



## Energy Efficiency / Demand Response Plan: Plan Year 2 (6/1/2009-5/31/2010)

### Evaluation Report: Residential Appliance Recycling

#### Presented to

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## Section E. Executive Summary Appliance Recycling

### *E.1 Evaluation Objectives*

The goal of this report is to present a summary of the findings and results from the evaluation of the Program Year 2 (PY2) Residential Appliance Recycling (AR) program. The objectives of the evaluation are to: (1) quantify net energy and peak demand savings impacts from the program during Program Year 2 (PY2); and (2) to determine key process-related program strengths and weaknesses and provide recommendations to improve the program.

### *E.2 Evaluation Methods*

To estimate gross energy savings, we have relied heavily on data from extensive research elsewhere, including, for refrigerators and freezers, regression equations for estimating refrigerator and freezer Unit Energy Consumption (UEC) that are based on a large database of over 1,600 previously metered units in California based on the DOE lab metering approach. The regression equations estimate usage as a function of unit characteristics (age, size, configuration, and defrost mode). The characteristics of units collected by JACO for ComEd were then input into these models to estimate full-year UECs (representing kWh savings) that are specific to ComEd's program.

Our primary data collection activities for the gross and net impact calculations were two telephone surveys, one of program participants, and a second of nonparticipants. The participant survey was used to determine a part-use factor and the program net-to-gross ratio, and to support the process evaluation. The nonparticipant survey was used to help explain the program net-to-gross ratio, and it also provided market information on the secondary market for used refrigerators and freezers.

The part-use factor was used to adjust the annualized UEC estimates to reflect the number of months the recycled unit would have been operated absent the program. This element of the calculation is particularly important for ComEd's program, since refrigerators and freezers located in garages may have been shut down during the winter months, when cold weather reduces or eliminates the need to run the unit. Similarly, room AC units may only have been operated during a few of the hottest days during the summer months.

Table E-0-1 below summarizes the key data collection activities in support of this evaluation.

**Table E-0-1. Data Collection Activities**

Data Collection Type	Targeted Population	Sample Frame	Sample Design	Sample Size	Timing
Tracking Data Analysis	All Program Participants	Tracking Database	-	All	Ongoing
In-depth Phone Interview	ComEd program manager	Contact from ComEd	AR program manager Sharon Madigan	1	March 16, 2010 and June 15, 2010
CATI Phone Surveys	Program Participants	Tracking Database	Random Sample of AR Program Participants	152 Total – 114 Refrigerator, 38 Freezer, 30 Room AC Recyclers	August 2010
	Nonparticipants	CIS frame	Random Sample. Survey questions used to identify Program Participants	32 Total - 20 acquirers and 20 discarders*	August 2010

\* Note that some respondents were both acquirers and discarders.

### **E.3 Key Findings and Recommendations**

The Residential Appliance Recycling program began operation in June 2008. This was its second full year of operation. The program offers free pickup and recycling services for older, working refrigerators and freezers, and room air conditioners. Program savings are based on the accelerated removal, dismantling and recycling of these older, inefficient units. In exchange for participating in the program, ComEd pays participants \$25 each for up to two recycled refrigerators or freezers. Operational room air conditioner units are also eligible for pick up and recycling, but they can only be picked up from sites where the recycler, JACO, is already collecting a refrigerator and/or freezer (so the room AC unit can “ride for free”). Participants contributing these working room AC units also receive the \$25 program incentive, in conjunction with the pickup of either a refrigerator or freezer. However the incentive is capped at 2 units per pickup. Therefore, if a room AC unit is also being collected with both a refrigerator and freezer, the participant is still paid a maximum of \$25 each for two appliances per scheduled visit.

A total of 25,735 units was picked up by the program during PY2. Almost four-fifths of these units were refrigerators, another fifth were freezers, and a very small percentage of units were room air conditioners. Table E-0-2 below provides the breakdown of recycled units by measure type.

**Table E-0-2. Summary of Recycled Units by Appliance Type**

Measure Type	Number of Units	Percent of Units
Refrigerators	20,065	78%
Freezers	4,946	19%
Room Air Conditioners	724	3%
<b>Total Units Recycled</b>	<b>25,735</b>	<b>100%</b>

Table E-0-3 below provides the second-year evaluation-adjusted gross and net MWh savings estimates for each measure and for the program overall. Table E-0-4 shows the comparable values for kW savings.

**Table E-0-3. PY2 Gross and Net Impact Parameter and Savings Estimates (MWh)**

Gross and Net Impact Parameter and Savings Estimates	Refrigerators	Freezers	Room AC	Total Program
Total units recycled through the Program	20,065	4,946	724	25,735
<b>Verified Annual MWh Savings Impacts</b>				
Verified annual Gross kWh savings per unit (full-load operating hours)	2,021	1,928		---
Part-Use Factor	87%	89%	NA	---
Verified annual Gross kWh savings per unit adjusted for part-use	1,757	1,715	80	--
Verified Program Gross MWh	35,248	8,482	58	43,788
Net-to-Gross Ratio (1-Free Rider %)	0.73	0.82	0.72	
<b>Total Second-Year Evaluation-Adjusted Net MWh Savings</b>	<b>25,663</b>	<b>6,919</b>	<b>42</b>	<b>32,624</b>

**Table E-0-4. PY2 Gross and Net Impact Parameter and Savings Estimates (kW)**

Gross and Net Impact Parameter and Savings Estimates	Refrigerators	Freezers	Room AC	Total Program
Total units recycled through the Program	20,065	4,946	724	25,735
Verified Annual kW Savings Impacts				
Annual Gross kW savings per unit (full-load operating hours)	0.30	0.26	0.04	---
Program Gross kW	6,020	1,286	29	7,334
Net-to-Gross Ratio (1-Free Rider %)	0.73	0.82	0.72	
<b>Total PY2 Net kW Savings</b>	<b>4,383</b>	<b>1,049</b>	<b>21</b>	<b>5,453</b>

#### **E.4 Key Impact Findings**

The starting PY2 net energy savings goal for this program was 18,358 MWh, but was increased mid-year to 23,628 MWh. The program-reported energy savings was somewhat higher than this, 25,997 MWh<sup>1</sup>. The verified energy savings is actually significantly higher than this – 32,624 MWh, for an overall realization rate of 125%. For year 2, the kW saved by the program are based on ComEd’s ex-ante planning estimates for per-unit kW savings for Refrigerators, Freezers and Room AC units.

A comparison of program verified versus program-ex-ante savings is provided in Table E-0-5 below. The program ex-ante savings estimate was provided by ComEd.

Gross savings per unit (without adjustment for the part-use factor) are identical for the ex-ante and ex-post program-verified savings estimates, since ComEd used the same approach to calculate ex-ante gross savings per unit as was used in this evaluation. Key differences are with respect to the part-use factor and net-to-gross ratio assumptions. In its ex-ante estimates, ComEd has assumed a part-use factor (labeled as a realization rate in their table) of 0.73, while the program verified part-use factors are 0.87 for refrigerators and 0.89 for freezers, respectively. ComEd assumed a net-to-gross ratio of 0.71, as versus program-verified net-to-gross ratios of 0.73 for refrigerators and 0.82 for freezers, respectively. These higher program-verified values yield a total ex-post net savings estimate of 32,624 MWh compared with ex-ante net savings of 25,997 MWh, for a total verified net realization rate of 1.25.

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<sup>1</sup> As reported in *PY2 Ex Ante & Plan Summary.xls* provided by ComEd.

**Table E-0-5. PY2 Program Tracking System Savings Versus Evaluation-Verified Savings (MWh)**

Gross and Net Impact Parameter and Savings Estimates	Program Tracking System Savings				Verified Program Savings			
	Refrigerators	Freezers	Room AC	Total Program	Refrigerators	Freezers	Room AC	Total Program
Total units recycled through the Program	20,065	4,946	724	25,735	20,065	4,946	724	25,735
<b>Annual kWh Savings Impacts</b>								
Annual Gross kWh savings per unit (full-load operating hours)	2,021	1,928	80	---	2,021	1,928		---
Part-Use Factor	73%	73%	73%	---	87%	89%		---
Annual Gross kWh savings per unit adjusted for part-use	1,478	1,410	59	--	1,757	1,715	80	--
Program Gross MWh	29,655	6,973	42	36,671	35,248	8,482	58	43,788
Net-to-Gross Ratio (1-Free Rider %)	0.71	0.71	0.71		0.73	0.82	0.72	
<b>Total PY2 Net MWh Savings</b>	<b>21,023</b>	<b>4,944</b>	<b>30</b>	<b>25,997</b>	<b>25,663</b>	<b>6,919</b>	<b>42</b>	<b>32,624</b>

### E.5 Key Process Findings

According to data from ComEd<sup>2</sup>, the program achieved its energy savings goals in PY2. The program initially set an initial savings goal of 18,357 net MWh, but increased the target to 23,628 MWh after realizing the initial goal was more than achievable. While the process evaluation does not address impact goals related to MWh savings, it is important to note here that unit goals or number of appliances picked up do not have a linear relationship with savings. That is, refrigerators, freezers, and AC units all carry different levels of savings; thus, the program does not set a specified number of units that it must collect to achieve its savings goals. As seen in Table E-0-6 below, as the energy savings goals changed during the program year, the unit goals did not change linearly. Furthermore, while the number of units that were ultimately collected was lower than targeted, the program still met its savings goals.

**Table E-0-6. ComEd Residential Appliance Recycling Program PY2 Goals**

Goals	Net MWh Goal	Associated Units <sup>1</sup>
Initial PY2	18,357	25,710
Revised PY2	23,628	26,250
Estimated Achieved PY2 <sup>2</sup>	25,997	25,735

Source: ComEd Program Staff

<sup>1</sup>Unit Goals shift as the year goes on because refrigerators, freezers, and AC units all provide different kWh savings.

<sup>2</sup>ComEd Program Staff provided their ex ante savings estimate. The Associate Units of appliances were indeed the total number of units collected.

In PY2, ComEd stepped up their program marketing efforts with increased usage of bill inserts, as well as newspaper, radio, newsletter, and on-line advertisements. Bill inserts are an effective method for increasing awareness of the program, as roughly 70% of participants and nonparticipant survey respondents learned of the program through bill inserts. The program also utilized more targeted marketing efforts. For example, ComEd used a direct mail campaign that involved sending personalized letters and coupons to customers they thought were likely to have appliances to recycle.

ComEd identified these groups using Prizm software capable of profiling past participants in their database. Past participants were found to have somewhat high education and income levels and are considered “empty-nesters” in specific communities. The direct mail was then targeted at individuals who fit this profile. However, according to the Appliance Recycling Program Manager, the direct mail promotion yielded a low response rate (estimated at 1.2%).

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<sup>2</sup> Data provided by ComEd on September 8, 2010.

An additional means of learning about the program and participating was through ABT Electronics. Nearly 10% of the units collected in PY2 were obtained from this retailer.

Using a satisfaction scale of 0 to 10, where 10 is extremely satisfied and 0 is extremely dissatisfied, the vast majority of participants (94%) are satisfied (7 to 10) with the program. With regard to specific elements of the program:

- Almost all participants (95%) are satisfied with the sign-up process.
- Nearly all, 96%, are satisfied with the team who picked up the appliances.
- With regard to the \$25 incentive amount, 79% are satisfied with it.

The convenience of the home pick-up was the main selling point of the program for more participants than any other reason. Nearly half (43%) of respondents said that the convenience of the home pickup is the main reason they chose to participate. Next most important is the \$25 incentive, with 32% of respondents citing it as the main reason they chose to participate. Finally, 13% of respondents said the environmental benefits are the main reason they participated. These three factors are also the most-liked elements of the program. Over half of respondents (54%) appreciate that they don't have to remove the appliance themselves, 23% like the environmental benefits, and 21% value the \$25 incentive.

## Section 1. Introduction to the Program

### 1.1 Program Description

The Residential Appliance Recycling program was designed to achieve energy savings through the retirement and recycling of older, inefficient refrigerators, freezers, and room air conditioners. The primary objectives of the program are to:

- Decrease the retention of high energy-use refrigerators and freezers; and
- Deliver long-term energy savings.

