in your bill/usage over time?	1	2	98	99
n. Answer questions about your home appliances?	1	2	98	99
o. Find out about your top 3 home energy uses?	1	2	98	99
p. Get offered literature about saving energy at home?	1	2	98	99
q. Discuss something else?	1	2	98	99
r. Don't recall	1			

Specify *"something else"*:

_____

3. How helpful was the information provided over the phone? Would you say "Very Helpful, Somewhat Helpful, Neither Helpful nor Unhelpful, Somewhat Unhelpful, or Not at all Helpful"?

Very Helpful ……...01
Somewhat Helpful ……..…..02
Neither Helpful nor Unhelpful…….03
Somewhat Unhelpful ……..……..04
Not at all Helpful ……..…..05
Don't Know/don't recall……98
Refused ……..…99

ASK Q4 IF Q3 = SOMEWHAT UNHELPFUL OR NOT HELPFUL

4. What aspects of the phone conversation with Customer Service were not helpful? Why?

RECORD VERBATIM: _____

_____
_____
_____
_____

Don't know……...98
Refused ……99

5. *Did the Customer Service Representative send you any of the following?*
   READ OPTIONS

	Yes	No	DK	Refused	
a. Brochure(s) on Energy Saving Tips	1	2	98	99	
b. Pack of 6 Energy-Saving CFL Light Bulbs		1	2	98	99
c. PC link to Home Energy Analyzer software	1	2	98	99	
d. Other	1	2	98	99	
e. Nothing was sent	1	2	98	99	

Specify Other: _____

ASK Q6 IF Q5 = ENERGY SAVING TIPS SENT

6. *How helpful were the Energy Saving Tips? Would you say "Very Helpful, Somewhat Helpful, Neither Helpful nor Unhelpful, Somewhat Unhelpful, or Not at all Helpful"?*

Very Helpful ……...01
Somewhat Helpful ……....02
Neither Helpful nor Unhelpful…….03
Somewhat Unhelpful ……..04
Not at all Helpful ……....05
Don't Know/don't recall……98
Refused ……..…99

ASK Q7 IFQ5 = CFL LIGHT BULBS SENT

7. *How many of the CFL light bulbs have you installed?*

Number of CFLs installed (maximum of 6): _____
Don't know……...98
Refused ……99

ASK Q8 IFQ5 = LINK TO ENERGY ANALYZER SENT

8. *Have you viewed the Energy Analyzer from the link that was sent to you? If so, have you used it?*

Yes, I viewed but have not used it ……....01
Yes, I have viewed it and I have used it …….……..02
No, I have not viewed it.……03
Don't know…….....98
Refused ……..99

9. What energy saving actions were you able to take, if any, as a result of your telephone call to the (NAME OF EDC) Customer Service Center? Did you start ***doing things differently to save energy*** *or did you have* ***new high efficiency energy saving equipment installed*** *in your home?*

*RECORD VERBATIM THEN CODE RESPONSE*_____

_____
_____
_____

Structural (equipment) changes made……. 01
Behavioral changes made..…….. 02
Both structural and behavioral changes made…… ……..03
No energy saving changes made ……..04
Don't Know/don't recall ……98
Refused ……99

ASK Q10 IF STRUCTURAL CHANGES WERE MADE

10. How is that working out? Is the ___ (equipment/materials) that you purchased still installed?

Yes, it's still installed……01
No, I removed it/took it out……..……..02
Don't Know……. ……..……98
Refused ……..……99

ASK Q11 IF Q10 = YES

11. How satisfied are you with your new ____ (equipment/materials)? Would you say you are "Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied"?

