APPENDIX D

EVALUATION
OF THE
2011 ENERGY EFFICIENT PRODUCTS PROGRAM

Final Report

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Prepared for:

FirstEnergy Ohio Companies:
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1. EXECUTIVE SUMMARY

During 2011, the Ohio Operating companies The Cleveland Electric Illuminating Company ("CEI"), Ohio Edison Company ("Ohio Edison"), and The Toledo Edison Company ("Toledo Edison") (collectively "Companies") implemented the Energy Efficient Products Program. The program provided rebates to residential and small commercial customers to encourage the purchase and installation of energy efficient appliances as well as heating, ventilation and air conditioning (HVAC) services and equipment. The program was administered by Honeywell, which worked with retailers and HVAC contractors to implement the program.

Rebated products were required to meet a number of screening criteria. These criteria included being listed as an ENERGY STAR® qualified product and meeting minimum energy efficiency standards. Additionally, rebates for ENERGY STAR® clothes washers required the consumer to use water from an electric water heater. A total of 11,312 energy efficiency products met these screening criteria and were rebated in 2011 through the Energy Efficient Products Program in the service territories of the Companies. The numbers of work orders processed in 2011 for these rebated products in the three FirstEnergy service territories were as follows:

- CEI 4,260
- Ohio Edison 4,619
- Toledo Edison 2,433

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

Table 1-1. Impact Evaluation Results

Utility	***Ex Ante Expected Gross Savings***		***Ex Post Verified Gross Savings***	
	Gross kWh	***Gross kW***	***Gross kWh***	***Gross kW***
CEI	580,486	164	587,902	191
OE	862,564	190	938,284	231
TE	279,268	95	296,960	112
All Companies	1,722,318	450	1, 823,146	534

The gross kWh savings total shown in Table 1-1 reflect a realization rate of 106 percent, as determined by the ratio of verified gross kWh savings to expected gross kWh savings. One source of differences between ex ante and ex post estimates of kWh savings was misclassification of 124 ENERGY STAR® refrigerators in the ex ante data set. Given that refrigerator savings are deemed based on refrigerator classification of door style configuration and that refrigerator rebates were a significant contributor to the program's energy savings, the classification issue in the ex ante data set contributes to the variance from the ex post verified savings. A second factor that contributed to the variance creating a realization rate greater than 100% was the ground source heat pump measure. The ex ante values for the ground source heat pump measure were on average about 15 percent lower than the ex post values. Since the ground source heat pump is a high impact measure in terms of kWh saved per unit, this also contributed to the variance from the ex post savings.

Rebated appliances accounted for 47% of the total kWh savings, with ENERGY STAR® dehumidifiers (25% of total kWh savings) and ENERGY STAR® refrigerators (14% of total kWh savings) accounting for 83% of the energy savings associated with energy efficient appliances. Rebated HVAC services and equipment accounted for 53% of the total kWh savings, with HVAC maintenance/tune-ups (20% of total kWh savings) and ground source heat pumps (15% of total kWh savings) accounting for 66% of the energy savings associated with rebated HVAC services and high efficiency equipment.

2. INTRODUCTION AND PURPOSE OF THE STUDY

During 2011, FirstEnergy implemented the Energy Efficient Products Program in the Companies' service territories. The program provided rebates to residential and small commercial customers to encourage the purchase and installation of ENERGY STAR® qualified products and other energy efficient appliances as well as the service or install of HVAC equipment. The program was administered by Honeywell, who worked with retailers and HVAC contractors to implement the program.

The purpose of this report is to present the results of the evaluation effort undertaken by ADM Associates, Inc. ("ADM") to verify the energy savings and peak demand reductions that resulted from the installation of the rebated appliances and HVAC products obtained through the rebates provided by the Energy Efficient Products Program during 2011. Additionally, the evaluation was undertaken to determine customer satisfaction with the Energy Efficient Products Program in 2011 and to identify any issues or concerns about program implementation that need to be resolved.

The methods used to calculate energy savings and peak demand reductions depended on whether a measure was an ENERGY STAR® appliance or an energy efficient HVAC measure.

The energy efficient appliance measures that were rebated through the Energy Efficient Products Program in 2011 included ENERGY STAR® clothes washers, dehumidifiers, refrigerators, room air conditioners, torchieres, and smart strip surge protectors. The status of the appliance rebate applications was first examined to determine whether the rebate processing had been completed by the end of 2011. All appliance rebate applications with a status of *complete* were retained for further analysis. The ENERGY STAR® status of these appliance measures was then verified.[1] For each verified appliance measure, total kWh savings and total peak demand savings for that measure were determined as a product of the number of measures verified as being ENERGY STAR®-qualified and the savings per measure, which were based on deemed values. Deemed savings were determined for each rebated appliance measure using values from the draft *State of Ohio Energy Efficiency Technical Reference Manual* ("TRM").[2]

HVAC tune-ups, high-efficiency central air conditioning systems, high-efficiency air source heat pumps, and high-efficiency ground source heat pumps were rebated through the HVAC component of the program. Each of the HVAC measures was screened for rebate completion status and meeting the program's criteria for high-efficiency status. For all HVAC measures passing these screens, total kWh savings and total peak demand savings were determined as a product of the number of measures qualifying for a rebate and the savings per measure. Per-unit

[1] Smart strip surge protectors were the only exception since this measure is not ENERGY STAR® rated.

[2] Vermont Energy Investment Corporation (VEIC), *State of Ohio Energy Efficiency Technical Reference Manual,* Prepared for Public Utilities Commission of Ohio, Draft of August 6, 2010.

savings for HVAC measures were determined using calculations specified in either the "TRM" or from the November 3, 2010 Ohio TRM Joint Objections and Comments, Case Number 09-512-GE-UNC.

A telephone survey was administered to 88 program participants to verify receipt of measure rebates claimed in the Energy Efficient Products Program records and to estimate customer satisfaction with the 2011 Energy Efficient Products Program. The survey measured customer satisfaction on a scale of zero to ten for each of the products rebated through the program. The survey was also used to describe the rebated products that customers purchased through the 2011 Energy Efficient Products Program.

Finally, a process evaluation of the Energy Efficient Products Program was conducted, which focused on issues related to program management and implementation. Additionally, a literature review of successful rebate-based energy efficiency products programs operated by utilities in the United States was conducted. The literature review focused on the same products categories rebated in the Companies' program. As part of the literature review, rebate incentive levels offered by the Companies' Energy Efficient Products Program were compared with those offered by other utilities across the United States.

3. DESCRIPTION OF PROGRAM

The Energy Efficient Products Program that was implemented during 2011 provided rebates to residential and small commercial customers of the Companies to encourage the purchase and installation of ENERGY STAR® qualified appliances and high efficiency HVAC equipment and services. The goal of the program is to help customers reduce their electricity consumption as well as their summer peak load demands.

The rebated appliances promoted through the 2011 program included the following ENERGY STAR®-rated energy efficient measures:

- Dehumidifiers
- Refrigerators
- Clothes washers[3]
- Room air conditioners
- Torchiere floor lamps
- Controlled power strips (Smart Strips)[4]

The rebated HVAC services and equipment promoted through the 2011 program included the following measures:

- Residential HVAC maintenance/tune ups
- High efficiency central air conditioning
- High efficiency air source heat pumps
- ENERGY STAR® qualified high efficiency ground source heat pumps

The Companies contracted with Honeywell to manage the program as the Implementation Contractor. During 2011, the Energy Efficient Products Program was implemented in partnership with 63 retailers who sold the rebated energy efficiency products to Ohio consumers and 421 HVAC contractors who helped the Companies' customers install the products and maintain the HVAC systems. The retail and HVAC partners were distributed throughout the Companies' service territory.

[3] Only for homes with electric water heaters

[4] Smart strips are not ENERGY STAR® qualified products.

4. METHODOLOGY

ADM's evaluation of the 2011 Ohio Energy Efficient Products Program consisted of both an impact evaluation and a process evaluation. The impact evaluation methodology is described in section 4.1 and the process evaluation methodology is described in section 4.2 of this chapter.