A secondary objective is to dispose of these older refrigerators and freezers in an environmentally safe manner by offering comprehensive toxic material recycling and disposal that conforms with applicable environmental laws and regulations and permitting requirements.

The table below shows the energy saving goals of the program in PY2 as provided by the Program Manager.

**Table 1-1. ComEd Residential Appliance Recycling Program PY2 Goals**

Goals	Net MWh Goal	Associated Units <sup>1</sup>
Initial PY2	18,357	25,710
Revised PY2	23,628	26,250
Estimated Achieved PY2 <sup>2</sup>	25,997	25,735

*Source: ComEd Program Staff*

<sup>1</sup>*Unit Goals shift as the year goes on because refrigerators, freezers, and AC units all provide different kWh savings.*

<sup>2</sup>*ComEd Program Staff provided their ex ante savings estimate. The Associate Units of appliances were indeed the total number of units collected.*

The Residential Appliance Recycling program began operation in June 2008. Program Year 2 (PY2) began on June 1, 2009 and ended on May 31, 2010. The program offers free pickup and recycling services for older, working refrigerators and freezers, and room air conditioners that households no longer want. Program savings are based on the accelerated removal, dismantling and recycling of these older, inefficient units.

The program is marketed through a combination of methods – bill inserts, radio and TV spots, newspaper and newsletter advertisements, online marketing, and word-of-mouth. ComEd also used a direct mail campaign that involved sending personalized letters and coupons to customers from specific demographic groups who had participated in the past and were seen as likely to participate in the future.

JACO continued to implement the Appliance Recycling Program in PY2. JACO is responsible for the following functions: appliance pickups and related scheduling; processing program enrollments; deconstructing and recycling program units; responding to customer questions and complaints; and program tracking and reporting.

## **1.1.1 Measures and Incentives**

In exchange for participating in the program, ComEd pays participants \$25 each for up to two recycled refrigerators or freezers per scheduled pickup. Operational room air conditioner (AC) units are also eligible for pick up and recycling, but they can only be picked up from sites where the recycler, JACO, is already collecting a refrigerator and/or freezer (so the room AC unit can “ride for free”). Participants contributing these working room AC units also receive the \$25 program rebate; however, because of the two appliance limit, participants are not paid for AC units if they are being paid for two other appliances for each scheduled pickup (e.g., refrigerator and freezer).

## **1.2 Evaluation Questions**

The evaluation sought to answer the following key researchable questions. Some of the researchable questions will also be addressed in Program Years 3.

### Impact Questions

1. - What are the gross impacts from this program?
2. - What are the net impacts from this program? What is the level of free ridership with this program? What is the level of participant spillover? How can free ridership be reduced?
3. - Did the program meet its energy and demand goals? If not, why not?

### Process Questions

1. - Has the program as implemented changed from that in PY1? If so, how, why, and was this an advantageous change?
2. - What are key barriers to participation in the program for eligible ComEd customers? How can they be addressed by the program?
3. - How do customers become aware of the program? What marketing strategies could be used to boost program awareness?
4. - Is the program outreach to customers and program partners effective in increasing awareness of the program opportunities?

- a. - What is the format of the outreach?
  - b. - How often does the outreach occur?
  - c. - Are the messages within the outreach clear and actionable?
5. - Are program incentive levels appropriate to encourage participation?
- a. - What is the influence of the incentive level versus the marketing effort on program participation levels?
  - b. - How should the budget allocation between incentive spending and marketing spending be adjusted to maximize participation?

## Section 2. Evaluation Methods

This section describes the analytic methods and data collection activities implemented as part of the PY2 process and impact evaluation of the Appliance Recycling program, including the data sources and sample designs used as a base for the data collection activities.

### 2.1 Analytical Methods

#### 2.1.1 Impact Evaluation Methods

##### Ex-Post Gross Program Savings

*Refrigerators and Freezers.* Ex-post gross energy savings are expressed in terms of Full-year Unit Energy Consumption (UECs). UEC estimates were made using a regression-based approach that models full-year energy savings as a function of unit age, size, configuration, and defrost mode. These regression equations are based on a large body of impact evaluation work that has already been completed in California, which rely on DOE lab metered results for over 1,600 units. The regression equations were applied to the characteristics of the population of units actually collected by JACO. In addition, gross savings estimates were adjusted for part-use, by applying findings from the phone survey of program participants.

The regression equation that was used to estimate gross unit savings for recycled refrigerators and freezers is shown below in Table 2-1. This equation is from the evaluation of California's 2004-05 Appliance Recycling program<sup>3</sup>, and is based on a large database of over 1,600 previously metered units in California based on the DOE lab metering approach. The regression equation estimates usage as a function of unit characteristics (age, size, configuration, and defrost mode). All of the required data inputs to this equation were obtained from the program tracking data.

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<sup>3</sup> Although the evaluation of California's 2006-2008 Appliance Recycling program has recently been completed, the methodology for calculating impacts has been revised to be based on a relatively small database of *in situ* metered data. In addition, the regression equations based on lab-metering results were also updated. Concerns have been expressed about the validity of the new methodology and results of this evaluation, for this reason, the results have not been incorporated into this report.

**Table 2-1. Regression Relating DOE Test Annual UEC for Recycled Appliances to Explanatory Variables**

ID	Utility	Text
Intercept	-422.4106	-0.77
Freezer dummy (=1 if freezer)	169.0536	1.84
Bottom freezer dummy (=1 if unit is bottom freezer)	595.3794	2.91
Side by side dummy (= 1 if unit is side-by-side)	-129.3553	-0.34
Single door dummy (= 1 if unit is single door)	-417.1026	-4.73
Frost free dummy (= 1 if unit is frost free)	-445.0348	-1.00
Natural log of unit age	405.2134	2.15
Cubic Feet of unit (per tracking system data)	43.6478	4.59
Label Amps	104.1018	4.83
Freezer dummy x frost free dummy	319.1097	1.94
Bottom freezer dummy x frost free dummy	-302.0484	-1.28
Side by side dummy x frost free dummy	1451.3206	3.80
Side-side dummy x amps	-126.4332	-2.88
Frost free dummy x ln(age)	299.8206	2.09
Dummy if unit age is 15 years or greater	1197.8349	2.61
Ln age x age 15 up dummy	-524.9782	-3.08

These estimates reflect the full-year Unit Energy Consumption or UEC.

*Part-Use Adjustment.* This full-year UEC value was then adjusted for part-use, based on self-reported findings from the completed telephone surveys. This adjustment pro-rates the full-year value for the proportion of the year that the unit would have been operated in the program's absence. The value of this adjustment was calculated directly from phone survey responses regarding the number of months during the year that the participant indicated the appliance would have been operated if the program had not picked it up. Average part-use factors were calculated across all respondents, separately for refrigerators and freezers.

*Room Air Conditioners.* The deemed savings memo and procedure called for the energy consumption of residential room AC units to be estimated using the following equation:

$$kWh = \text{unit capacity} \times \text{load} \times \text{FLEH} / (\text{efficiency} \times 1000)$$

where

unit capacity [BTU/h] is a nameplate value

load [dimensionless] is assumed to be 1.0 with partial loading accounted for in FLEH

FLEH (full-load equivalent hours) [hours] is basically the compressor run-time if we assume window AC units are generally a two-state device – on or off.

Efficiency [Btu out / Watts in] or EER for equipment of this type

1000 is the conversion factor from Watts to kW

## Ex-Post Net Savings Analysis

The primary objective of the net savings analysis for the Appliance Recycling program is to determine the program's net effect on customers' electricity usage. This requires estimating what would have happened in the absence of the program. Thus, after gross program impacts adjusted for part-use have been assessed, net program impacts are derived by estimating a Net-to-Gross (NTG) ratio which quantifies the percentage of the gross program impacts that can reliably be attributed to the program. A customer self-report method, based on data gathered during participant phone surveys, was used to estimate the NTG ratio for this evaluation. This data was cross-checked against responses from a survey of nonparticipant discarders, that is, those who actually disposed of used units during the past 4 years.

For PY2, the net program impacts were based solely on the estimated level of free-ridership in the program. In this program, free ridership is defined based on the percentage of program participants that would have disposed of their units absent the program in a manner that would have permanently removed the unit from the grid. This includes participants who indicated they would have otherwise:

- Sent the unit to a recycling facility, or
- Taken the unit to a landfill

Participant spillover was not assessed. For this program, because the program approach does not support a theory for how meaningful spillover might occur, and because it does seem unlikely to be significant, we have not estimated spillover.

### 2.1.2 Process Evaluation Methods

The process evaluation consisted of 2 in-depth interviews with the ComEd Appliance Recycling Program Manager, as well as telephone surveys with participants and nonparticipants of the program.

- *Program Staff Interview.* The interview with the Appliance Recycling Program Manager focused on changes and updates regarding the goals of the program, the program implementation, the perceived effectiveness of the program, and also verified evaluation priorities. This year, an interview with the JACO managers was not conducted.
- *Telephone Surveys.* The process evaluation component of the participant telephone survey obtained information on sources of program awareness, program satisfaction, rebate satisfaction, and awareness of program features (e.g., rebates, technical assistance, marketing materials). The process evaluation component of the nonparticipant telephone survey found information on program awareness, program market opportunities, and secondary markets for used refrigerators and freezers.

In the telephone surveys, participants were asked numerous questions about satisfaction using a scale from 0 to 10, with 0 being the most dissatisfied, and 10 being the most satisfied. For the data analysis, the evaluation team grouped the responses into the following groups: 0 to 3 responses are classified as dissatisfied, 4 to 6 are classified as neutral, and 7 to 10 are classified as satisfied.

## 2.2 *Data Sources*

Table 2-2 below summarizes the key data collection activities in support of this evaluation.

**Table 2-2. Data Collection Activities**

Data Collection Type	Targeted Population	Sample Frame	Sample Design	Sample Size	Timing
Tracking Data Analysis	All Program Participants	Tracking Database	-	All	Ongoing
In-depth Phone Interviews	ComEd program manager	Contact from ComEd	AR program manager Sharon Madigan	1	March 16, 2010 and June 15, 2010
CATI Phone Surveys	Program Participants	Tracking Database	Random Sample of AR Program Participants	152 Total – 114 Refrigerator, 38 Freezer, 30 Room AC Recyclers	August 2010
	Nonparticipants	CIS frame	Random Sample. Survey questions used to identify Program Participants	32 Total - 20 acquirers and 20 discarders*	August 2010

\* Note that some respondents were both acquirers and discarders.

Below is a summary of how each of these data sources was used in the specific components of the evaluation study.

- **Impact Evaluation**
  - *Estimation of gross savings/UECs.* All of the required data inputs to the regression equation used to develop final estimates of gross unit energy consumption for refrigerators and freezers were obtained from the program tracking database. The phone survey also obtained several of these same characteristics. However, because they were based on self-reported information, rather than the results of a visual inspection of the units picked up by the program, they were deemed less reliable than the tracking data which was ultimately used for the calculation.
  - *Estimation of the Part-use factor and Net-to-gross ratio.* Self-reported findings from both telephone surveys were the sole data source for both the part-use factor and the net-to-gross ratio. For the Net-to-Gross ratio, the primary data source was the Participant survey, while the Nonparticipant survey data was used to validate the self-reported findings from the Participant survey.

- Process Evaluation
  - The process evaluation relied primarily on two data sources, program staff interviews, and telephone surveys of program participants. Nonparticipant surveys also provided information on the secondary market for used refrigerators and freezers.
  - *Program Staff interviews.* The interview with the Appliance Recycling Program Manager focused on program processes in order to better understand the goals of the program, how the program was implemented, the perceived effectiveness of the program, and also verified evaluation priorities. The interviews with the JACO managers focused on the recycling process and the details of the appliance pickup.
  - *Telephone surveys.* The process evaluation component of the surveys obtained information on sources of program awareness, program satisfaction, rebate satisfaction, and awareness of program features (e.g., rebates, technical assistance, marketing materials).