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

*ASK Q12- Q16 IF **BEHAVIORAL** CHANGES MADE; OTHERWISE SKIP TO Q17*

*12. Do you do things differently now to save energy in **hot weather**?*

Yes ……..01
No…… ……02
Don't know ……..98
Refused ……..…..…99

13. (IF YES) What do you do differently now?
*RECORD VERBATIM RESPONSE*_____

_____

_____

_____

*14. Do you do things differently now to save energy in **cold weather**?*

Yes ……..01
No…… ……02
Don't know ……..98
Refused ……..…..…99

15. (IF YES) What do you do differently now?
*RECORD VERBATIM RESPONSE*_____

_____

_____

_____

16. Are you continuing to do that (the behavior change identified in Q10)?

Yes, behavior still practiced……01
No, I stopped doing that…...……..……02
Don't Know……. ……..…….98
Refused ……..……99

ASK Q17 IF ANY CHANGES WERE MADE; OTHERWISE SKIP TO Q19

17. Have you noticed any savings on your electric bill since you made these changes?

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

ASK Q18 IF Q17 = YES

18. *How satisfied are you with the savings you noticed on your electric bill since making these changes? Would you say you are "Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied"?*

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

19. *Overall, how satisfied are you with the High Bill Analysis performed by the (NAME OF EDC) Customer Service Center? Would you say you are "Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied"?*

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

20. *Why do you give it that rating?*

RECORD VERBATIM: _____

_____

_____

21. *Do you have any suggestions to improve the (NAME OF EDC) High Bill Analysis process?*

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

IF YES, RECORD VERBATIM:

_____

_____

_____

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

22. Which of the following best describes your home? [READ LIST: OPTIONS 01-07]

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

Specify Other: _____

23. Do you own or rent this residence?

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

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

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

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

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

ASK Q26 IF Q25 = DON'T KNOW OR REFUSED

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

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

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

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

ASK 28 IF Q27 = DON'T KNOW OR REFUSED

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

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

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

Ohio Edison, The Illuminating Company and Toledo Edison

2011 Home Energy Audit Program
Phone Audit Participant Survey: Cohort 1

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

Customer Account Number: _____ Customer Zip Code: _____

Date of Interview: _____/_____/_____

EDC:

Ohio Edison ……. 01

The Illuminating Company …… 02

Toledo Edison …….. 03

Hello. I am calling on behalf of (NAME OF EDC), your electric utility company. You have been randomly selected to participate in this survey about your experience with (NAME OF EDC) Customer Service Center. You will receive a $10 gas card from Shell for participating in this survey. May I to talk with you now about how things went with the Customer Service Center? This will only take about 10 minutes.

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

1. *Our records indicate that you called the Customer Service Center on _____ (month/date) 2010. Can you tell me why you called the Customer Service Center? What were your concerns?*

   High bill complaint……01
   Other……....02
   Don't know/don't recall…….. 98
   Refused ……99

   SPECIFY OTHER:_____
_____
_____
_____
_____

2. W*hat did the Customer Service Center Representative discuss with you? Did you …*
ASK A-E;

		Yes	No	DK	Refused
s.	Review changes in your bill/usage over time?	1	2	98	99
t.	Answer questions about your home appliances?	1	2	98	99
u.	Find out about your top 3 home energy uses?	1	2	98	99
v.	Get offered literature about saving energy at home?	1	2	98	99
w.	Discuss something else?	1	2	98	99
x.	Don't recall	1			

Specify *"something else"*:

_____

3. *How helpful was the information provided over the phone? Would you say "Very Helpful, Somewhat Helpful, Neither Helpful nor Unhelpful, Somewhat Unhelpful, or Not at all Helpful"?*

Very Helpful ……...01
Somewhat Helpful ……..…..02
Neither Helpful nor Unhelpful…….03
Somewhat Unhelpful ……..……..04
Not at all Helpful ……..…..05
Don't Know/don't recall……98
Refused ……..…99

ASK Q4 IF Q3 = SOMEWHAT UNHELPFUL OR NOT HELPFUL

4. *What aspects of the phone conversation with Customer Service were not helpful? Why?*

RECORD VERBATIM: _____
_____
_____
_____
_____

Don't know……...98
Refused ……99

5. *Did the Customer Service Representative send you any of the following?*
READ OPTIONS