4.1 IMPACT EVALUATION METHODOLOGY

As specified in the Evaluation Plan prepared by the Statewide Evaluator[5], kWh savings and kW reductions for a program are to be calculated measure-by-measure. For measures installed through programs in 2011, the Statewide Evaluator[6] expected that savings would be calculated using values from the TRM. However, alternative methods can be used in cases where measures are not included in the TRM. In such cases, documentation is to be provided that justifies the use of values not specified in the TRM.

ADM's impact analysis was based on two final data files provided by Honeywell in February 2012. One file provided data for PY2011 appliance rebates and the other file provided data for PY2011 HVAC equipment rebates. Those two final data files for PY2011 did not contain ex ante estimates of energy (kWh) savings or peak demand (kW) reduction. ADM subsequently imputed ex ante kWh and kW values from a supplemental PY2011 Honeywell data file which contained ex ante kWh and kW fields for all measures. PY2011 ex ante energy and peak demand savings were determined by applying the per unit per measure ex ante kWh and kW values to the final ex ante quantities received previously. To determine the final ex post quantity per measure ADM screened out (a) rebates that were paid but which were not Energy Star qualified measures and (b) duplicate work orders.

The impact evaluation addressed the following two research questions:

1. What are the kWh energy savings for each product measure qualified for a rebate?

2. What are the summer peak demand kW reductions for each product measure qualified for a rebate?

The methods used to verify a measure's qualifications for being rebated and to calculate kWh savings and kW reductions for qualifying measures rebated through the Energy Efficient Products Program are presented in sections 4.1.1 and 4.1.2 of this chapter. For each product measure identified, total kWh savings and total peak demand savings for that measure are

[5] ECONorthwest, Inc., *Ohio Independent Evaluator 2010 Evaluation Plan*, Prepared for Public Utilities Commission of Ohio, December 6, 2010

[6] Ibid., p. 4.

determined as a product of the number of measures verified as qualifying for a rebate and the savings per measure.

4.1.1 Analysis of Savings for Appliance Measures

A "deem and count" approach was used to analyze the energy savings and demand reductions for the following ENERGY STAR®-rated measures:

- Dehumidifiers
- Refrigerators
- Clothes Washers
- Room Air Conditioners
- Torchiere Lamps
- Smart Strip Surge Protectors

4.1.1.1 Verification of Number of Appliance Measures Qualified for Rebates

The first step in the appliance measure savings analysis process was to verify the rebate status of the work orders associated with the products in the appliance database. All work orders whose rebate status was "complete" were retained for further analysis. A work order whose rebate status was complete indicated that the rebate application had completed processing for the product in question by the end of the 2011 program year.

The second step in the appliance savings analysis process was to verify the ENERGY STAR® status of the rebated products listed in the Honeywell appliances database. This was determined by looking up the model numbers of the rebated products in ENERGY STAR® 's databases. Additionally, ADM verified that all rebates paid for ENERGY STAR® qualified clothes washers were from homes with electric hot water heaters. Appliances verified as passing ADM's three rebate qualifying screens were analyzed further for energy and demand savings using the procedures described below. The final measure count per appliance category was the total number of appliances that passed all of the applicable screens in qualifying as a rebated product for which savings could legitimately be claimed by the 2011 Energy Efficient Products Program.

4.1.1.2 ENERGY STAR® Dehumidifiers

Annual kWh savings per unit and average summer peak kW savings per unit are deemed based on the unit's capacity range in pints per day. Capacity was determined for each ENERGY STAR® qualified dehumidifier based on the model listed in the Honeywell appliance database. Table 4-1 lists the deemed savings values specified in the TRM (p. 64) for the purchase of an ENERGY STAR® Dehumidifiers.

Table 4-1. Deemed Savings Values for ENERGY STAR® Dehumidifiers

Capacity Range (pints per day)	Average Annual kWh Savings per unit	Average Summer Coincident Peak kW Savings per unit
<25	54	0.012
>25 to 35	114	0.027
>35 to 45	213	0.048
>45 to 54	297	0.068
>54 to 75	185	0.042
>75 to 185	374	0.085

4.1.1.3 ENERGY STAR® Refrigerators

Annual kWh savings and kW demand reduction are deemed based on the refrigerator door configuration, which is recorded in the Honeywell appliance database. Table 4-2 shows the deemed savings values for ENERGY STAR® qualified refrigerators specified in the TRM (p. 53) for the purchase of ENERGY STAR® Refrigerators.

Table 4-2. Deemed Savings Values for ENERGY STAR® Refrigerators

Refrigerator Configuration	Average Annual kWh Savings per unit	Average Summer Coincident Peak kW Savings per unit
Bottom Freezer	119	0.021
Top Freezer	100	0.018
Side by Side	142	0.025

ADM also identified single door refrigerators in the Honeywell appliance database that had been rebated. Since savings values for single door refrigerator configurations are not listed in the Ohio TRM, we simply looked up the deemed savings values for the listed models in the ENERGY STAR® refrigerator database. Additionally, ADM found that Honeywell had misclassified 124 rebated refrigerators. These refrigerators were re-assigned to their proper refrigerator configuration categories and deemed savings values were based on these re-assigned categories.

4.1.1.4 ENERGY STAR® Clothes Washers

ADM verified that the rebated clothes washers were not only ENERGY STAR® qualified but that the customer's home used an electric hot water heater. ADM used the deemed values for kWh and kW demand reduction cited in the TRM for ENERGY STAR® qualified clothes washers. The listed savings values for ENERGY STAR® clothes washer are 202 kWh per unit and 0.028 kW per unit.

4.1.1.5 ENERGY STAR® Room Air Conditioners

ADM used a deemed energy savings value of 22 kWh per qualified ENERGY STAR® ENERGY STAR® room air conditioner, per recommendations in the Joint Utility Comments document which recommended adjusting the size of the average rebated unit from 8,500 BtuH to 10,000 BtuH. An average summer peak demand savings of 0.024 kW per unit was used, as specified in the TRM (p.67).

4.1.1.6 ENERGY STAR® ENERGY STAR® Torchiere Lamps

ADM was unable to verify the four torchieres listed in Honeywell's appliance database that were rebated in 2011 as being ENERGY STAR® qualified models. Therefore, the deemed savings values specified by the TRM for torchiere floor lamps (p. 40) could not be applied and a value of zero was assigned to the savings for the program's torchiere measure.

4.1.1.7 Smart Strip Surge Protectors

Energy and demand saving are deemed based on the plug size (5-plug or 7-plug) of the smart strip purchased. Table 4-3 shows the deemed savings values specified in the TRM (p. 76) for the purchase of Smart Strip Power Strips.

Table 4-3. Deemed Savings Values for Smart Strips

Plug Size	Average Annual kWh Savings per unit	Average Summer Coincident Peak kW Savings per unit
5-Plug	56.5	0.0063
7-Plug	102.8	0.012

Honeywell's appliance database lists rebated smart strips other than those of the 5-plug and 7-plug variety. ADM's telephone survey indicated that 66.7% of the customers surveyed who had been rebated for smart strips had purchased a 5-plug smart strip model whereas 33.3% had purchased a 7-plug model. The obtained survey proportions (i.e., .667 and .333) were used as sampling strata to randomly assign the "other" smart strip plug sizes to either a 5-plug category or a 7-plug category so that the TRM deemed savings values could be applied and so that annual kWh energy savings and kW demand savings could be calculated for Smart Strips in a manner consistent with the TRM.

4.1.2 Analysis of Savings for HVAC Measures

The impact methods used to analyze the HVAC measures are presented in section 4.1.2 and utilize the formulas specified in the TRM to calculate energy and demand savings. Estimates of savings were calculated for the following HVAC measures that were rebated through the Energy Efficient Products Program in 2011.

- Residential HVAC Maintenance/Tune Up

- Central air conditioning (CAC)
- Air Source Heat Pump (ASHP)
- Ground Source Heat Pump (GSHP)

For each HVAC measure, total kWh savings and total peak demand savings for that measure are determined as a product of the number of measures verified as qualifying for a rebate under the Energy Efficient Products Program and the savings per measure. The methods used to verify rebate qualifications and the per-unit kWh and peak demand savings for the HVAC measures are described in this section.