## 2.3 *Sampling Plan*

*Participant survey.* The sample of Appliance Recycling participants was randomly selected from the Program Tracking Database provided by ComEd. Basic data cleaning steps were undertaken before the sample was pulled from the database so that for example, records with missing or invalid phone numbers were removed. A total of 555 participants recycled more than one of the same type of major appliance and were dropped from the survey effort for ease of survey administration. (To avoid survey fatigue, participants were only asked about one major appliance so respondents could more easily focus on a single appliance in their responses.) In addition, 2,463 participants were dropped because the database did not indicate if a recycled refrigerator was a primary or secondary refrigerator, which was necessary for survey stratum assignment. These records could not be included in the surveying efforts but were included in the final impact results. The final participant population from which the survey sample was drawn was 19,337 participants.

The sample was stratified by appliance type and quotas were set based on the proportion of each appliance in the general population. Each participant was assigned to one of six strata based on the type of unit or units recycled: Primary Refrigerator, Secondary Refrigerator, Primary Refrigerator and AC Unit, Secondary Refrigerator and AC unit, Freezer, and Freezer and AC Unit.<sup>4</sup> Quotas were then set for each stratum. The Room AC strata were oversampled to ensure sufficient data would be available to support the impact and process analysis. Because of

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<sup>4</sup> Participants who recycled both a refrigerator and a freezer were randomly assigned a major appliance for the survey to limit survey fatigue.

the oversampling, weights were then constructed for each stratum that reflect that stratum’s share of the Appliance Recycling program population.

ODC was then instructed to randomly select and dial participants until they had reached the following quotas – 112 Refrigerator Recyclers, 38 Freezer Recyclers, and 30 Room AC Recyclers, for a total of 150 completed surveys. Ultimately, 152 surveys were completed. Table 2-3 shows the population sizes and number of completed surveys for each of the six strata.

**Table 2-3. PY2 Participant Survey Population and Sample Sizes by Stratum**

Strata (Types of Units Recycled)	Population Size* (N)	Completed Surveys (n)
Primary Refrigerator	2,015	14
Secondary Refrigerator	12,522	76
Primary Refrigerator and AC Unit	124	3
Secondary Refrigerator and AC unit	352	21
Freezer	4,194	30
Freezer and AC Unit	130	8
Total	19,377	152

*\*Source: PY2 Appliance Recycling Participant Survey Sample Frame from Program Tracking Database*

*Nonparticipant survey.* The Nonparticipant survey was directed toward a random sample of ComEd residential customers. The starting point for the survey was ComEd’s general database 3.5 million active electric accounts from their 2010 customer information system. The survey then used a series of screening questions to identify residential customers who, within the previous 4 years, had either purchased or obtained a used refrigerator, freezer or room AC (‘acquirers’) or disposed of one (‘discarders’). ODC randomly selected and dialed residential customers in the database until it had satisfied the following quotas – 20 acquirers and 20 discarders. In total, 32 customers were surveyed, representing 20 acquirers and 20 discarders. a Therefore, 8 respondents were both acquirers and discarders.

## 2.4 Sampling Error

Table 2-4 gives population sizes, completed interviews and the associated confidence intervals for each appliance type.

**Table 2-4. PY2 Participant Survey Population, Sample Sizes and Sampling Error by Appliance Type**

Strata	Population Size <sup>1</sup> (N)	Completed Surveys <sup>2</sup> (n)	Sampling Error (90% CI)
Total Refrigerators	15,013	114	7.7%
Primary Refrigerators	2,139	17	19.8%
Secondary Refrigerators	12,874	97	8.3%
Freezers	4,324	38	13.2%
Air Conditioners	482	29	14.8%
Total	19,377	152	6.6%

<sup>1</sup>Source: PY2 Appliance Recycling Participant Survey Sample Frame from Program Tracking Database

<sup>2</sup>This column sums to more than 152 completed surveys because respondents could have recycled more than one appliance type and are included in the analysis of each subgroup.

### 2.4.1 Survey Disposition

Table 2-5 shows the final dispositions for the 744 program participants we attempted to contact for this evaluation. As the table shows, we completed interviews with 152 participants, or 20%. We were unable to reach 31% for a variety of reasons such as no one answering, an answering machine, or a busy signal. Another 32% requested to be called back later to complete the survey but did not end up doing so.<sup>5</sup> There were problems with the phone number, such as a disconnected number, for 12%. Only 1% of participants who answered refused to participate in the survey.

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<sup>5</sup> Often, participants who are not inclined to participate do not outright refuse. Instead they agree to be called back, but when called back, the time is once again inconvenient. These participants are typically called a number of times, but many never complete a survey so that their final disposition is “call back”.

**Table 2-5. Participant Survey Sample Disposition**

Sample Disposition	Customers	%
Participants Attempted to Contact	744	100%
Completes	152	20%
Appliance not picked up	7	1%
Electric company not ComEd	2	0%
Refusal	11	1%
Unable to Reach	227	31%
Language Barrier	13	2%
Phone Number Issue	90	12%
Non-Specific Callback/Appointment Scheduled	235	32%
Mid Interview Terminate	7	1%

*Source: PY2 Appliance Recycling Participant Survey*

As outlined in Table 2-6, interviews were attempted with 168 participants and completed with 152 participants. The remaining 16 did not complete full surveys for several reasons including participants terminated mid-interview (n=7), the participant claimed they signed up for the program but the appliance was never picked up (n=7), or ComEd was not their electric utility (n=2). For these latter two categories, we cannot say if the participant database included some people in error or, as seems more likely, these respondents had recall problems.

**Table 2-6. Participant Survey Contacts Disposition**

Survey Contacts Disposition	Customers	%
Customers Surveyed	168	100%
Completed Interview	152	90%
Appliance not picked up	7	4%
Electric company not ComEd	2	1%
Mid-Interview Terminate	7	4%

*Source: PY2 Appliance Recycling Participant Survey*

## Section 3. Program Level Results

This section presents the results of the impact and process evaluations of the Appliance Recycling program.

### 3.1 Impact Evaluation Results

#### 3.1.1 Verification and Due Diligence

Given modest changes in the program design, this topic was not revisited. Participant survey results continue to indicate that the program tracking database correctly records units recycled. Refer to the year 1 report for more information.

#### 3.1.2 Tracking System Review

The Appliance Recycling tracking data for PY2 contained 25,735 records, one for each appliance that was picked up and recycled. This is consistent with the claimed savings estimate which was also based on this same total of recycled appliances.

#### Distribution by Appliance Type

About 78% of these units were refrigerators, another 19% were freezers, and the remaining 3% were room air conditioners. Table 3-1 below provides the breakdown of recycled units by measure type.

**Table 3-1. Summary of Recycled Units by Appliance Type**

Measure Type	Number of Units	Percent of Units
Refrigerators	20,065	78%
Freezers	4,946	19%
Room Air Conditioners	724	3%
Total Units Recycled	25,735	100%

Table 3-2 below provides a further breakdown of the population stratified by appliance type, of the number of appliances turned in as reported by the tracking data.

**Table 3-2. Appliance Recycling Program: Appliance Type Versus Number Turned In**

Refrigerators	Freezers	Room AC Units	Number of Applications	Number of Participants
		1	1	1
	1		1	4,072
	1	1	2	118
	2		2	72
	2	1	3	6
1			1	17,885
1		1	2	522
1	1		2	562
1	1	1	3	38
2			2	490

From these data, we observe the following patterns in terms of the distribution and count by appliance type:

- There are 23,805 unique participants, and most recycled one unit (17,885 refrigerators, 4,072 freezers).
- Approximately 680 participants (2.9%) recycled 2 major units (defined as a refrigerator and/or freezer), and of these, about 6.4% also recycled a room AC unit.
- For room ACs, the majority of participants had AC units that were picked up at the same time as a refrigerator or freezer, in accordance with program procedures.

In terms of anomalies, we found one type, which did not result in any adjustment to the tracking data:

- There was 1 participant who recycled only a room AC, which the program managers had indicated would not be allowed.

**Problems Found**

Our review of the tracking data provided to the evaluation team also uncovered some relatively minor problems, most notably that there were:

- Incomplete records for a number of tracked fields. Most fields were well-populated, and particularly the most important fields for evaluation (appliance brand, model number, size, age/year manufactured, defrost type, location at the time of pick up). However, some of the tracked fields continued to be sparsely populated in PY2, or the entry was designated ‘unknown’ or ‘N/A’. These included:
- Information on Room AC model number. In a significant number of cases, the model number was listed as N/A or ‘unknown’ (typically nameplate was missing, per JACO). This made it impossible to develop independent savings estimates based on an engineering algorithm for all units collected by the program.

Although we were able to complete the evaluation without these incomplete data, it would be better if they could be more fully populated in the future. We will document our concerns in a memo to ComEd and JACO and will work closely with JACO over the next few months to ensure these fields are correct, and are being populated. Data exported for the evaluation team should also be checked for anomalies.

### 3.1.3 Gross Program Impact Parameter Estimates

#### Refrigerators and Freezers

##### Annualized Unit Energy Consumption (UECs)

As detailed in Section 1, regression based Unit Energy Consumption (UEC) estimates were made for both refrigerators and freezers. The regression equation estimates usage as a function of unit characteristics (age, size, configuration, and defrost mode). All of the required data inputs to this equation were obtained from the program tracking data.

Applying the regression coefficients to the full population of units collected through the program during PY2 and their associated characteristics yielded the following UECs for each type of appliance (Table 3-3).

**Table 3-3. Estimated UECs**

Annualized UECs	Refrigerators	Freezers
kWh	2,021	1,928

Both age (in years) and size (in cubic feet) are key explanatory variables that drive these estimates. In general, the older a unit is, the larger it is and the more electricity it uses. This is the case for 2 reasons:

1. - Because of a change in standards in 1993, units built since that time are much more energy efficient and generally smaller than units made prior to the standards change.

2. - There is degradation of a unit’s efficiency over time, as the unit ages.

Because this is a fairly new program, the appliances collected during PY2 have been primarily older and larger units than those collected via a more established program (as in California). Table 3-4 and Table 3-5 below provide the age and size characteristics of the units collected in PY2 through ComEd’s program.

**Table 3-4. Age Characteristics of Recycled Appliances**

Appliance Type	Age in Years								
	0 to 5	6 to 10	11 to 15	16 to 20	21 to 25	26 to 30	31 to 35	36 to 40	Over 40
Refrigerators	1%	6%	13%	22%	22%	16%	8%	3%	9%
Freezers	0%	2%	4%	9%	18%	22%	17%	9%	18%
Room Air Conditioners	0%	1%	3%	8%	24%	54%	2%	1%	6%

**Table 3-5. Size Characteristics of Recycled Appliances**

Appliance Type	10 cubic feet and smaller	11 to 15 cubic feet	16 to 20 cubic feet	21 cubic feet and larger
Refrigerators	6%	19%	45%	30%
Freezers	15%	37%	40%	8%

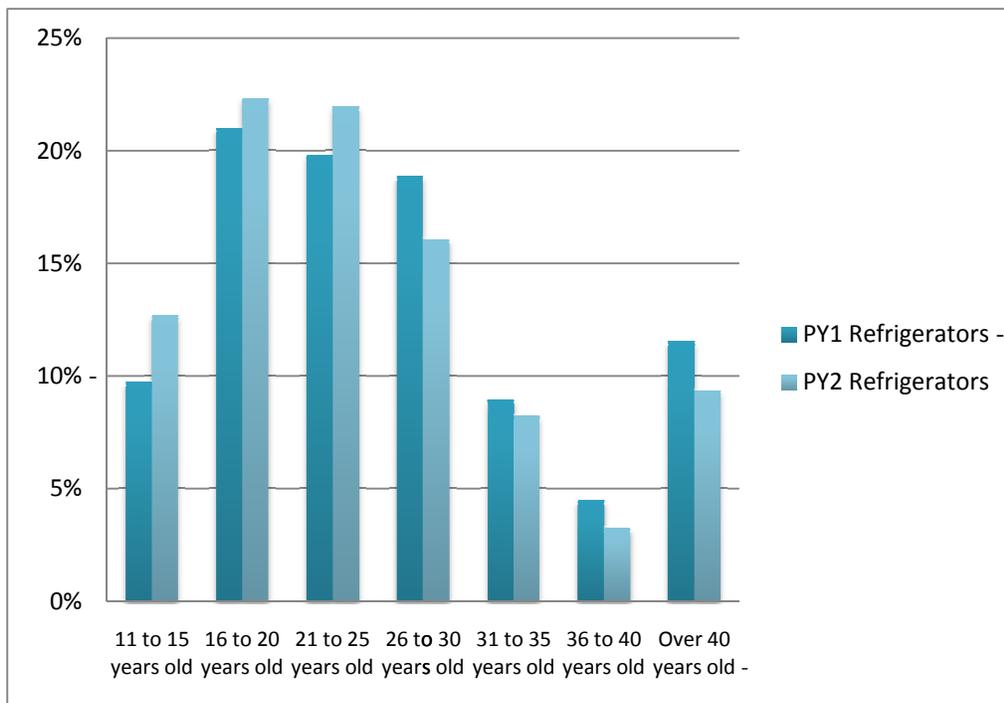
From these data, the following observations can be made:

- Age
  - Fully 59% of refrigerators and 84% of freezers are over 20 years old
  - Approximately 40% of refrigerators and freezers are between 21 and 30 years old
  - One-fifth of refrigerators (21%) and 44% of freezers are over 30 years old
  - The following percentages of appliances collected by the program were made before the 1993 standards change: 69% of refrigerators and 90% of freezers

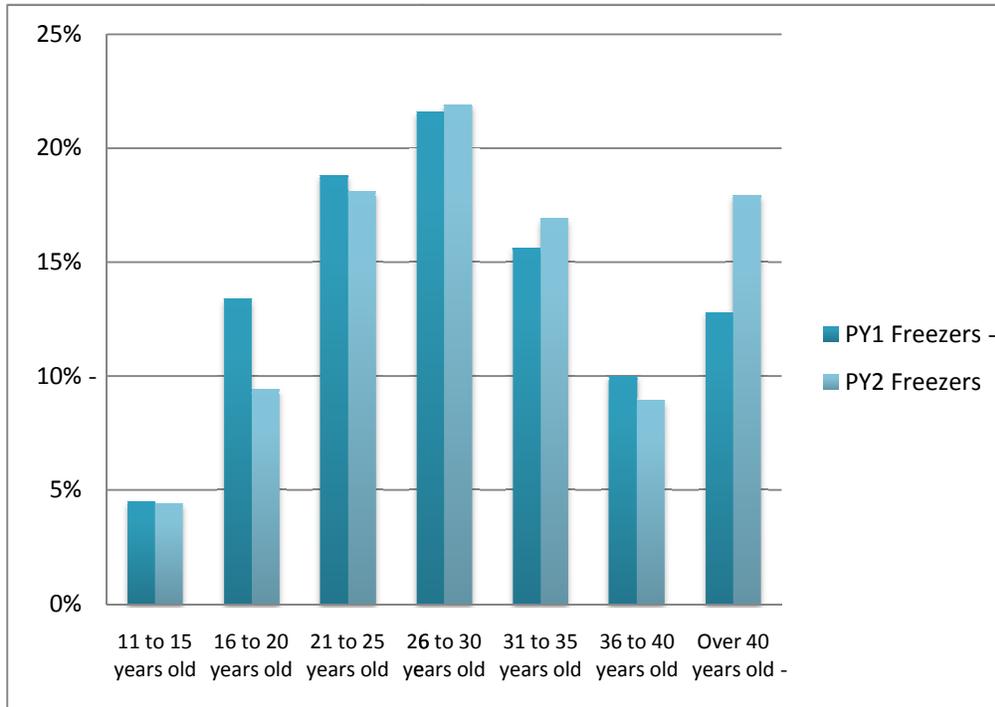
- Size
  - The majority of units collected are 16 cubic feet and larger, one third of refrigerators are larger than 20 cubic feet
  - Recycled refrigerators tend to be larger on average than recycled freezers
  - The size distribution of freezers collected by the program is more diverse than refrigerators. The most common freezer sizes are between 11 and 20 cubic feet, while those for refrigerators range from 11 cubic feet to over 20 cubic feet.

Since the age of recycled units is a major driver of unit energy consumption, we also looked at the trend in the age distribution of units collected through the program in PY1 and PY2. Table 3-6 provides a comparison of the age distribution of recycled refrigerators, while Table 3-7 has similar information for recycled freezers.

**Table 3-6. Comparison of Age Distribution of Recycled Refrigerators**



**Table 3-7. Comparison of Age Distribution of Recycled Freezers**



With respect to refrigerators, the PY2 program has picked up a lower proportion of older units (particularly those over 25 years old) than in PY1. However, the trend is the opposite for freezers. It may be that there is still a substantial ‘inventory’ of older units of both measure types available to the program for at least the short-term. However, over the longer term, one would expect the program to be picking up younger units as it matures, thereby decreasing unit energy savings.

**Part use factors.** The part-use factors account for the fact that a unit that would have stayed in use would have been in use only part of the time. For example, the savings due to removal of a unit that would have been used only three months of the year is only one-quarter (3/12) the savings associated with full-year use (assuming essentially constant use over the year for a full-use unit). The part-use factor is used to adjust gross savings UECs to yield estimates of annualized gross savings that can be attributed to the program. The part-use factors are taken from the results of the telephone survey of participants.

**Refrigerators.** The assumption is that any refrigerator that would otherwise have been kept in use would have been used as a secondary, not as a primary refrigerator. Therefore, the part-use for all primary refrigerators that would otherwise have been kept is set at the average part-use reported by participants who disposed of a secondary refrigerator. This part-use was the number of months, divided by 12, that the participant reported the unit would have been plugged in and running had the program not picked it up. This average was determined to be

87% or 0.87. The program ex-ante gross impact estimate was based on an assumption that the part-use factor for refrigerators was 73%.

**Freezers.** For freezers, the average part-use is based on a similar question for all participants who disposed of a freezer. This average was determined to be 89% or 0.89. The supplemental data collected in the survey provide no further insight into the part-year usage, nor do the tracking data. The program ex-ante gross impact estimate was based on an assumption that the part-use factor for freezers was 73%.

Table 3-8 below reports the distribution of unit usage by appliance type and frequency of use for both refrigerators and freezers. The vast majority of participants claim they would have used the unit ‘always’ if the program had not picked it up.

**Table 3-8. Frequency of Usage in the Absence of the Program**

Appliance Type	Never	1 to 3 months	4 to 6 months	7 to 9 months	10 to 12 months	Always	N
Refrigerators	6%	3%	6%	1%	0%	85%	109
Freezers	7%	4%	4%	4%	0%	81%	27

### Gross Savings (UEC) Impacts Adjusted for Part-Use

The next step is to develop gross savings estimates for each type of appliance adjusted for part use. The application of the part-use factor reduces refrigerator savings/unit to 1,757 kWh per year, and freezer savings/unit to 1,715 kWh/year. These estimates are provided in Table 3-9 below.

**Table 3-9. Gross Savings (UECs) Adjusted for Part Use**

Appliance Type	Gross Savings (UECs)	Part Use Factor	Adjusted Gross Savings (kWh/unit)
Refrigerators	2,021	87%	1,757
Freezers	1,928	89%	1,715

### Room Air Conditioners

The deemed savings memo called for the energy consumption of residential room AC units to be estimated using an engineering algorithm. However, upon reviewing the program tracking data, it was discovered that only a small portion of the required data continues to be tracked.

Although more data are included in the tracking database than in PY1, there still was insufficient data to do the calculation. However, the savings contribution of this measure to the program is extremely small – it accounts for only 0.1% of program savings. Therefore, we have elected to accept ComEd’s ex-ante gross savings estimates.

### 3.1.4 Gross Program Impact Results

Table 3-10 below provides the second-year evaluation-adjusted gross kWh savings estimates for each measure. The resulting verified total program gross savings quantity is 43,788 MWh. This value includes the application of the part-use factor. The ex-ante gross savings claimed by the program is 36,671 MWh<sup>6</sup>. Gross savings per unit (without adjustment for the part-use factor) are identical for the ex-ante and ex-post program-verified savings estimates, since ComEd used the same approach to calculate ex-ante gross savings per unit as was used in this evaluation. Key differences are with respect to the part-use factor. In its ex-ante estimates, ComEd has assumed a part-use factor (labeled as a realization rate in their table) of 0.73, while the program verified part-use factors are 0.87 for refrigerators and 0.89 for freezers, respectively.

**Table 3-10. PY2 Gross Impact Parameter and Savings Estimates (MWh)**

Gross and Net Impact Parameter and Savings Estimates	Refrigerators	Freezers	Room AC	Total Program
Total units recycled through the Program	20,065	4,946	724	25,735
Verified Annual kWh Savings Impacts				
- Verified annual Gross kWh savings per unit (full-load operating hours)	2,021	1,928		---
- Part-Use Factor	87%	89%		---
- Verified annual Gross kWh savings per unit adjusted for part-use	1,757	1,715	80	--
<b>Verified Program Gross MWh</b>	<b>35,248</b>	<b>8,482</b>	<b>58</b>	<b>43,788</b>

Table 3-11 below provides the second-year evaluation-adjusted gross kW savings estimates for each measure. For year 2, the kW saved by the program are based on ComEd’s ex-ante planning estimates for per-unit kW savings for Refrigerators, Freezers and Room AC units.

<sup>6</sup> As reported in *PY2 Ex Ante & Plan Summary.xls* provided by ComEd.

**Table 3-11. PY2 Gross and Net Impact Parameter and Savings Estimates (kW)**

Gross and Net Impact Parameter and Savings Estimates	Refrigerators	Freezers	Room AC	Total Program
Total units recycled through the Program	20,065	4,946	724	25,735
<b>Verified Annual kW Savings Impacts</b>				
Annual Gross kW savings per unit (full-load operating hours)	0.30	0.26	0.04	---
Program Gross kW	6,020	1,286	29	7,334
Net-to-Gross Ratio (1-Free Rider %)	0.73	0.82	0.72	
<b>Total PY2 Net kW Savings</b>	<b>4,383</b>	<b>1,049</b>	<b>21</b>	<b>5,453</b>

### 3.1.5 Net Program Impact Parameter Estimates

Once gross program impacts have been estimated, net program impacts are calculated by multiplying the gross impact estimate by the Program Net-to-Gross (NTG) ratio. The NTG ratio is equal to 1 minus the percentage of free riders plus spillover. For this program because the program approach does not support a theory for how meaningful spillover might occur, and because it does seem unlikely to be significant, we have not estimated spillover.

In this program, free ridership is defined based on the percentage of program participants that would have disposed of their units absent the program in a manner that would have permanently removed the unit from the grid. This includes participants who indicated they would have otherwise:

- Sent the unit to a recycling facility, or
- Taken the unit to a landfill

In total, 31 out of 114 refrigerator respondents (27%), 7 of 38 freezer respondents (18%), and 8 out of 30 room AC respondents (28%) revealed they would have used a method to dispose of their unit that would have permanently destroyed it, indicating they are free riders. Resulting NTG ratios are 0.73 for refrigerators, 0.82 for freezers, and 0.72 for room air conditioners. The refrigerator NTG improved from 0.70 in PY1 and the freezer NTG was largely unchanged from 0.83. For its ex-ante planning estimates, ComEd has used an average figure of 0.73 across all 3 measures based on the results of the PY1 evaluation.

### 3.1.6 Net Program Impact Results

Table 3-12 below provides the program-level evaluation-adjusted net impact results for the PY2 Residential Appliance Recycling program. As this figure shows, the ex post program-level

second-year net energy saving estimate resulting from this evaluation is 32,624 MWh, exceeding program claimed estimates by over 6,600 MWh, and resulting in a net realization rate of 125%. The difference between the ex-ante net savings and ex-post net savings is primarily due to differences in the part-use factors applied. Program verified part-use factors were 87% for refrigerators, and 89% for freezers, while the ex-ante assumption was 73% for both measures. The net-to-gross ratios for both the ex-post and ex-ante estimates were very similar.

**Table 3-12. PY2 Net Impact Parameter and Savings Estimates**

Gross and Net Impact Parameter and Savings Estimates	Refrigerators	Freezers	Room AC	Total Program
Verified Program Gross MWh	35,248	8,482	58	43,788
Net-to-Gross Ratio (1-Free Rider %)	0.73	0.82	0.72	
<b>Total Second-Year Evaluation-Adjusted Net MWh Savings</b>	<b>25,663</b>	<b>6,919</b>	<b>42</b>	<b>32,624</b>
Net MWh Savings Claimed by the Program				25,997
<b>Net Realization Rate</b>				<b>125%</b>

### 3.1.7 Nonparticipant Survey Results

This section presents selected impact-related findings from the Nonparticipant survey. This survey serves two purposes. It provides: (1) general information on the secondary market for used refrigerators and freezers, and (2) information to help explain the program’s net-to-gross ratio.