		Yes	No	DK	Refused	
a.	Brochure(s) on Energy Saving Tips		1	2	98	99
b.	Pack of 6 Energy-Saving CFL Light Bulbs 99			1	2	98
c.	PC link to Home Energy Analyzer software		1	2	98	99
d.	Other	1	2	98	99	
e.	Nothing was sent		1	2	98	99

Specify Other: _____

ASK Q6 IF Q5 = ENERGY SAVING TIPS SENT

6. *How helpful were the Energy Saving Tips? Would you say "Very Helpful, Somewhat Helpful, Neither Helpful nor Unhelpful, Somewhat Unhelpful, or Not at all Helpful"?*

Very Helpful ……...01
Somewhat Helpful ……..…..02
Neither Helpful nor Unhelpful…….03
Somewhat Unhelpful ……..……..04
Not at all Helpful ……..…..05
Don't Know/don't recall……98
Refused ……..…99

ASK Q7 IFQ5 = CFL LIGHT BULBS SENT

7. *How many of the CFL light bulbs have you installed?*

Number of CFLs installed (maximum of 6): _____
Don't know……...98
Refused ……99

ASK Q8 IFQ5 = LINK TO ENERGY ANALYZER SENT

8. *Have you viewed the Energy Analyzer from the link that was sent to you? If so, have you used it?*

Yes, I viewed but have not used it ……....01
Yes, I have viewed it and I have used it …….……..02
No, I have not viewed it.……03
Don't know…….....98
Refused ……..99

9. *What energy saving actions were you able to take, if any, as a result of your telephone call to the (NAME OF EDC) Customer Service Center? Did you start **doing things differently to save energy** or did you have **new high efficiency energy saving equipment installed** in your home?*

*RECORD VERBATIM THEN CODE RESPONSE*_____
_____
_____
_____

Structural (equipment) changes made……. 01
Behavioral changes made..…….. 02
Both structural and behavioral changes made…… ……..03
No energy saving changes made ……..04
Don't Know/don't recall ……98
Refused ……99

ASK Q10 IF STRUCTURAL CHANGES WERE MADE

10. *How is that working out? Is the ___ (equipment/materials) that you purchased still installed?*

Yes, it's still installed……01
No, I removed it/took it out……..……..02
Don't Know……. ……98
Refused ……..……99

ASK Q11 IF Q10 = YES

11. *How satisfied are you with your new ____ (equipment/materials)? Would you say you are "Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied"?*

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

*ASK Q12- Q16 IF **BEHAVIORAL** CHANGES MADE; OTHERWISE SKIP TO Q17*

12. *Do you do things differently now to save energy in **hot weathe**r?*

Yes ……..01
No…… ……02
Don't know ……..98
Refused ……..…..…99

13. (IF YES) What do you do differently now?
*RECORD VERBATIM RESPONSE*_____

_____

_____

_____

*14. Do you do things differently now to save energy in **cold weather**?*

Yes ……..01
No…… ……02
Don't know ……..98
Refused ……..…..…99

15. (IF YES) What do you do differently now?
*RECORD VERBATIM RESPONSE*_____

_____

_____

_____

16. Are you continuing to do that (the behavior change identified in Q10)?

Yes, behavior still practiced……01
No, I stopped doing that…...……..……02
Don't Know……. ……..……98
Refused ……..……99

ASK Q17 IF ANY CHANGES WERE MADE; OTHERWISE SKIP TO Q19

17. Have you noticed any savings on your electric bill since you made these changes?

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

ASK Q18 IF Q17 = YES

18. *How satisfied are you with the savings you noticed on your electric bill since making these changes? Would you say you are "Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied"?*

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

19. *Overall, how satisfied are you with the High Bill Analysis performed by the (NAME OF EDC) Customer Service Center? Would you say you are "Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied"?*