4.1.2.1 Verification of Number of HVAC Measures Qualified for Rebates

The first step in the HVAC measure savings analysis process was to verify the rebate status of the work orders associated with the products in the HVAC database. A work order whose rebate status was complete indicated that the rebate application for the product in question had been processed by the end of the 2011 program year. All work orders whose rebate status was "complete" were retained for further analysis.

The second step in the HVAC savings analysis process was to verify that the rebated HVAC products met the minimum efficiency requirements specified on the Honeywell rebate application forms for HVAC measures. Minimum efficiency requirements listed by Honeywell included the following:

- Central air conditioning: 15 SEER or higher
- Air Source Heat Pump: 15 SEER or higher; 8.5 HSPF or higher
- Ground Source Heat Pump: ENERGY STAR® ENERGY STAR® qualified

There is no minimum efficiency criteria listed for HVAC tune ups on the Honeywell rebate application. ADM sent Honeywell the 2011 HVAC tune ups data set that had passed the first step of the verification screening process to request that BtuH values (for cooling and heating capacity) be added to the data file.[7] The final measure count per HVAC category was the total number of HVAC products that passed all of the applicable screens in qualifying as a rebated product for which savings could be claimed by the 2011 Energy Efficient Products Program.

4.1.2.2 Residential HVAC Maintenance/Tune Ups

The TRM algorithms for residential HVAC maintenance were used for calculating energy and demand savings in the 2011 evaluation.[8] As specified in the TRM, the formulas for calculating annual energy savings for residential HVAC maintenance are:

[7] The BtuH values were necessary for the savings analysis and had not been included in Honeywell's HVAC database. The BtuH values were only available from the Honeywell customer rebate applications.

[8] VEIC, *State of Ohio Energy Efficiency Technical Reference Manual*, Draft of August 6, 2010, pp. 26-29.

$$\text{kWh Savings}_{\text{central AC}} = (FLHcool * BtuH * (1/SEER_{CAC}))/1000 * MFe$$

$$\text{kWh Savings}_{\text{AS Heat Pump}} = ((FLHcool * BtuH * (1/SEER_{ASHP}))/1000 * MFe) + ((FLHheat * BtuH * (1/HSPF_{ASHP}))/1000 * MFe)$$

Where:

FLHcool = Full load cooling hours, which depend on location

FLHheat = Full load heating hours, which depend on location

BtuH = Size of the HVAC equipment in tons (1 ton = 12,000 BtuH)

$SEER_{CAC}$= SEER efficiency rating of the CAC unit receiving maintenance[9]

$SEER_{ASHP}$ = SEER efficiency rating of the ASHP receiving maintenance

MFe = Maintenance energy savings factor = 0.05

HSPFbase = Heating Season Performance Factor of the ASHP receiving maintenance.[10]

As specified in the TRM, the formula for calculating summer coincident peak demand savings for residential HVAC maintenance is:

$$kW\ Savings = BtuH * (1/EER)/1000 * MFd * CF$$

Where:

EER = Energy efficiency ratio of the unit receiving maintenance = SEER * 0.9[11]

MFd = Maintenance demand savings factor = 0.02

CF = Summer peak coincidence factor = 0.5

The values needed for variables in the HVAC maintenance savings analysis were obtained from the Honeywell HVAC database and the addition of BtuH values to ADM's working data set for residential HVAC maintenance, based on information contained in customer rebate applications.

4.1.2.3 Central Air Conditioning

The TRM algorithms for estimating annual energy and demand savings from the purchase of a new central air conditioning ducted split system meeting ENERGY STAR® ENERGY STAR® efficiency standards were used for calculating energy and demand savings in the 2011

[9] If unknown, a default value of SEER = 10 was used

[10] If unknown, a default value of HSPF = 6.8 was used.

[11] If unknown, a default value of EER = 9.0 was used

evaluation.[12] As specified in the TRM, the formula for calculating annual energy savings for a new ENERGY STAR® central air conditioning system is:

kWh Savings = (FLHcool * BtuH * (1/SEERbase – 1/SEERee))/1000

Where:

FLHcool = Full load cooling hours, which depend on location

BtuH = Size of the replaced AC unit in tons (1 ton = 12,000 BtuH)

SEERbase = SEER efficiency of the baseline AC unit = 13[13]

SEERee = SEER efficiency rating of the ENERGY STAR® AC unit installed

The formula for calculating demand savings for the purchase of a central air conditioning unit meeting ENERGY STAR® standards is specified as follows in the TRM:

kW Savings = (BtuH * (1/EERbase – 1/EERee))/1000 * CF

Where:

BtuH = Size of the new AC unit in tons (1 ton = 12,000 BtuH)

EERbase = EER efficiency rating of the baseline AC unit = 11[14]

EERee = EER efficiency rating of the ENERGY STAR® AC unit installed

CF = Summer Peak Coincidence Factor for a CAC measure = 0.5 (TRM specified)

Full load cooling hours were determined from the customer's zip code. The values for other variables in the equation (e.g., BtuH, SEER, and EER) were determined for a given central air conditioning system model by looking up the values for a given model number in the AHRI database.

4.1.2.4 Air Source Heat Pump

The TRM algorithms for the estimating annual energy and demand savings from the purchase of a new air source heat pump were used for calculating energy and demand savings in the evaluation[15] of the 2011 Energy Efficient Products Program. As specified in the TRM, the formula for calculating annual energy savings for a new air source heat pump meeting minimum ENERGY STAR® efficiency level standards is:

[12] VEIC, *State of Ohio Energy Efficiency Technical Reference Manual,* Draft of August 6, 2010, pp. 30-32.

[13] The minimum Federal standard for central AC systems is currently 13 SEER

[14] Minimum Federal Standard

[15] VEIC, *State of Ohio Energy Efficiency Technical Reference Manual,* Draft of August 6, 2010, pp. 33-35.

$$kWh\ Savings_{\ AS\ Heat\ Pump} = ((FLHcool * BtuH * (1/SEERbase - 1/SEERee))/1000 + (FLHheat * BtuH * (1/HSPFbase - 1/HSPFee))/1000$$

Where:

FLHcool = Full load cooling hours, which depend on location

FLHheat = Full load heating hours, which depend on location

BtuH = Size of the HVAC equipment in tons (1 ton = 12,000 BtuH)

SEERbase= SEER efficiency rating of the baseline unit = 13[16]

SEERee = SEER efficiency rating of the new ASHP installed

HSPFbase = Heating Season Performance Factor for baseline unit = 7.7[17]

HSPFee = Heating Season Performance Factor for efficient unit installed

The formula for calculating demand savings for the purchase of a new air source heat pump meeting ENERGY STAR® standards is specified as follows in the TRM:

$$kW\ Savings = BtuH * (1/EERbase - 1/EERee))/1000 * CF$$

Where:

BtuH = Size of the new ASHP unit in tons (1 ton = 12,000 BtuH)

EERbase = EER efficiency rating of the baseline ASHP unit = 11[18]

EERee = EER efficiency rating of the ENERGY STAR® ASHP unit installed

CF = Summer Peak Coincidence Factor for measure (TRM specifies CF = 0.5)

Full load cooling and heating hours were determined from the customer's zip code. The values for other variables in the equation (e.g., BtuH, SEER, EER, and HSPF) were determined for a given air source heat pump model by looking up the values for a given model number in the AHRI database.