Findings are presented for two distinct subgroups:

- Acquirers – those that acquired a used refrigerator or freezer during the past 4 years
- Discarders – those that disposed of a used refrigerator or freezer during the past 4 years

In total, 32 surveys were completed, 20 with Acquirers and 20 with Discarders. The majority of respondents had both discarded and acquired units.

### Impact and Market Findings

#### Acquirers

Acquirers were asked a series of questions regarding the characteristics of the used refrigerator or freezer they had obtained during the past 4 years. First, they were asked about the type of

appliance they had acquired, whether the unit was new or used, and if it was operated as a primary or secondary unit. As shown in Table 3-13, the vast majority of acquirers obtained a refrigerator (85%) and most of these (also 85%) are new units. Only about 19% of respondents obtained a freezer, and all are new units. (Some respondents obtained both refrigerators and freezers in the past 4 years; thus, the total exceeds 100%.)

**Table 3-13. Types of Units Obtained by Acquirers**

Appliance Type	Percentage of Households that Obtained in Past 4 Years (N 32)	
	New Unit	Used Unit
Refrigerator (Any)	72%	13%
- Refrigerator (Main)	66%	9%
- Refrigerator (2nd)	9%	3%
Freezer (Any)	19%	0%
- Freezer (Main)	16%	0%
- Freezer (2nd)	3%	0%

Next, acquirers were asked about the condition, age, and nature of use of the used unit they had obtained. Table 3-14 below reports these findings. Note that the number of respondents is very small, and the findings are for Refrigerator acquirers only. All of the acquired units were working, and were newer models (i.e., less than 4 years old) when they were obtained. In addition, units are evenly split between Primary (Main) and Secondary (Spare) units. Finally, all units are operating year-round.

**Table 3-14. Characteristics of Acquired Unit**

Characteristics of Acquired Used Unit	Percent of Respondents
	Refrigerators (N 4)
Condition when Acquired	
- Working	100%
Age	
- Less than 4 years old	100%
Main vs. Spare	
- Main	50%
- Spare	50%
Total months used in past 12 months	
- 12 months	100%

**Discarders**

All respondents were asked if they had disposed of a unit during the past 4 years, and roughly one-third of those interviewed had done so. Those who had, the “Discarders”, were asked a series of questions regarding the characteristics of the used refrigerator or freezer they had disposed of during the past 4 years. The majority of the discarded units (81%) were refrigerators. These findings are reported in Table 3-15 below. Characteristics of the discarded units are shown in Table 3-16. Note the very small number of respondents for Freezer discarders.

**Table 3-15. Incidence of Disposal of Used Units**

Appliance Type	Percentage of Households that Discarded Unit in Past 4 Years
Refrigerator	28%
Freezer	6%

With respect to Refrigerator discarders, the units:

- Were replaced with another unit (89% of respondents)
- Were working when they were disposed of (67%)
- Reflected a wide range of age categories

- Were split between Primary (Main) and Secondary (Spare) usage

**Table 3-16. Characteristics of Discarded Units**

Characteristics of Discarded Units	Percent of Respondents	
	Refrigerators (N 9)	Freezers (N 2)
Replaced with another Unit	89%	50%
Condition when Discarded		
- Working	67%	50%
- Working but needed repair	33%	50%
- Not working	0%	0%
Age		
- 0 to 10 years	22%	0%
- 10 to 20 years	22%	50%
- Over 20 years	11%	0%
- Don't know	44%	50%
Main vs. Spare Unit		
- Main	44%	N/A
- Spare	44%	N/A
- Other	11%	N/A

Finally, limited information was obtained on the cost of disposal. Only one Refrigerator disposer responded to this question, and they indicated there was no disposal cost.

### **3.2 Process Evaluation Results**

The process evaluation component of the Residential Appliance Recycling evaluation focused on appliance usage data and satisfaction with program processes, including sign up, pickup and receipt of the refund check. Key data sources for the process evaluation include the Participant telephone survey, the Nonparticipant telephone survey, and the in-depth interview with the ComEd Program Manager.

## 3.2.1 Process Themes

As indicated above, because of the way samples were drawn, participant survey results have been weighted, and nonparticipant survey results have not.

### Changes to Program

ComEd has a retailer partnership with ABT Electronics, a local appliance retailer. In Program Year 1 (PY1), this channel accounted for only 1% of units that were recycled through the program, but increased to 10% in PY2 (2,511 units).

In PY2, the program nearly tripled its PY1 energy savings goals (23,628 Net MWh in PY2 vs. 8,159 Net MWh in PY1). Consequently, the program increased its marketing and promotion activities. In PY2, ComEd increased the frequency of bill insert mailings to six times per year (versus 4 in PY1), ran more newspaper advertisements, continued with newsletter advertisements, placed coupons in a coupon magazine (Clipper), added radio advertisements, and posted advertisements on Craigslist.org. Furthermore, ComEd also ran a direct mail pilot using a profiling database to target customers who had a demographic profile similar to those who had already participated in the program.

### Overall Program Satisfaction

Table 3-17 below presents findings related to participant satisfaction with various elements of the program. In general, participants are highly satisfied with the program. Overall, on a 0 to 10 satisfaction scale, 94% of respondents were satisfied with their experiences with the Appliance Recycling Program. A negligible share, 1% indicated some level of dissatisfaction.

The convenience of the home pick-up is the main selling point of the program for participants. Next most important is the environmental benefits of participation. Third is the \$25 incentive. These three factors are the most-liked elements of the program.

When asked if they would recommend the program to friends and family, 98% of respondents say they would recommend it, and 69% say they have already.

**Table 3-17. Aspects of Appliance Recycling Program Customers Liked**

What people liked about the program (Multiple Response)	Total (n 149)*
Did not have to remove appliance by myself	54%
Recycling of the appliance/environmental component	23%
\$25 incentive payment	21%
Short wait time between sign up and pick up of appliance	14%
Pick-up team did a nice job	8%
The service was free	5%
Other	5%
<i>Don't know/Refused</i>	6%

*Source: PY2 Appliance Recycling Participant Survey (weighted results)*

*\*Three respondents from the sample were not asked this question because they expressed some level of dissatisfaction with the program overall.*

Overall satisfaction with ComEd is also high: 79% say they are satisfied, 18% remain neutral, and only 3% report some level of dissatisfaction. About half of those who are dissatisfied indicate it is due to perceived frequency of power outages, and the other half indicate it was due to high energy costs. Participation in the program also has a positive effect on satisfaction with ComEd. When asked if participating in the program has made them feel more favorable, less favorable, or no different about ComEd, nearly half (48%) of respondents indicate that they have a more favorable view of ComEd, while the remainder feel no differently about ComEd based on their experiences with the program. The survey did not ask why participants why they felt this way.

Only a minority of participants have noticed a reduction in their energy bill since their appliance was removed by the program. Over half (57%) of respondents have not seen a reduction in their energy bill since their appliance was removed, while 30% have noticed a decrease. Another 13% are unsure if they have seen a decrease. These findings may indicate that people are not that attentive to changes in their electric bill.

### **Drivers of Participation**

Convenience is the most important reason participants used the program PY2 (43%). Among program participants, many who recycled refrigerators (75%) and freezers (67%) were already considering discarding their appliance when they first heard of the program. However, when asked if they would have kept their appliance or gotten rid of it if the ComEd Appliance Recycling Program did not exist, roughly one-third (31% refrigerators, 33% freezers) of respondents report that they would have kept the appliance if the program did not exist. This

means that the majority of participants who recycled an appliance through the program still would have gotten rid of their appliance in another manner if the program did not exist.

All of these findings seem to signify that convenience plays a large part in customers' choices related to discarding their appliances.

## **Barriers to Participation**

The nonparticipant survey includes ComEd customers who would have been candidates for the program because they recently acquired an appliance or disposed of one (but did not participate). More than one-half (63%) of the nonparticipants surveyed have heard about the ComEd Appliance Recycling Program. When asked why they did not participate, it became clear that some could not participate because the program did not exist when they disposed of their appliance (59%). Others only learned of the program after they had already gotten rid of their appliance through other means (24%). Unfortunately, the small sample size of the nonparticipant survey does not allow for more detailed analysis of barriers to participation.

All nonparticipants were asked if there are any changes that could be made to the program that would make them more likely to participate in the future. The vast majority (72%) are unable to offer suggestions. A small number of nonparticipants suggest increasing the incentive amount (6%), setting an exact pickup time (3%), and adding other appliances to the program (3%).

There is one key finding from the participant survey that informs the barriers to participation as well: frequency of appliance usage does not necessarily represent a barrier to participation. Nearly all participants who recycled a spare refrigerator used it at least part of the year (97%) and three-quarters had used it all the time. Nearly all of those who recycled a freezer also used it at least part of the year (96%) with most having used it all the time (83%). This could indicate that it may not be difficult to convince those with a secondary refrigerator to discard it.

## **Marketing and Promotion Strategy**

ComEd increased both the frequency and scope of the program marketing campaign in PY2. In PY2, ComEd increased the frequency of bill insert mailings from four to six times per year, ran more newspaper advertisements, continued with newsletter advertisements, placed coupons in a coupon magazine (Clipper), added radio advertisements, and posted advertisements on Craigslist.org.

ComEd also ran a direct mail pilot using a profiling database to target customers who had a demographic profile similar to those who had already participated in the program. Past program participants were found to have somewhat high education and income levels and are considered "empty-nesters" in specific communities. The direct mail was targeted at individuals who fit this profile. The response rate for the direct mail campaign was estimated at 1.2%. The Program Manager considers this response rate to be low; however, the Evaluation

Team's experience with direct mail indicates that this response is not low in comparison with results of other direct mail campaigns. ComEd should consider conducting further research to examine the cost-effectiveness of direct mail in comparison to other Appliance Recycling Program marketing methods.

A content review of the marketing materials shows the messages to be clear, actionable and consistent. Print advertisements and bill inserts are in full color, and with very clear language about the intent of the program (picking up old refrigerators with no cost to the customer) and prominently display the amount of the incentive (\$25). The advertisements clearly show how to schedule the appointments and also provide various explanations about why someone should get rid of a secondary refrigerator. Some materials point out that older units can cost \$150 a year to run. In the depth interview, the Program Manager reported that the results of a survey that is left with participants shows that the free pickup and the \$150 savings are the two most important reasons why ComEd customers chose to participate. As discussed previously, the program convenience and the incentive amount are the two most popular reasons customers chose to participate. Given the success of the \$150 savings campaign, ComEd may want to increase the frequency of this message. It may also want to highlight in its messages the program convenience and the incentive amount that have proved to be popular with participants.

The program had expected to gain some additional participants from the one-day ARRA<sup>7</sup> rebate that offered an additional \$75 to recycle an old unit in conjunction with purchasing a new ENERGY STAR unit. However, in Illinois the promotion ended up lasting for less time than expected and only brought in about 1,000 units for the program.

When asked unprompted where they had heard of the program, nearly three in four participants (74%) recall seeing the program mentioned in a bill insert with most (71%) saying that was where they first learned of the program, as shown in Table 3-18. Furthermore, when asked if they learned of the program through bill inserts, nearly half (48%) of those who had not mentioned bill inserts recall seeing the program in a bill insert. Other unprompted sources where participants have heard of the program include word of mouth, advertising in the newspaper, TV, radio, the internet and the ComEd Energy at Home Newsletter.

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<sup>7</sup> American Recovery and Reinvestment Act (ARRA); in 2009 this rebate for ENERGY STAR appliances was set at 15% in Illinois. The rebate was unexpectedly capped at \$400 and instead of lasting one week, it lasted 11 hours.