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

20. *Why do you give it that rating?*

RECORD VERBATIM: _____

_____

_____

21. *Do you have any suggestions to improve the (NAME OF EDC) High Bill Analysis process?*

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

IF YES, RECORD VERBATIM:

_____

_____

_____

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

22. *Which of the following best describes your home? [READ LIST: OPTIONS 01-07]*

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

Specify Other: _____

23. *Do you own or rent this residence?*

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

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

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

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

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

ASK Q26 IF Q25 = DON'T KNOW OR REFUSED

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

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

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

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

ASK 28 IF Q27 = DON'T KNOW OR REFUSED

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

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

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

Ohio Edison, The Illuminating Company and Toledo Edison

2011 Home Energy Audit Program
Control Survey: Cohort 2

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

Customer Account Number: _____ Customer Zip Code: _____

Date of Interview: _____/_____/_____

EDC:

Ohio Edison ……. 01

Illuminating Company …… 02

Toledo Edison …….. 03

Hello. I am calling on behalf of (NAME OF EDC), your electric utility company. You have been randomly selected to participate in this survey about your experience saving energy with (NAME OF EDC). You will receive a $10 gas card from Shell for participating in this survey. Is now a good time to talk with you? This will only take a few minutes.

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

1. *Did you participate in any of the following (NAME OF EDC) residential energy saving programs in 2011 that could help save you money? These include:*

	Yes	*No*	*DK*	*Refused*
CFL Retail Program	1	2	98	99
Residential Energy Audit Program	1	2	98	99
Heating, Ventilation & Air Conditioning Program	1	2	98	99
Easy Cool Rewards Program	1	2	98	99
Energy Efficient Products Program	1	2	98	99
Appliance Turn-In Program	1	2	98	99
Community Connections Program	1	2	98	99

2. Have you taken any of the following energy saving steps this year? Have you:

	Yes	*No*	*DK*	*Refused*
Purchased any CFLs	*1*	*2*	*98*	*99*
Added insulation to your home	*1*	*2*	*98*	*99*
Tuned up your central AC system	*1*	*2*	*98*	*99*
Installed a high efficiency central AC system	*1*	*2*	*98*	*99*
Installed a new high efficiency heat pump	*1*	*2*	*98*	*99*
Installed Energy Star windows	*1*	*2*	*98*	*99*
Installed a programmable thermostat	*1*	*2*	*98*	*99*
Had a residential energy audit performed	*1*	*2*	*98*	*99*
Purchased Energy Star home appliances[6]	*1*	*2*	*98*	*99*
Other	*1*	*2*	*98*	*99*

Specify Other: _____

*3. Are you doing anything in particular this year to save energy in **hot weather**?*

Yes ……..01
No…… ……02
Don't know ……..98
Refused ……..…..….99

4. (IF YES) What do you do?
*RECORD VERBATIM RESPONSE*_____
_____
_____
_____

*5. Are you doing anything in particular this year to save energy in **cold weather**?*

Yes ……..01
No…… ……02
Don't know ……..98
Refused ……..…..….99

6. (IF YES) What do you do?
*RECORD VERBATIM RESPONSE*_____
_____
_____
_____

[6] Includes Energy Star rated clothes washers, refrigerators, room AC units, dehumidifiers as well as energy saving surge protectors and torchiere floor lamps.

ASK Q7 IF ANY ACTIONS HAVE BEEN TAKEN; OTHERWISE SKIP TO Q9

7. *Have you noticed any savings on your electric bill since you made these changes?*

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

[ASK Q8 IF Q7 = YES]

8. *How satisfied are you with the savings you noticed on your electric bill since making these changes? Would you say you were Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied?*

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

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

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

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

Specify Other: _____

10. *Do you own or rent this residence?*

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

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

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

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

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

ASK Q13 IF Q12 = DON'T KNOW OR REFUSED

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

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

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

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

ASK Q15 IF Q14 = DON'T KNOW OR REFUSED
15. Would you estimate the below-ground living space is about:

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

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