4.1.2.5 Ground Source Heat Pump

The TRM algorithms for estimating annual energy and demand savings from the purchase of a new ground source heat pump were used for calculating energy and demand savings in the evaluation[19] of the 2011 Energy Efficient Products Program. As specified in the TRM, the

[16] Minimum Federal Standard

[17] Minimum Federal Standard

[18] Minimum Federal Standard

[19] VEIC, *State of Ohio Energy Efficiency Technical Reference Manual,* Draft of August 6, 2010, pp. 82-85.

formula for calculating annual energy savings for a ground source heat pump meeting ENERGY STAR® efficiency level standards is:

$$kWh\ Savings_{GS\ Heat\ Pump} = ((FLHcool * BtuH * (1/SEERbase - 1/EERee * 1.02))/1000 + (FLHheat * BtuH * (1/HSPFbase - 1/COPee * 3.412))/1000$$

Where:

FLHcool = Full load cooling hours, which depend on location

FLHheat = Full load heating hours, which depend on location

BtuH = Size of the HVAC equipment in tons (1 ton = 12,000 BtuH)

SEERbase= SEER efficiency rating of the baseline unit = 13[20]

EERee = EER efficiency rating of the new GSHP installed

1.02 = Constant used to estimate SEER based on efficient unit's EER

HSPFbase = Heating Season Performance Factor for baseline unit = 7.7[21]

COPee = Coefficient of Performance for efficient unit installed

3.413 = Constant to convert the COP of the unit to HSPF

The formula for calculating demand savings for the purchase of a ground source heat pump meeting ENERGY STAR® standards is specified as follows in the TRM:

$$kW\ Savings = BtuH * (1/EERbase - 1/(((EERee * 1.02) * 0.37) + 6.43))/1000 * CF$$

Where:

BtuH = Size of the new GSHP unit in tons (1 ton = 12,000 BtuH)

EERbase = EER efficiency rating of the baseline GSHP unit = 11[22]

EERee = EER efficiency rating of the ENERGY STAR® GSHP unit installed

1.02 = Constant used to estimate the unit's equivalent AC EER to enable comparisons to the baseline unit[23]

CF = Summer Peak Coincidence Factor for measure = 0.5 (TRM specified)

[20] Minimum Federal Standard

[21] Minimum Federal Standard

[22] Minimum Federal Standard

[23] Using the algorithm EERac = (SEER * 0.37) + 6.43

Full load cooling and heating hours were determined from the customer's zip code. The values for other variables in the equation (e.g., BtuH, SEER, EER, and CF) were determined for a given ground source heat pump model by looking up the values for a given model number in the AHRI database.

4.1.2.6 Calculation of First-Year Pro-Rata Savings per Measure

First-year pro-rata savings were calculated by first determining the midpoint purchase date of the appliance measures and the midpoint installation date for HVAC measures and then using these dates to determine the number of months remaining in 2011 for which annual savings could be attributed as first-year savings.

4.1.2.7 Calculation of Lifetime kWh Savings per Measure

Lifetime kWh savings for appliance and HVAC measures were calculated by multiplying annual kWh savings for each measure by the deemed effective useful life for the each measure, as specified in the TRM.

4.2 PROCESS EVALUATION METHODS

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

1. How did customers hear about the Energy Efficient Products Program?
2. What is the number of the Companies' customers applying for rebates?
3. What is the number of participating retailers and HVAC contractors?
4. What is the number and types of products rebated?
5. To what extent are customers satisfied with the products rebated?
6. To what extent are customers satisfied with the Program?
7. To what extent are there issues about program management and implementation?

Process evaluation activities included a customer telephone survey and a series of in-depth interviews with the Companies' program staff, Honeywell staff, participating retail partners, and participating HVAC contractors. A review was conducted of the literature on best practices of energy efficiency product rebate programs and a review of incentive levels of similar product measures offered by utilities across the United States.

4.2.1 Customer Telephone Survey

The telephone survey was designed to verify customer receipt of the rebates for the various measures indicated in the Honeywell databases and to assess customer satisfaction with the products purchased. The telephone survey was completed by a random sample of 88 Energy Efficient Products Program participants during March and early April of 2012.

4.2.2 In-Depth Interviews with Program and Implementation Contractor Staff

Twenty-Four semi-structured telephone interviews were conducted with program staff, implementation contractor staff (Honeywell), and participating retailers and HVAC contractors during March and April of 2012. The focus of the process evaluation activities was on issues related to program management and implementation. Findings were compared with best practices of energy efficiency product rebate programs gleaned from a national literature review.

5. DETAILED EVALUATION FINDINGS

The number of energy efficient products that were qualified to receive a rebate from the Energy Efficient Products Program in 2011 is shown in Table 5-1 for each of the Companies' service territory and for the total program.

Table 5-1. Qualified Measures Rebated in the Energy Efficient Products Program during 2011

Utility	***Ex Post Estimate of Number of Qualified Rebates***
CEI	4, 260
OE	4,619
TE	2,433
Total Companies	11, 312

5.1 IMPACT EVALUATION FINDINGS

Table 5-2 shows the quantities of qualified energy efficient measures that were rebated per operating company and for the total Energy Efficient Products Program in 2011. Table 5-3 shows estimates of annual kWh savings by measure, operating company, and for the total Energy Efficient Products Program in 2011. Table 5-4 shows estimates of annual kW savings by measure, operating company, and for the total Energy Efficient Products Program in 2011.

Applying the methods described in Chapter 4 produced estimates of savings per unit on a measure-by-measure basis. Multiplying the quantities in Table 5-2 by the per-measure savings estimates produced the program-level estimates of energy savings reported in Table 5-3 and the peak demand reductions reported in Table 5-4.

Table 5-2. Quantities of Qualified Energy Efficiency Measures Rebated per Operating Company

	CEI	***OE***	***TE***	***Total, Companies***
Energy Efficiency Measures: Appliances				
Dehumidifiers	780	1,017	266	2,063
Refrigerators	902	1,106	226	2,234
Clothes Washer	218	367	55	640
Room Air Conditioner	266	271	89	626
Torchiere Floor Lamps	0	0	-	0
Smart Strips	5	12	-	17
Total Qualifying Appliances	2,171	2,773	636	5,580
Energy Efficiency Measures: HVAC				
HVAC Tune Ups	1,841	1,507	1,669	5,017
Air Source Heat Pumps	89	146	27	262
Ground Source Heat Pumps	14	75	12	101
Central Air Conditioning	145	118	89	352
Total Qualifying HVAC units	2,089	1,846	1,797	5,732
Grand Total of Qualifying Measures	4,260	4,619	2,433	11,312

Note: Counts are based on ex post estimates.

Table 5-3. Ex Post Estimates of Annual kWh Savings by Measure and Operating Company

	CEI	***OE***	***TE***	***Total, Companies***
Energy Efficiency Measures: Appliances				
Dehumidifiers	169,494	222,763	55,690	447,947
Refrigerators	106,600	129,866	26,571	263,037
Clothes Washer	44,036	74,134	11,110	129,280
Room Air Conditioner	5,830	5,940	1,958	13,728
Torchiere Floor Lamps	0	0	-	0
Smart Strips	329	1,002	-	1,331
Total Annual kWh Savings, Appliances	326,289	433,705	95,329	855,323
Energy Efficiency Measures: HVAC				
HVAC Tune Ups	129,167	114,754	117,390	361,311
Ground Source Heat Pumps	40,883	206,356	29,007	276,246
Air Source Heat Pumps	62,339	157,154	33,954	253,447
Central Air Conditioning	29,224	26,315	21,280	76,819
Total Annual kWh Savings, HVAC	261,613	504,579	201,631	967,823
Grand Total of Annual kWh Savings	587,902	938,284	296,960	1,823,146

Table 5-4. Ex Post Estimates of Annual kW Savings by Measure and Operating Company

	CEI	***OE***	***TE***	***Total, Companies***
Energy Efficiency Measures: Appliances				
Dehumidifiers	38.74	50.97	12.77	102.48
Refrigerators	18.90	23.03	4.71	46.64
Clothes Washer	6.10	10.28	1.54	17.95
Room Air Conditioner	6.36	6.48	2.14	14.98
Torchiere Floor Lamps	0	0	-	0
Smart Strips	.04	.12	-	.16
Total Annual kW Savings, Appliances	70.14	90.88	21.16	182.18
Energy Efficiency Measures: HVAC				
HVAC Tune Ups	67.39	55.59	60.25	183.22
Central Air Conditioning	32.81	26.32	21.36	80.49
Air Source Heat Pumps	14.63	25.71	4.62	44.96
Ground Source Heat Pumps	6.16	32.79	4.46	43.41
Total Annual kW Savings, HVAC	120.99	140.41	90.69	352.09
Grand Total of Annual kW Savings	191.13	231.29	111.85	534.27