**Table 3-18. Where Participants Have Heard of the Appliance Recycling Program**

Source	First heard of program	Additional sources*	Total
	Percent of Respondents (n 152)		
Bill Insert	71%	3%	74%
Word of Mouth	8%	9%	17%
Newspaper	3%	4%	7%
TV/NEWS	5%	11%	16%
Radio	4%	9%	13%
ComEd Energy at Home Newsletter	2%	2%	4%
Internet	3%	3%	6%
Other	4%	1%	5%
Don't know/No other sources	1%	61%	--

Source: PY2 Appliance Recycling Participant Survey (weighted results)

\*Multiple responses

As reported earlier, the majority (63%) of nonparticipants have heard of ComEd's Appliance Recycling Program. Most (70%) learned of the program through bill inserts while 20% said they heard about it from the radio, and another 10% through word of mouth. Bill inserts are the most common method for hearing about the program.

Based on a call with ComEd program staff,<sup>8</sup> in PY3 the program plans to offer limited-time increased incentive coupons, e.g., \$35 or \$50 instead of \$25, to 200,000 selected customers. Additionally in PY3, ComEd plans to heavily promote its recycling program in conjunction with the ARRA rebate. Also, in PY3, ComEd will increase coordination with appliance retailers like Sears and Best Buy in addition to the existing relationship with ABT Electronics.

In its marketing efforts, the program also promotes the energy and environmental benefits of recycling an older appliance. Over three-fourths (82%) of respondents say they learned that older refrigerators and freezers are less efficient and use more energy than newer ones. Roughly the same percentage (81%) say that they learned that the coolant in the unit would be safely removed and that material that makes up the appliance would be reused.

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<sup>8</sup> Conference call between ComEd Program Staff members and evaluation team regarding PY3 program changes on September 1, 2010.

## Market Channels and Opportunities

Through the nonparticipant survey, we explored market opportunities and secondary markets for acquisition and discarding of appliances. A better understanding of how people are obtaining and disposing of their appliances lends itself to an informed program strategy.

### Acquirers

Twenty acquirers were interviewed. Of the 20 acquirers, nineteen acquired refrigerators. Because we were only interested in learning about recently acquired used appliances, we only inquired further of those who had acquired used refrigerators and freezers. A total of nine individuals acquired a used refrigerator; only five of these were confirmed as acquired recently (after August 1, 2006).

Thirteen individuals had reported recently acquiring freezers. Two of these individuals had reported acquiring used units; however, neither acquired the unit in the last four years. Therefore, we did not inquire further about the used freezers that were acquired.

Of the 5 individuals who recently acquired a used refrigerator, one individual purchased his or her refrigerator from a used appliance dealer, 2 people received the unit from an occupant who left it behind, one individual received it from a friend or relative, and one person bought it from Sears.

Two of the five used refrigerator acquirers obtained units to replace their secondary refrigerator. Two others received the units when they moved in, and the other person got the unit to provide more capacity in the form of a second unit.

### Discarders

Among the 20 discarders of an appliance, nine of the 20 discarders indicated that they discarded a working refrigerator, while another 2 discarded a working freezer. The remaining 9 out of 20 discarders discarded non-working appliances (the survey does not confirm if these are freezers or refrigerators). The nonparticipant survey inquired about secondary markets used by discarders to better understand channels that are competing with the Appliance Recycling Program. Of the nine working refrigerator discarders, four individuals had their working refrigerators removed by the dealer who dropped off a new unit. One had given it away, one hired someone to take it away (but did not know to where), and one left it outside for garbage removal. Only two respondents had discarded working freezers. One person took the unit to a recycling center, and the other gave the unit away to someone he or she knew.

Additionally, we asked *acquirers* who had acquired a refrigerator as a replacement (n=2) what they had done with the unit they had replaced, and both indicate that they discarded the unit instead of continuing to use it as a secondary unit.

In addition, all nonparticipants (n=32) were asked how likely they would be to utilize the program to discard a room AC unit. Six out of 32 of respondents (19%) are somewhat likely to discard a room AC unit through the Appliance Recycling Program, and 13 out of 32 (41%) are very likely. Eleven individuals (34%) indicate they are not at all likely to have done so.

The information in this section provides useful information about market opportunities and characteristics, that can potentially be used by the program to identify ways to increase participation. However, because the sample sizes are so small, this limits the usefulness of the information.

### **Incentive Level and Budget Allocation**

In PY2, participants continued to receive \$25 for each unit that was picked up for up to two units. The \$25 incentive was a strong motivation to participate, since over half of those surveyed (54%) say the incentive was one reason why they had decided to do so. Roughly one third (32%) say it was the main reason they chose to participate in the program. On a satisfaction scale of 0 to 10, where 10 is very satisfied, 79% are satisfied (a rating of 7-10), and 6% are dissatisfied (a ranking of 0-3) with the size of the payment they received. Additionally, only 6% of nonparticipants claim that increasing the incentive level would make them more likely to participate in the future.

ComEd's program staff members perform a review of incentive amounts at the end of each 12 month program cycle. Incentive amounts are slightly less than other Appliance Recycling Programs offered elsewhere. For instance, PG&E and DTE<sup>9</sup> both provide higher incentive amounts for participants. PG&E provides \$35 for refrigerators and freezers, but \$25 for AC units. DTE provides \$40 for refrigerators and freezers. However, based on current high customer satisfaction with incentive levels, this may indicate that more financial resources should go to marketing rather than increasing incentive levels.

### **Participation in the Program**

Participants were asked, unprompted, why they chose the ComEd Appliance Recycling Program to dispose of their appliance instead of some other disposal method. The convenience of the home pick-up is the main selling point of the program for more participants than any other reason (43%). An additional 12% say the home pick-up was a secondary reason. The \$25 cash incentive is also a factor, but it plays more of a secondary role (with 32% saying it was the

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<sup>9</sup> Visits to Pacific Gas & Electric (PG&E) and Detroit Edison (DTE) Appliance Recycling Program websites show higher incentive levels for the two other programs than for ComEd. PG&E was chosen based on its broad range of programs and strong market penetration, and DTE was chosen based on its geographic proximity to ComEd territory.

main reason and an additional 22% a secondary reason). The third most important motivator is the environmental benefits of the program (13% main reason, 11% secondary reason). Others report they were prompted simply because they did not have to pay for the pick-up (4% main reason, 10% secondary reason).

**Table 3-19. Reasons Why Customers Chose the Appliance Recycling Program**

Reason	Main Reason	Additional Reasons (Multiple Response)	Total
	Percent of Respondents (n 152)		
Convenience of home pickup	43%	12%	55%
\$25 Cash Incentive	32%	22%	54%
Recycling/environmentally friendly	13%	11%	24%
Pick up was free	4%	10%	14%
Other	7%	6%	13%
<i>Don't know /no other reasons</i>	1%	45%	--

Source: PY2 Appliance Recycling Participant Survey (weighted results)

### Participant Sign-Up for Program

Participants had a few different options to sign up for the program. They could have called ComEd to set up an appointment, they could have gone through the ComEd website, or they could have signed up at an ABT Retailer. The most popular method is telephone sign-up (69% of respondents), followed by the ComEd website (27%). The rest did not recall how they signed up (3%) or did so through ABT Electronics (<1%).

Customer satisfaction with the sign-up process is very high, with 95% of respondents reporting that they are satisfied (rating of 7-10). Moreover, 84% provide ratings of 9 and 10. Almost all participants who signed up via the phone report that the representative was polite and courteous (97%), the representative had answered all of their questions about the program (96%), and that they only needed to call once to successfully sign up for the program (95%). Participants who signed up on-line report that the sign up screen was easy to find (93%), the website answered all of their questions (96%), and that they received confirmation that the sign up had been successful (100%).

ComEd strives to ensure that customers are able to schedule an appointment within 7 to 10 days of the initial contact, unless the customer requests otherwise. The implementation plan stipulates that 90% of customers will not have to wait for more than 14 days to have their

appliance picked up. Sixteen percent of respondents recall waiting three or more weeks for pickup after scheduling, and only 74% confirm that it took two weeks or less (11% are unable to recall how long it took). However, customers are permitted to schedule more than 14 days from the initial contact. Moreover, all participants are generally quite satisfied with the amount of time between scheduling the appointment and the date of pickup—92% are satisfied; and 77% rate it as a 9 or 10. Most importantly, virtually all (99% of respondents) say they were able to schedule a pick-up date that was convenient for them. With planned program growth in PY3, additional crews and trucks will be added to facilitate more timely pickups.

**Table 3-20. Time between Making Appointment and Pick-Up of Appliance**

Amount of Time	Total (n 130)
Less than 1 week	25%
1 week	27%
2 weeks	22%
3 or more weeks	16%
<i>Don't Know</i>	11%

*Source: PY2 Appliance Recycling Participant Survey (weighted results)*

### **Appliance Collection Process**

JACO Collection crews are instructed to call customers two days ahead to confirm appointments and remind customers that the appliances are supposed to be plugged in, defrosted and cleaned out. A second reminder call is to be delivered 30 minutes before the scheduled appointment to serve as a final confirmation and to also give customers an update if the time has changed due to traffic or weather conditions. JACO seems to be meeting this goal, as 90% of respondents are certain that they received a call in advance to confirm the appointment. Additionally, employees arrived on time for the pickup with 94% of respondents reporting that the collection crew arrived on time. Overall, 96% of respondents are satisfied with the collection team who came to pick up the appliance; 84% rate them a 9-10. None reported being dissatisfied.

### **Payment Process**

The implementation plan stipulates that most incentive checks should be issued within 14 days of the actual pickup, with the customer receiving the check within four weeks after the pickup. The survey results indicate that JACO is meeting this goal in the vast majority of cases. Only 6% of respondents recalled receiving payment more than four weeks after the appliance pickup. Slightly less than three quarters of respondents (72%) were satisfied with the timeline of

receiving the check, while 3% are dissatisfied. Two people are dissatisfied because they feel it took too long to receive the check.

**Table 3-21. Time between Appointment and Receipt of Incentive Check**

Amount of Time	Total (n 152)
1 week or less	13%
2 weeks	31%
3 weeks	16%
4 weeks	20%
5 weeks or more	6%
<i>Don't know/Refused</i>	21%

*Source: PY2 Appliance Recycling Participant Survey (weighted results)*

### **Additional Energy Efficiency Actions**

The program has also had an influence on additional behavior(s) toward saving energy. Many (71%) of those surveyed say that based on the participation in the program they have taken additional actions to save energy at their home. Of the 71% of participants who have taken additional actions, the most common changes are the installation of CFLs (39%), energy efficient appliances (26%), and new energy efficient windows (20%). Other actions include turning off lights when not using them (14%), improving insulation (12%) and reducing the running time of appliances unplugging appliances when not in use (11%).

A small minority (5%) have participated in other ComEd energy efficiency programs, namely the Central Air Conditioning Cycling or Central AC Efficiency and ENERGY STAR® Lighting programs. They heard about these additional programs primarily through bill inserts.

#### **3.2.2 Program Theory**

Given modest changes in the program design, this topic was not revisited. Please refer to the PY1 report.

### **3.3 Cost Effectiveness Review**

This section addresses the cost effectiveness of the Residential Appliance Recycling program. Cost effectiveness is assessed through the use of the Total Resource Cost (TRC) test. The TRC test is defined in the Illinois Power Agency Act SB1592 as follows:

*“ ‘Total resource cost test’ or ‘TRC test’ means a standard that is met if, for an investment in energy efficiency or demand-response measures, the benefit-cost ratio is greater than one. The benefit-cost ratio is the ratio of the net present value of the total benefits of the program to the net present value of the total costs as calculated over the lifetime of the measures. A total resource cost test compares the sum of avoided electric utility costs, representing the benefits that accrue to the system and the participant in the delivery of those efficiency measures, to the sum of all incremental costs of end-use measures that are implemented due to the program (including both utility and participant contributions), plus costs to administer, deliver, and evaluate each demand-side program, to quantify the net savings obtained by substituting the demand-side program for supply resources. In calculating avoided costs of power and energy that an electric utility would otherwise have had to acquire, reasonable estimates shall be included of financial costs likely to be imposed by future regulations and legislation on emissions of greenhouse gases.”<sup>10</sup>*

ComEd uses DSMore™ software for the calculation of the TRC test.<sup>11</sup> The DSMore model accepts information on program parameters, such as number of participants, gross savings, free ridership and program costs, and calculates a TRC which fits the requirements of the Illinois legislation. Environmental benefits have been quantified for CO<sub>2</sub> reductions, using a value of \$0.013875 per kWh.