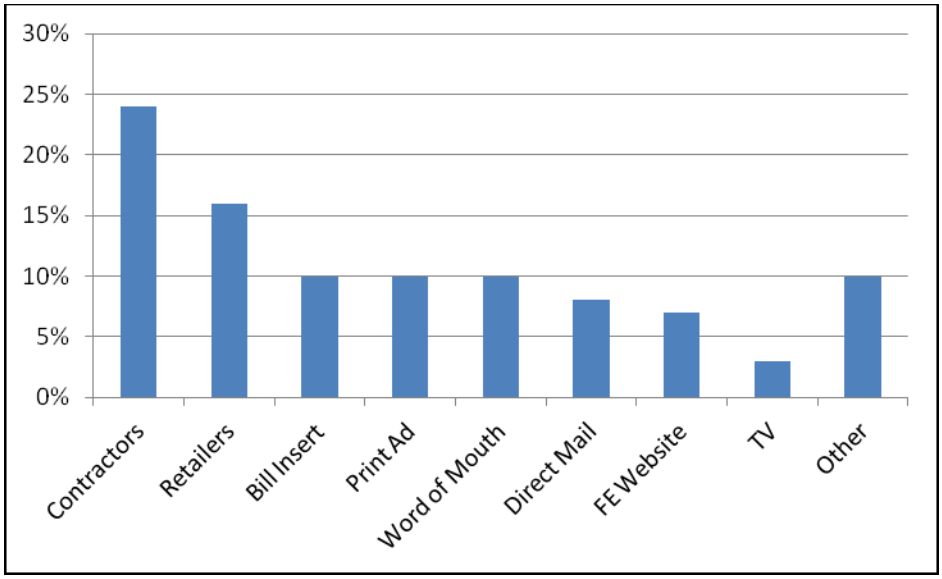
5.2 PROCESS EVALUATION FINDINGS

Process evaluation findings are reported topically in this section, bringing together findings from the telephone surveys, the in-depth interviews, and the literature review to provide a comprehensive view of program implementation.

5.2.1 Marketing and Customer Awareness of the Program

As shown in Figure 5-1, the telephone survey data suggest that customers were made aware of the Energy Efficient Products Program largely through customer contacts with the participating retail stores and partnering HVAC contractors. The in-depth interviews reveal that customer awareness of the program came about through marketing materials provided to the participating retailers which they displayed in their stores and through the sales promotions of HVAC contractors. Utility bill inserts were also effective in raising customer awareness of the program.

Figure 5-1. Sources of Customer Awareness of the Products Program (N=87)



5.2.2 Customer Rebate Applications

The program received 7,085 applications for appliance rebates and 7,219 applications for HVAC rebates, for a total of 14,304 rebate applications in 2011. The number of applications received by rebate measure and operating company is shown below in Table 5-5.

Table 5-5. Quantities of Rebate Applications by Measure per Operating Company

	CEI	*OE*	*TE*	*Total Companies*
Energy Efficiency Measures: Appliances				
Dehumidifiers	871	1,143	284	2,298
Refrigerators	1,085	1,379	273	2,737
Clothes Washer	435	653	94	1,182
Room Air Conditioner	345	367	121	833
Torchiere Floor Lamps	2	3	1	6
Smart Strips	10	18	1	29
Total Appliance Rebate Applications	2,748	3,563	774	7,085
Energy Efficiency Measures: HVAC				
HVAC Tune Ups	2,087	1,908	1,977	5,972
Air Source Heat Pumps	161	268	49	478
Ground Source Heat Pumps	35	116	25	176
Central Air Conditioning	212	234	147	593
Total HVAC Rebate Applications	2,495	2,526	2,198	7,219
Grand Total of Rebate Applications	5,243	6,089	2,972	14,304

The rebate applications are paper based. Retail rebate applications are filled out by the customer whereas the HVAC rebate applications are filled out on-site jointly by the HVAC contractor and the customer. The HVAC contractors expressed concern regarding the time consuming nature of filling out the rebate applications.

5.2.3 Participating Retailers and HVAC Contractors

Program staff recruited 63 retailers and 421 HVAC contractors as implementation partners. The retail and HVAC partners were distributed throughout the Companies' service territory.

5.2.4 Numbers and Types of Products Rebated

ADM found that Honeywell rebated 82% of the appliance rebate applications and 82% of the HVAC rebate applications[24] received in 2011. The numbers and types of products rebated through the 2011 Energy Efficient Products Program are shown in Table 5-6 below.

[24] Honeywell rebated 5,824 of the 7,085 appliance applications and 5,891 of the 7,219 HVAC applications.

Table 5-6. Number and Types of Products Rebated by Measure and Operating Company

	CEI	***OE***	***TE***	***Total Companies***
Energy Efficiency Measures: Appliances				
Dehumidifiers	811	1,076	269	2,156
Refrigerators	923	1,135	230	2,288
Clothes Washer	236	395	61	692
Room Air Conditioner	278	292	97	667
Torchiere Floor Lamps	2	2	-	4
Smart Strips	5	12	-	17
Total Appliance Rebate Applications	2,255	2,912	657	5,824
Energy Efficiency Measures: HVAC				
HVAC Tune Ups	1,855	1,526	1,695	5,076
Air Source Heat Pumps	110	176	34	320
Ground Source Heat Pumps	16	85	15	116
Central Air Conditioning	150	134	95	379
Total HVAC Rebate Applications	2,131	1,921	1,839	5,891
Grand Total of Rebate Applications	4,386	4,833	2,496	11,715

5.2.5 Rebate Processing Issues

Incomplete rebate applications and errors in completing the rebate application caused delays in processing the rebates, which in turn delayed payment of the rebates to customers. Some participating HVAC contractors felt they needed more timely feedback from the program regarding any deficiencies in the rebate applications they had helped customers complete so they could help make the corrections needed and get the customer the rebate.

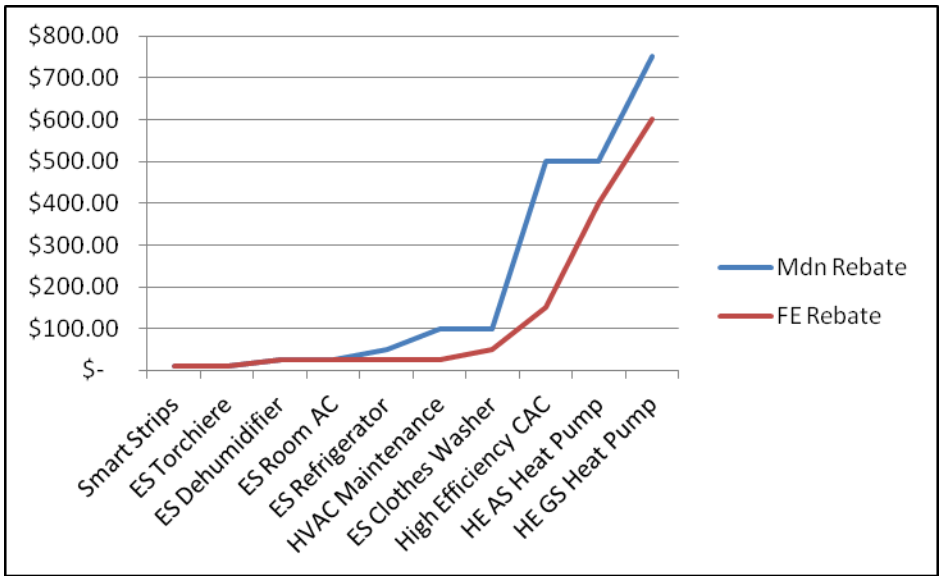
Some HVAC contractors interviewed voiced criticisms of the HVAC rebate application process. The HVAC contractors are required to provide serial numbers of the installed equipment, AHRI certification information, and sales or service receipts as part of the application process. The HVAC contactors typically fill out the entire HVAC rebate application for their customers, although they are not required by the program to do so. But the HVAC contractors are required to provide considerable information on the application, so they typically complete the application for the customer. This process requires extra time and effort on the part of the HVAC contractors.

5.2.6 Rebate Adequacy

Retailer and HVAC contractor respondents felt that the product rebates offered by the Companies were adequate to encourage participation in the program. For the ten products

rebated by the program in 2011, up to 21 comparisons of incentive levels from other utilities operating similar product rebate programs in the United States was obtained. The Companies' incentive levels for each of the ten rebated products were compared with the median incentive level offered nationally. The results are summarized in the graph shown in Figure 2.

Figure 2. FirstEnergy Rebate Levels for 10 Products compared to National Averages



The graph in Figure 2 shows that the Companies' incentive levels are at national norms for the lower cost products: Smart Strips, torchieres, dehumidifiers, and room air conditioners. For these products, rebates generally vary between $10 and $25. With the more costly products, starting with ENERGY STAR® refrigerators, there is increasing separation between the Companies' rebate levels and the national median. The incentive gap is biggest for the Companies' rebate to induce the purchase of high efficiency central air conditioning systems: a difference of $350. The gaps between the Companies' product rebates and national norms are shown in Table 5-8.

Table 5-8. Differences in Product Rebate Levels

Measure	National Median Rebate Level	Companies Rebate Level	Rebate Gap
Smart Strips	$10	$10	$0
Torchiere	$10	$10	$0
Dehumidifier	$25	$25	$0
Room AC	$25	$25	$0
Refrigerator	$50	$25	$25
Clothes Washer	$100	$50	$50
HVAC Tune-Up	$100	$25	$75
High Efficiency Central AC	$500	$150	$350
Air Source Heat Pump	$500	$400	$100
GS Heat Pump	$750	$600	$150

5.2.7 Satisfaction with the Program

Telephone interviews were conducted with 88 customers who received rebates for purchasing an ENERGY STAR® appliance or a high efficiency HVAC product or service through the Ohio Energy Efficient Products Program in 2011. Respondents were asked to rate their satisfaction with the product or service rebated on three dimensions: (1) the rebate application process; (2) the rebate dollar amount received; and (3) the performance of the product purchased. Respondents were asked to use a zero to ten rating scale where zero meant very dissatisfied and ten meant very satisfied. The results of the survey are shown in Table 5-9 below.[25]

Table 5-9. Customer Satisfaction with the Rebate Process and Rebated Products

Product Measure	**Mean Satisfaction Ratings**		
	Application Process	**Rebate Amount**	**Product Performance**
Smart Strips	9.00	6.67	9.00
ES Dehumidifiers	8.78	8.28	8.28
ES Room AC Units	8.75	8.75	8.75
ES Refrigerators	9.27	7.92	8.58
ES Clothes Washers	9.25	9.00	9.20
Appliances Group	**9.26**	**8.46**	**8.89**
HVAC Tune Up	8.32	8.50	8.13
Central AC Systems	9.07	8.33	9.00
AS Heat Pumps	8.11	7.78	9.00
GS Heat Pumps	8.60	8.56	9.33
HVAC Group	**8.53**	**8.29**	**8.87**

[25] Rebate recipients for torchiere floor lamps were not surveyed because the four torchiere models rebated by the program were not eligible.

The data in table 5-9 suggest that program participants were generally satisfied with the Energy Efficient Products Program in 2011. They did, however, rate the HVAC application process lower than the retail application process. Respondents who were dissatisfied with the rebate application process were all recipients of HVAC rebates.

- One of the HVAC rebate recipients indicated that he disliked the paperwork involved with the HVAC tune-up application.

- The HVAC contractors generally did not like the additional administrative burden involved in being required to assist with the completion of the rebate application.

The survey data on customer satisfaction with the amount of the rebate received suggests that program participants are less satisfied with the HVAC rebates than with the appliance rebates. These ratings appeared to be somewhat product specific. For example, the $400 rebate for the purchase of a high efficiency air source heat pump received the lowest satisfaction rating within the HVAC group. Significantly, the biggest gap between the Companies' incentive levels and national norms is the rebate offered for central air conditioning which lags most other utilities nationally by $350 on the average. Similarly, the $25 rebate for purchasing an ENERGY STAR® refrigerator received a relatively low satisfaction rating. $50 is the usual incentive level found for rebating an ENERGY STAR® refrigerator at the national level. Two of the participating retailers interviewed recommended increasing the refrigerator rebate level.

The participating customers appeared reasonably satisfied with the performance of the products rebated. The product performance satisfaction ratings for appliances and HVAC products were similar overall.

Eight of the ten retail partners interviewed were satisfied with the program and five of eleven HVAC contractors interviewed were satisfied with the program. Improving the HVAC rebate application process is a step which would benefit the program.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions:

A total of 11,312 energy efficient products qualified for rebates in 2011 through the Energy Efficient Products Program implemented in the service territories of the Companies. The numbers of qualifying products in each service territory were as follows:

- CEI 4,260
- Ohio Edison 4,619
- Toledo Edison 2,433

The overall evaluation results for estimated gross energy savings and peak demand reductions for the program in the Companies' service territories are summarized in Table 6-1.

Table 6-1. Overall Evaluation Results for Gross kWh and kW Savings

Utility	***Ex Ante Expected Gross Savings***		***Ex Post Verified Gross Savings***	
	Gross kWh	***Gross kW***	***Gross kWh***	***Gross kW***
CEI	580,486	164	587,902	191
OE	862,564	190	938,284	231
TE	279,268	95	296,960	112
Total Companies	1,722,318	450	1,823,146	534

The gross kWh savings total shown in Table 1-1 reflect a realization rate of 106 percent, as determined by the ratio of verified gross kWh savings to expected gross kWh savings. A source of differences between ex ante and ex post estimates of kWh savings was misclassification of 124 ENERGY STAR® refrigerators in the ex ante data set. Given that refrigerator savings are deemed based on refrigerator classification of door style configuration and that refrigerator rebates were a major contributor to the program's energy savings, the classification issue in the ex ante data set contributes to the variance from the ex post verified savings. A second factor that contributed to the variance creating a realization rate greater than 100% was the ground source heat pump measure. The ex ante values for the ground source heat pump measure were on average about 15 percent lower than the ex post values. Since the ground source heat pump is a high impact measure in terms of kWh saved per unit, this also contributed to the variance from the ex post savings.

Rebated appliances accounted for 47% of the total kWh savings, with ENERGY STAR® dehumidifiers (25% of total kWh savings) and ENERGY STAR® refrigerators (14% of total kWh savings) accounting for 83% of the energy savings associated with energy efficient

appliances. Rebated HVAC services and equipment accounted for 53% of the total kWh savings, with HVAC maintenance/tune-ups (20% of total kWh savings) and ground source heat pumps (15% of total kWh savings) accounting for 66% of the energy savings associated with rebated HVAC services and high efficiency equipment.

6.2 Recommendations:

This section provides ADM recommendations pertaining to program and evaluation improvement.

6.1.1 Recommendations for Program Improvement

- Increase program marketing efforts by increasing the frequency of utility bill insert promotions and additional online advertising. Retail signage and banners could also be improved by increasing their size and number at each retail location. Respondents felt that more television and print ads would also help promote customer awareness of the program
- The rebate application process was burdensome to the HVAC contractors and customer errors in both the retail and HVAC applications caused delays in rebate processing. Moving from paper-based applications to online rebate applications, or at least introducing that as an option, would reduce the error rate and speed up the rebate processing since the online form could be designed with required data fields and data validation parameters.
- Simplify the rebate application forms and use duplicate paper forms so that the homeowner has a copy after it is submitted.
- Consider increasing some of the rebate amounts, particularly those for ENERGY STAR® refrigerators and high efficiency central air conditioning systems.

7. APPENDIX A: REQUIRED SAVINGS TABLES

Tables showing measure-level participation counts and savings for the Energy Efficient Products Program were provided in Chapter 5. This appendix provides two additional tables summarizing savings for first-year ex post pro-rata kWh savings and lifetime ex post kWh savings.

- Table 7-1 reports the first-year *Ex Post* pro-rata kWh savings by utility and measure.
- Table 7-2 reports the lifetime *Ex-Post* kWh savings by utility and measure.