One important feature of the DSMore model is that it performs a probabilistic estimation of future avoided energy costs. It looks at the historical relationship between weather, electric use and prices in the PJM Northern Illinois region and forecasts a range of potential future electric energy prices. The range of future prices is correlated to the range of weather conditions that could occur, and the range of weather is based on weather patterns seen over the historical record. This method captures the impact on electric prices that comes from extreme weather conditions. Extreme weather creates extreme peaks which create extreme prices. These extreme prices generally occur as price spikes and they create a skewed price distribution. High prices are going to be much higher than the average price while low prices are going to be only moderately lower than the average. DSMore is able to quantify the weighted benefits of avoiding energy use across years which have this skewed price distribution.

Table 3-22 summarizes the unique inputs used in the DSMore model to assess the TRC ratio for the Residential Appliance Recycling program in PY2. Most of the unique inputs come directly from the evaluation results presented previously in this report. Measure life estimates and program costs come directly from ComEd. All other inputs to the model, such as avoided costs, come from ComEd and are the same for this program and all programs in the ComEd portfolio.

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<sup>10</sup> Illinois Power Agency Act SB1592, pages 7-8. -

<sup>11</sup> Demand Side Management Option Risk Evaluator (DSMore) software is developed by Integral Analytics. -

**Table 3-22. Inputs to DSMore Model for Residential Appliance Recycling Program**

Item	Value Used
Measure Life	8 years
Participants	25,735
Annual Gross Energy Savings	43,788 MWh
Gross Coincident Peak Savings	7.3 MW
Net-to-Gross Ratio	72% to 82%
Utility Administration and Implementation Costs	\$274,923
Utility Incentive Costs	\$641,200
Participant Contribution to Incremental Measure Costs	\$0

Based on these inputs, the Illinois societal TRC for this program is 3.97 and the program passes the TRC test. The standard TRC calculation produced by DSMore is 3.06.

## Section 4. Conclusions and Recommendations

This section highlights the findings and recommendations from the evaluation of the Appliance Recycling Program implemented by JACO on behalf of ComEd. The objectives of the evaluation were to: (1) quantify net energy and peak demand savings impacts from the program during Program Year 2 (PY2); and (2) to determine key process-related program strengths and weaknesses and provide recommendations to improve the program.

Below are the key conclusions and recommendations.

### 4.1 Conclusions

#### 4.1.1 Key Impact Findings

The PY2 net energy savings goal for this program was 18,358 MWh and the program-reported energy savings was significantly higher than this, 25,997 MWh<sup>12</sup>. The verified energy savings is actually somewhat higher than this – 32,624 MWh, for an overall realization rate of 125%.

Gross savings per unit (without adjustment for the part-use factor) are identical for the ex-ante and ex-post program-verified savings estimates, since ComEd used the same approach to calculate ex-ante gross savings per unit as was used in this evaluation. Key differences are with respect to the part-use factor and net-to-gross ratio assumptions. In its ex-ante estimates, ComEd has assumed a part-use factor (labeled as a realization rate in their table) of 0.73, while the program verified part-use factors are 0.87 for refrigerators and 0.89 for freezers, respectively. ComEd assumed a net-to-gross ratio of 0.71, as versus program verified net-to-gross ratios of 0.73 for refrigerators and 0.82 for freezers, respectively. These higher program verified values yield the higher total ex-post net savings quantities.

Because of inadequate tracking data, it was not possible to fully evaluate room AC savings. Program-claimed gross savings for room ACs are accepted as verified. The evaluation-verified net-to-gross ratio of 0.72 was then applied. This appliance contributes a very small proportion of the program savings (0.1%).

#### 4.1.2 Key Process Findings

The amount of marketing that was done for PY2 was sufficient, given that ComEd reached their target savings goal. Bill inserts are an effective method for increasing awareness of the program, as roughly 70% of participants and non-participant survey respondents learned of the program through bill inserts. Furthermore, the program was able to achieve its significantly increased

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<sup>12</sup> As reported in *PY2 Ex Ante & Plan Summary.xls* provided by ComEd.

savings target, indicating that its promotional efforts, including increased reliance on bill inserts, are providing the desired results. The direct mail campaign yielded an estimated 1.2% response rate. The Program Manager indicated that this response rate is not as high as the program had desired. However, in comparison to experiences of other direct mail campaigns, this response rate is fairly typical.

The vast majority of participants (94%) are satisfied with the program. Regarding specific aspects of the program, almost all (95%) are satisfied with the sign-up process. Nearly all (96%) are satisfied with the team who picked-up the appliances. Furthermore, 79% are satisfied with the \$25 incentive amount.

Convenience is the top motivation for participation. Nearly half (43%) cite the convenience of the home pickup as the main reason they chose to participate. Next is the \$25 incentive, with 32% of participants citing it. Third are the environmental benefits of the program, which are cited by 13% of participants. This is consistent with findings related to program elements that participants like most, as 54% are pleased that they do not have to remove the appliance themselves, while the environmental benefits and the \$25 incentive are other aspects of the program participants like.

The implementation plan stipulates that 90% of customers will not have to wait for more than 14 days to have their appliance picked up. Only 74% recall waiting for two weeks or less, and 16% are certain they waited more than two weeks (11% do not recall how long they waited). However, customers are permitted to schedule pickups later than within two weeks. The timeline is not an issue, as 99% of customers say they were able to schedule a pickup time that was convenient for them. Moreover, most (92%) are satisfied with the amount of time between scheduling the appointment and the date of pickup.

The program has also had an influence on additional energy saving behaviors. Most of those surveyed (71%) cite their participation in the program as the reason they have taken additional actions to save energy at home. The most common changes that participants have made are installing: CFLs (39%), energy efficient appliances (26%), and new energy efficient windows (20%).

## **4.2**      *Recommendations*

### **4.2.1**      **Impact Recommendations**

- As in PY1, we continue to recommend the program tracking data receive periodic data quality reviews for data quality and completeness. Incomplete data fields need to be populated, particularly those data fields that are critical to the evaluation, such as appliance brand, model number, age/year manufactured, size, configuration and location. Data exported for the evaluation team should also be checked for anomalies.

## 4.2.2 Process Recommendations

- Bill inserts are an effective vehicle for marketing the program and should be leveraged heavily in the future. Also, the program should consider continuing to use TV and radio spots as these methods have proven to be successful at building awareness of the program – albeit to a lesser degree than bill inserts. The program may possibly want to analyze the cost-effectiveness of direct mail in comparison to other marketing methods that the program uses.
- Use of marketing messages highlighting the program’s convenience, its \$25 incentive, and its environmental benefits is highly effective and should be continued. These are the most popular reasons customers participate and are the aspects of the program they like best.
- The cost and environmental impact of operating used refrigerators and freezers is substantial, and ComEd’s customers may not be fully aware of this. The program should consider becoming more proactive with customers with used refrigerators and freezers by increasing its messaging about the savings and environmental benefits that could be achieved by recycling those units through the program.

## Section 5. Appendices

### 5.1 *Data Collection Instruments*

The data collection instruments used in this evaluation consisted of in-depth interview guides for the ComEd program manager and JACO program management and implementers.

#### 5.1.1 **ComEd Residential Appliance Recycling Participant Survey**

**QUOTA CHECK:**

**USE SAMPLE:**

- **IF REF\_NUM>=1 and REFRIGERATOR QUOTA NOT MET OR**
- **IF FRZ\_NUM>=1 and FREEZER QUOTA NOT MET**

#### **INTRODUCTION AND SCREENER**

Hello, this is [SURVEYOR NAME] from Opinion Dynamics calling on behalf of Commonwealth Edison company. This is not a sales call. We are contacting customers who had refrigerators, freezers or room air conditioners removed through an appliance pick-up and recycling program offered by Commonwealth Edison. May I please speak with [CUSTOMER\_NAME]?

Are you the person who was most involved and familiar with the removal? (If not may I please speak with the person who was most involved with the removal?)

IF NO, NO REFRIGERATOR OR FREEZER PICKED UP: THANK AND TERMINATE

CONTINUE WITH RIGHT PERSON: We are conducting a study to evaluate Commonwealth Edison's appliance pick up and recycling program and would like to include your opinions. This is required by the Illinois Commerce Commission and will be used to verify the effectiveness of the program and to make improvements.

(IF NEEDED: It will take about 15 minutes.)

This call may be monitored or recorded for quality purposes.

## SCREENING QUESTIONS

S0. Is ComEd your electric company or do you receive electricity from someone else?

- ComEd
- Someone Else [TERMINATE]
- (Don't know)
- (Refused)

S1. Our records show that you had [ONE OR MORE REFRIGERATOR if REF\_NUM>0, ONE OR MORE FREEZERS if FRZ\_NUM>0, AN AIR CONDITIONER if AC\_NUM=1] picked up by ComEd or its subcontractor JACO. Is this correct?

- 01 Yes, correct
- 00 No, it was [RECORD VERBATIM and TERMINATE]
- 98 (Don't know) [TERMINATE]
- 99 (Refused) [TERMINATE]

**[Read if REF\_NUM>=1 and if REFRIGERATOR\_QUOTA not met]**

## SECTION A: REFRIGERATOR CHARACTERISTICS

S2b Next, I'm going to ask you some specific questions about the refrigerator that was picked up by ComEd.

A1 Were you using this refrigerator as your main refrigerator, or had it been a secondary or spare? If you recently bought a new main refrigerator and were just waiting for the old one to be picked up, it should be classified as "main." (IF NEEDED: A MAIN REFRIGERATOR IS TYPICALLY IN THE KITCHEN, A SECONDARY OR SPARE IS USUALLY KEPT SOMEPLACE ELSE AND MIGHT OR MIGHT NOT BE RUNNING.)

- 1 Main
- 2 Secondary or Spare
- 3 (N/A - Respondent is not primary user of fridge (landlord, etc.)) [TERMINATE]
- 8 (Don't know) [TERMINATE]
- 9 (Refused) [TERMINATE]

**QUOTA CHECK ... Use responses to 1 for Main quota, 2 for Secondary quota. Once quota met, T&T**

**[ASK A2 IF A1=2 ELSE SKIP TO A5]**

A2 How long had you been using this refrigerator as a secondary or spare?

[IF NEEDED: If respondent is confused, reinforce that “how long had it been a spare when you decided to get rid of it.”]