Table 7-1. First Year Ex Post Pro-Rata (2011) kWh Savings by Utility and Measure

	CEI	***OE***	***TE***	***Total, Companies***
Energy Efficiency Measures: Appliances				
Dehumidifiers	70,623	92,818	23,204	186,645
Refrigerators	35,533	43,289	8,857	87,679
Clothes Washer	14,679	24,711	3,703	43,093
Room Air Conditioner	2,429	2,475	816	5,720
Torchiere Floor Lamps	0	0	-	0
Smart Strips	137	418	-	555
Total First Year kWh Savings, Appliances	123,401	163,710	36,580	323,692
Energy Efficiency Measures: HVAC				
HVAC Tune Ups	64,584	57,377	58,695	180,656
Air Source Heat Pumps	20,780	52,385	11,318	84,482
Ground Source Heat Pumps	13,628	68,785	9,669	92,082
Central Air Conditioning	9,741	8,772	7,093	25,606
Total First Year kWh Savings, HVAC	108,732	187,319	86,775	382,826
Grand Total First Year kWh Savings	232,133	351,029	123,355	706,518

Table 7-2. Lifetime Ex Post kWh Savings by Utility and Measure

	EUL	***CEI***	***OE***	***TE***	***Total, Companies***
Energy Efficiency Measures: Appliances					
Dehumidifiers	12	2,033,928	2,673,156	668,280	5,375,364
Refrigerators	17	1,812,200	2,207,722	451,707	4,471,629
Clothes Washer	11	484,396	815,474	122,210	1,422,080
Room Air Conditioner	12	69,960	71,280	23,496	164,736
Torchiere Floor Lamps	8	0	0	-	0
Smart Strips	4	1,316	4,008	-	5,324
Total Lifetime kWh Savings, Appliances		4,401,800	5,771,640	1,265,693	11,439,133
Energy Efficiency Measures: HVAC					
HVAC Tune Ups	5	645,835	573,770	586,950	1,806,555
Air Source Heat Pumps	18	1,122,102	2,828,772	611,172	4,562,046
Ground Source Heat Pumps	18	735,894	3,714,408	522,126	4,972,428
Central Air Conditioning	18	526,032	473,670	383,040	1,382,742
Total Lifetime kWh Savings, HVAC		3,029,863	7,590,620	2,103,288	12,723,771
Grand Total of Lifetime kWh Savings		7,431,663	13,362,260	3,368,981	24,162,904

8. APPENDIX B: SURVEY INSTRUMENT

2011 Energy Efficient Products Program
Participant Telephone Survey

EDC	Code
Illuminating Company	1
Ohio Edison	2
Toledo Edison	3

A1 *Hello, my name is (interviewer name), and I am calling on behalf of (name of EDC), your electric utility company. May I speak with (name of respondent)?*

Yes 01
No 02 [IF *NOT AVAILABLE, ASK FOR ANOTHER ADULT FAMILIAR WITH HOUSEHOLD'S PARTICIPATION IN ENERGY EFFICIENT PRODUCTS PROGRAM]*

A2 *I'm with ADM Associates, an independent research firm. We are speaking with households that participated in (name of EDC's) Energy Efficient Products Program. Through this program you may have received a rebate for the purchase of energy efficient products like an Energy Star refrigerator, dehumidifier, or clothes washer or you might have received a rebate for the tune-up of your home heating and air conditioning system. Do you recall participating in this program?*

Yes 01 [SKIP TO A6]
No 02
Don't Know 98
Refused 99 [THANK AND TERMINATE]

A3 *Is it possible that someone else in your household would be familiar with the products or services you received through this program?*

Yes 01
No 02 [THANK AND TERMINATE]
Don't Know 98 [THANK AND TERMINATE]
Refused 99 [THANK AND TERMINATE]

A5 *May I speak with that person?*

Yes 01 [RECYCLE THROUGH A1 and A2 WITH NEW RESPONDENT]
No 02 [THANK AND TERMINATE]
Don't Know 98 [THANK AND TERMINATE]
Refused 99 [THANK AND TERMINATE]

A6 *Great, thank you. First I want to assure you that I'm not selling anything. We are calling program participants to verify information about the products and services received and to assess customer satisfaction with the products and services. You will receive a $10 gift card from Shell for participating in this survey. May I take a few minutes to talk with you about the products and services you received and how satisfied you have been with those products and services? Your responses will be kept confidential.*

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

THE INTERVIEW

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

Bill Insert	01
Direct Mail from Utility	02
Energy Save Ohio website	03
Retail Store	04
Contractor	05
Print Ad	06
Radio	07
Word-of-Mouth	08
Other (specify)	09

Specify Other: _____

2. *Next, I would like to verify the products or services you received through the program. Our records indicate that you received a rebate for a ___. Is that correct?*

[READ ITEM FOR WHICH REBATE WAS PAID; RECORD ANSWER INDICATED BY RESPONDENT]

		Yes	No	DK	NA
a.	HVAC Tune-up	01	02	98	99
b.	ENERGY STAR® ENERGY STAR® Refrigerator	01	02	98	99
c.	ENERGY STAR® ENERGY STAR® Dehumidifier	01	02	98	99
d.	ENERGY STAR® ENERGY STAR® Room Air Conditioner	01	02	98	99
e.	ENERGY STAR® ENERGY STAR® Clothes Washer	01	02	98	99
f.	Hi Efficiency Central AC System	01	02	98	99
g.	Air-to-Air Heat Pump	01	02	98	99
h.	Geothermal Heat Pump	01	02	98	99
i.	Smart Strip Surge Protector	01	02	98	99

[ASK FOLLOW-UP QUESTIONS ONLY ABOUT REBATED PRODUCTS & SERVICES]

HVAC Tune-Up

[ASK Q3-Q6 IF Q2A = 1]

3. Can you tell me what kind of HVAC equipment you had tuned up? Was it an…[READ OPTIONS]

Air Conditioner	01
Heat Pump	02
Don't recall	98
Refused	99

4. Do you remember when in 2011 you had the tune-up done? What month was that?

_____ [ENTER MONTH TUNE-UP WAS DONE]

Don't recall	98
Refused	99

5. Did you notice an improvement in the cooling/heating performance of the system after the tune-up was performed?

Yes	01
No	02
Don't recall	98
Refused	99

6. *Using a scale of 0 to 10 where 0 is very dissatisfied and 10 is very satisfied; please tell me how satisfied you are with the following aspects of the tune-up you received:*

a. Rebate application process: _____ [ENTER 0 TO 10]
b. Rebate dollar amount you received: _____ [ENTER 0 TO 10]
c. Cooling/heating performance after the tune-up: _____ [ENTER 0 TO 10]

ASK Q7 IF Q6 <6]

7. Why weren't you satisfied with the (application process, rebate amount, or cooling/heating performance after the tune-up)?

[RECORD VERBATIM RESPONSE]

ENERGY STAR® REFRIGERATOR

[ASK Q8-Q10 IF Q2B = 1]

8. What kind of refrigerator model did you purchase? Was it a… [READ RESPONSE OPTIONS]

Top-freezer refrigerator model	01	
Bottom-freezer refrigerator model	02	
Side-by-Side refrigerator model	03	
Don't know	98	[PROMPT TO LOOK AT THE UNIT]
Refused	99	

9. Do you remember the month in 2011 when you purchased the refrigerator? What month was that?

_____ [ENTER MONTH TUNE-UP WAS DONE]

Don't recall	98
Refused	99

10. *Using a scale of 0 to 10 where 0 is very dissatisfied and 10 is very satisfied; please tell me how satisfied you are with the following:*

a.	Rebate application process:	_____	[ENTER 0 TO 10]
b.	Rebate dollar amount you received:	_____	[ENTER 0 TO 10]
c.	ENERGY STAR® Refrigerator you purchased:	_____	[ENTER 0 TO 10]

ASK Q11 IF Q10 <6]

11. *Why weren't you satisfied with (the application process, rebate amount, or product)?*
[RECORD VERBATIM RESPONSE]

ENERGY STAR® DEHUMIDIFIER

[ASK Q12-Q14 IF Q2C = 1]

12. Do you remember the month in 2011 when you purchased the dehumidifier? What month was that?

_____ [ENTER MONTH PRODUCT WAS PURCHASED]

Don't recall	98
Refused	99

13. *Can you tell me the make or manufacturer of the dehumidifier you purchased? The make or manufacturer should be listed on the unit.*

_____ [ENTER MANUFACTURER OF UNIT]

Don't know	98	[PROMPT TO LOOK AT THE UNIT]
Refused	99	

14. *Using a scale of 0 to 10 where 0 is very dissatisfied and 10 is very satisfied; please tell me how satisfied you are with the following:*

a.	Rebate application process:	_____	[ENTER 0 TO 10]
b.	Rebate dollar amount you received:	_____	[ENTER 0 TO 10]
c.	ENERGY STAR® dehumidifier you purchased:	_____	[ENTER 0 TO 10]

ASK Q15 IF Q14 <6]

15. *Why weren't you satisfied with (the application process, rebate amount, or product)?* [RECORD VERBATIM RESPONSE]

ENERGY STAR® ROOM AIR CONDITIONER

[ASK Q16-Q18 IF Q2D = 1]

16. *Do you remember the month in 2011 when you purchased the air conditioner? What month was that?*

_____ [ENTER MONTH PRODUCT WAS PURCHASED]

Don't recall	98
Refused	99

17. *Can you tell me the make or manufacturer of the room air conditioner you purchased? The make or manufacturer should be listed on the unit.*

_____ [ENTER MANUFACTURER OF UNIT]

Don't know	98	[PROMPT TO LOOK AT THE UNIT]
Refused	99	

18. *Using a scale of 0 to 10 where 0 is very dissatisfied and 10 is very satisfied; please tell me how satisfied you are with the following:*

a. Rebate application process: _____ [ENTER 0 TO 10]
b. Rebate dollar amount you received: _____ [ENTER 0 TO 10]
c. Energy Star Air Conditioner you purchased:_____ [ENTER 0 TO 10]

ASK Q19 IF Q18 <6]

19. Why weren't you satisfied with (the application process, rebate amount, or product)?
[RECORD VERBATIM RESPONSE]

ENERGY STAR® CLOTHES WASHER

[ASK Q20-Q23 IF Q2E = 1]

20. Do you remember the month in 2011 when you purchased the clothes washer? What month was that?

_____ [ENTER MONTH PRODUCT WAS PURCHASED]

Don't recall	98	
Refused	99	

21. Can you tell me whether you have an electric or gas water heater?

Gas	01	
Electric	02	
Don't know	98	[PROMPT TO LOOK AT THE UNIT]
Refused	99	

22. *Can you tell me the make or manufacturer of the clothes washer you purchased? The make or manufacturer should be listed on the unit.*

_____ [ENTER MANUFACTURER OF UNIT]

Don't know	98	[PROMPT TO LOOK AT THE UNIT]
Refused	99	

23. *Using a scale of 0 to 10 where 0 is very dissatisfied and 10 is very satisfied; please tell me how satisfied you are with the following:*

a.	Rebate application process:	_____	[ENTER 0 TO 10]
b.	Rebate dollar amount you received:	_____	[ENTER 0 TO 10]
c.	Energy Star clothes washer you purchased:	_____	[ENTER 0 TO 10]

ASK Q24 IF Q23 <6]

24. *Why weren't you satisfied with (the application process, rebate amount, or product)?*
[RECORD VERBATIM RESPONSE]

CENTRAL AIR CONDITIONING

[ASK Q25-Q27 IF Q2F = 1]

25. *Do you remember the month in 2011 when you purchased the central air conditioning system? What month was that?*

_____ [ENTER MONTH PRODUCT WAS PURCHASED]

Don't recall	98
Refused	99

26. *Can you tell me the make or manufacturer of the central air conditioning system you purchased? The make or manufacturer should be listed on the unit.*

_____ [ENTER MANUFACTURER OF UNIT]

Don't know	98	[PROMPT TO LOOK AT THE UNIT]
Refused	99	

27. *Using a scale of 0 to 10 where 0 is very dissatisfied and 10 is very satisfied; please tell me how satisfied you are with the following:*

a.	Rebate application process:	_____	[ENTER 0 TO 10]
b.	Rebate dollar amount you received:	_____	[ENTER 0 TO 10]
c.	Central Air Conditioning system you purchased:	_____	[ENTER 0 TO 10]

ASK Q28 IF Q27 <6]

28. Why weren't you satisfied with (the application process, rebate amount, or product)?
[RECORD VERBATIM RESPONSE]

AIR-TO-AIR HEAT PUMP

[ASK Q29-Q31 IF Q2G = 1]

29. Do you remember the month in 2011 when you purchased the air-to-air heat pump? What month was that?

_____ [ENTER MONTH PRODUCT WAS PURCHASED]

Don't recall	98
Refused	99

30. Can you tell me the make or manufacturer of the air-to-air heat pump you purchased?

_____ [ENTER MANUFACTURER OF UNIT]

Don't know	98	[PROMPT TO LOOK AT THE UNIT]
Refused	99	

31. Using a scale of 0 to 10 where 0 is very dissatisfied and 10 is very satisfied; please tell me how satisfied you are with the following:

a. Rebate application process: _____ [ENTER 0 TO 10]
b. Rebate dollar amount you received: _____ [ENTER 0 TO 10]
c. Air source heat pump you purchased: _____ [ENTER 0 TO 10]

ASK Q32 IF Q31 <6]

32. *Why weren't you satisfied with (the application process, rebate amount, or product)?* [RECORD VERBATIM RESPONSE]

GEOTHERMAL HEAT PUMP

[ASK Q33-Q35 IF Q2H = 1]

33. *Do you remember the month in 2011 when you purchased the geothermal heat pump? What month was that?*

_____ [ENTER MONTH PRODUCT WAS PURCHASED]

Don't recall	98
Refused	99

34. *Can you tell me the make or manufacturer of the geothermal heat pump you purchased?*

_____ [ENTER MANUFACTURER OF UNIT]

Don't know	98	[PROMPT TO LOOK AT THE UNIT]
Refused	99	

35. *Using a scale of 0 to 10 where 0 is very dissatisfied and 10 is very satisfied; please tell me how satisfied you are with the following:*

a.	Rebate application process:	_____	[ENTER 0 TO 10]
b.	Rebate dollar amount you received:	_____	[ENTER 0 TO 10]
c.	Geothermal heat pump you purchased:	_____	[ENTER 0 TO 10]

ASK Q36 IF Q35 <6]

36. Why weren't you satisfied with (the application process, rebate amount, or product)?
[RECORD VERBATIM RESPONSE]

SMART STRIP SURGE PROTECTORS

[ASK Q37-Q39 IF Q2I = 1]

37. Do you remember the month in 2011 when you purchased the smart strip surge protector? What month was that?

_____ [ENTER MONTH PRODUCT WAS PURCHASED]

Don't recall	98
Refused	99

38. Can you tell me the plug size of the smart strip you purchased? Was it a 5-plug or a 7-plug smart strip or some other size?

5-plug model	01	
7-plug model	02	
Other plug size model	03	
Don't know	98	[PROMPT TO LOOK AT THE UNIT]
Refused	99	

Specify other plug size: _____

39. Using a scale of 0 to 10 where 0 is very dissatisfied and 10 is very satisfied; please tell me how satisfied you are with the following:

a. Rebate application process: _____ [ENTER 0 TO 10]
b. Rebate dollar amount you received: _____ [ENTER 0 TO 10]
c. Smart strip surge protector you purchased: _____ [ENTER 0 TO 10]

ASK Q40 IF Q39 <6]

40. *Why weren't you satisfied with (the application process, rebate amount, or product)?*
[RECORD VERBATIM RESPONSE]

HOME DEMOGRAPHICS

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

41. 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: _____

42. Do you own or rent this residence?

Own	01
Rent	02
Don't Know	98
Refused	99

43. *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

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

Square Feet: _____
Don't know 98
Refused 99

[ASK Q44 IF Q43 = 98 OR 99]

45. 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

46. 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 Q46 IF Q45 = 98 0R 99]

47. 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.

You will receive your gift card within the next 30 days. Do you have any questions?

OK. Good bye.