[NUMERIC OPEN END RECORD IN YEARS] -

- 00 (Less than one year) -
- 98 - (Don't know) -
- 99 (Refused) -

**A3** Thinking just about the past year, was the spare refrigerator plugged in and running ...

- 1 All the time -
- 2 For special occasions only -
- 3 During certain months of the year only, or -
- 4 Was it never plugged in and running -
- 8 (Don't know) -
- 9 (Refused) -

**[ASK A4 and A4a IF A3=02 OR 03, ELSE A5]**

**A4** If you add up the total time your spare refrigerator was plugged in and running during the last 12 months that you had it, about how many total months would that be? Your best estimate is okay. (GET NEAREST MONTH)

[RECORD IN MONTHS] -

- 00 (Less than 1 month) -
- 98 (Don't know) -
- 99 (Refused) -

**A4a** Was the refrigerator running during the summer or was it mainly running during other times of the year?

- 1. Running during the summer
- 2. Mainly running other times of the year
- 3. (A mix of both summer and other times of the year)
- 8. (Don't know)
- 9. (Refused)

**A5** Where would the refrigerator have been located if it had not been removed by ComEd?

- 01 (Kitchen) -
- 02 (Garage) -
- 03 - (Porch/Patio) -
- 04 - (Basement)

- 00 (Other (SPECIFY:))
- 98 (Don't know)
- 99 (Refused)

**[SKIP A5B IFA5=1 OR 98 or 99]**

**A5B** Was the space heated or not?

- 1 Yes -
- 2 No -
- 3 (Heated part of the year) -
- 8 (Don't know) -
- 9 (Refused) -

**[SKIP A5C IFA5=98 or 99]**

**A5C** Was the space air-conditioned or not?

- 1 Yes -
- 2 No -
- 3 (Air conditioned part of the year) -
- 8 (Don't know) -
- 9 (Refused) -

**A6** How old was the refrigerator when ComEd removed it?

[NUMERIC OPEN END RECORD IN YEARS] -

- 00 (Less than one year) -
- 98 (Don't know) -
- 99 (Refused) -

**A7** Did you replace the refrigerator that ComEd picked up with another one?

- 1 Yes -
- 2 No -
- 8 (Don't know) -
- 9 (Refused) -

[ASK IF A7=1 else skip to A9] -

A8aa. Did you get the replacement refrigerator before or after the old refrigerator was -  
picked up? -

- 1 Before [read in before in A8a] -
- 2 After [read in after in A8a] -
- 3 (Got it the same day) skip to 8b -
- 8 (Don't know) Skip to A8b -
- 9 (Refused) Skip to A8b -

**A8a** How long <before/after> the old one was picked-up did you get the replacement refrigerator?

- 01 Within one to two weeks -
- 02 Within one month -
- 03 Within two to three months -
- 04 Within four to six months -
- 05 Within six to twelve months/ one year -
- 06 More than one year later -
- 00 (Other (record verbatim)) -
- 98 (Don't know) -
- 99 (Refused) -

**A8b** Was this replacement refrigerator brand new or used?

- 1. Brand new
- 2. Used
- 8. (Don't know)
- 9. (Refused)

**A8c** Does your replacement refrigerator have ... (READ)

- 01 A single door, with a freezer compartment inside -
- 02 Two doors, side by side -
- 03 A Top freezer -
- 04 Or a Bottom freezer? -
- 00 (Other (SPECIFY:\_\_\_)) -
- 98 (Don't know) -
- 99 - (Refused)

**A8d** Is the replacement refrigerator frost free or manual defrost?

- 01 Frost free -
- 02 - Manual defrost -
- 00 - (Other (SPECIFY:\_\_\_)) -
- 98 - (Don't know) -
- 99 - (Refused)

**A8e1** Is your replacement refrigerator larger, smaller or the same size as the one it replaced? -

- 1 Larger
- 2 Smaller
- 3 Same Size
- 8 (Don't know)
- 9 (Refused)

**A8f** Was getting the replacement a major reason you decided to discard the old one?

- 1 Yes -
- 2 No -
- 8 (Don't know) -
- 9 (Refused) -

**[SKIP IF A8b=1, ELSE TA9]**

**A8g** How old is this replacement refrigerator?

- [NUMERIC OPEN END RECORD IN YEARS] -
- 00 (Less than one year) -
  - 98 (Don't know) -
  - 99 (Refused) -

**[ONLY READ TA9 IF A7=1]**

TA9. Now let's get back to your old refrigerator that was removed by ComEd.

**A9** When you first heard about ComEd's Appliance Recycling Program, were you already considering getting rid of this refrigerator? This could have been by selling it, giving it away, having someone pick it up, or taking it to the dump or a recycling center.

- 1 Yes
- 2 No
- 8 (Don't know)
- 9 (Refused)

**A10a.** If you had been unable to get rid of your refrigerator through the ComEd appliance recycling program, would you have still gotten rid of the refrigerator, or would you have kept it?

- 1 Gotten rid of it
- 2 Kept it
- 8 (Don't know)
- 9 (Refused)

[ASK IF A10a = 1, ELSE SKIP TO B2]

**A10b.** If the ComEd program hadn't been available, would you have gotten rid of the refrigerator within 6 months of when you did, within a year of when you did, or would it have taken longer than a year for you to get rid of this refrigerator?

1. Within 6 months
2. Within a year
3. Over a year
8. (Don't know)
9. (Refused)

## **SECTION B: CONSIDERATION OF ALTERNATIVES SECTION**

**B1** Now suppose that ComEd appliance recycling program hadn't been available. I am going to read a list of alternative ways that you could have disposed of this refrigerator. Please tell me which one you would have been most likely to use to get rid of this refrigerator. Would you have...

1. Sold it
2. Given it away for free
3. Have it removed by the dealer you got your new or replacement refrigerator from
4. Taken it to a dump or recycling center
5. Hired someone to take it to a dump or recycling center
6. (Keep it)
8. (Don't know)
9. (Refused)

**B2.** What was the condition of the refrigerator? Would you say ...

1. It worked and was in good physical condition
2. It worked but needed minor repairs like a door seal or handle, or
3. It worked but had some bigger problems
4. (It didn't work)
8. (Don't know)

9. (Refused)

**B3.** Thinking about the refrigerator that ComEd picked up, how much money do you think it would have cost each month to run it if it were running full-time?

- 1 Nothing
- 2 \$1 to \$5
- 3 \$6 to \$10
- 4 \$11 to \$15
- 5 \$16 to \$20
- 6 More than \$20
- 8 (Don't know)
- 9 (Refused)

**[ASK B4A THRU B4E IF A10a=2. OTHERWISE, SKIP TO B5]**

**B4A.** You mentioned you would have kept this refrigerator if the ComEd appliance recycling program wasn't available. If you had kept the refrigerator, would it have been stored unplugged, or used as a spare?

- 1 Stored it unplugged
- 2 Used it as a spare
- 3 (Both-store it and use it)
- 4 (Would not have kept it)
- 8 (Don't know)
- 9 (Refused)

**[ASK IF B4A=2 or 3, Else B5]**

**B4B** For how many years would you have used this refrigerator as a spare? IF NEEDED: Your best estimate is fine. -

- [NUMERIC OPEN END]
- 00 (Less than 1 year)
  - 96 (Until it broke, indefinitely)
  - 98 (Don't know)
  - 99 (Refused)

**B4C.** Where would this refrigerator have been located if you hadn't gotten rid of it and had used it as a spare? IF NEEDED, CLARIFY: What room? IF NEEDED: Your best estimate is fine.

- 01 (Kitchen)
- 02 (Garage)
- 03 (Porch)

- 04 (Basement)
- 00 (Other (SPECIFY:\_\_\_))
- 98 (Don't know)
- 99 (Refused)

[SKIP IF B4C=1 OR B4C=98 or 99]

**B4D.** Would this have been a heated space?

- 1. Yes
- 2. No
- 3. (Part of the year)
- 8. (Don't know)
- 9. (Refused)

[SKIP IF B4C=98 or 99]

**B4E** Would this have been an air-conditioned space?

- 1 Yes
- 2 No
- 3 (Part of the year)
- 8. (Don't know)
- 9. (Refused)

**B5.** There may have been a number of reasons why you chose to get rid of the refrigerator that we've been discussing. Using a 0 to 10 scale where 0 is not at all important and 10 is extremely important, please tell me how important each reason was in your decision to get rid of it?

- a. The refrigerator was expensive to run
- b. The refrigerator was a spare that I did not use very much [ASK IF A1=2]  
[ASK B5C AND B5D IF A7=1 ELSE SKIP TO C1]
- c. The refrigerator was old and I wanted something with more modern features
- d. I wanted a bigger refrigerator [SKIP IF A8E1 =2,3]

## FREEZER SECTION

[READ IF FRZ\_NUM>=1]

### QUOTA CHECK:

IF REF\_NUM=0 THEN COUNT THIS AGAINST FREEZER QUOTA.

IF REF\_NUM>=1 THEN DO \*NOT\* COUNT THIS AGAINST FREEZER QUOTA, WE NEED AS MANY MULTIPLE APPLIANCE RECYCLERS AS WE CAN GET.

## SECTION C: FREEZER CHARACTERISTICS

Next, I'm going to ask you some specific questions about the freezer that was picked up by ComEd.

C1 How long had you been using this freezer?

[IF NEEDED: If respondent is confused, reinforce that "how long had it been used when you decided to get rid of it."]

[NUMERIC OPEN END RECORD IN YEARS] -

00 (Less than one year) -

96 (N/A – Respondent not primary user (landlord, etc.)) [TERMINATE] -

98 (Don't know) -

99 (Refused) -

C2 Thinking just about the past year, was the freezer plugged in and running ...

1 All the time -

2 For special occasions only -

3 During certain months of the year only, or -

4 Was it never plugged in and running -

8 (Don't know) -

9 (Refused) -

[ASK C3 and C4 IF C2=02 OR 03, ELSE C5]

**C3** If you add up the total time your freezer was plugged in and running during the last 12 months that you had it, about how many total months would that be? Your best estimate is okay. (GET NEAREST MONTH)

[RECORD IN MONTHS]

- 00 (Less than 1 month)
- 98 (Don't know)
- 99 (Refused)

**C4** Was the freezer running during the summer or was it mainly running during other times of the year?

- 1. Running during the summer
- 2. Mainly running other times of the year
- 3. (A mix of both summer and other times of the year)
- 8. (Don't know)
- 9. (Refused)

**C5** Where would the freezer have been located if it had not been removed by ComEd?

- 01 (Kitchen)
- 02 (Garage)
- 03 (Porch/Patio)
- 04 (Basement)
- 00 (Other (SPECIFY:))
- 98 (Don't know)
- 99 (Refused)

**[SKIP IF C5=1 OR 98 or 99]**

**C5B** Was the space heated or not?

- 1 Yes
- 2 No
- 3 (Heated part of the year)
- 8 (Don't know)
- 9 (Refused)

[SKIP IF C5=98 or 99]

C5C Was the space air-conditioned or not? -

- 1 Yes
- 2 No
- 3 (Air conditioned part of the year)
- 8 (Don't know)
- 9 (Refused)

C6 How old was the freezer when ComEd removed it?

[NUMERIC OPEN END RECORD IN YEARS] -

- 00 (Less than one year) -
- 98 (Don't know) -
- 99 (Refused) -

C7. Did you replace the freezer that ComEd picked up with another one?

- 1 Yes -
- 2 No -
- 8 (Don't know) -
- 9 (Refused) -

[ASK IF C7=1 else skip to C9] -

C8aa. Did you get the replacement freezer before or after the old freezer was picked up?

- 1 Before [read in before in C8a]
- 2 After [read in after in C8a]
- 3 (Got it the same day) Skip to C8b
- 8 (Don't know) Skip to C8b
- 9 (Refused) Skip to C8b

C8a. How long <before/after> the old one was picked-up did you get the replacement

freezer? RECORD TIME INTERVAL

- 01 Within one to two weeks
- 02 Within one month
- 03 Within two to three months
- 04 Within four to six months

- 05 Within six to twelve months/ one year -
- 06 More than one year later -
- 00 (Other (record verbatim)) -
- 98 (Don't know) -
- 99 (Refused) -

**C8b.** Was this replacement freezer brand new or used?

- 1. Brand new
- 2. Used
- 8. (Don't know)
- 9. (Refused)

**[SKIP IF C8b=1, ELSE C8c]**

**C8g** How old is this replacement freezer?

- [NUMERIC OPEN END RECORD IN YEARS] -
- 00 (Less than one year) -
- 98 (Don't know) -
- 99 (Refused) -

**C8c.** Is your replacement freezer ... (READ)

- 01 A chest freezer or -
- 02 An upright freezer -
- 00 (Other (SPECIFY: \_\_\_)) -
- 98 (Don't know) -
- 99 (Refused) -

**C8d.** Is the replacement freezer frost free or manual defrost?

- 01 Frost free -
- 02 - Manual defrost -
- 00 - (Other (SPECIFY: \_\_\_)) -
- 98 - (Don't know) -
- 99 - (Refused)

**C8e1** Is your replacement freezer larger, smaller or the same size as the one it replaced?

- 1 Larger -
- 2 - Smaller

- 3 Same Size
- 8 (Don't know)
- 9 (Refused)

**C8f** Was getting the replacement a major reason you decided to discard the old one?

- 1 Yes -
- 2 No -
- 8 (Don't know) -
- 9 (Refused) -
- [ONLY READ TC9 IF C7=1] -

TC9. Now let's get back to your old freezer that was removed by ComEd.

**C9** When you first heard about ComEd's Appliance Recycling Program, were you already considering getting rid of this freezer? This could have been by selling it, giving it away, having someone pick it up, or taking it to the dump or a recycling center.

- 1 Yes
- 2 No
- 8 (Don't know)
- 9 (Refused)

**C10.** If you had been unable to get rid of your freezer through the ComEd appliance recycling program, would you have still gotten rid of the freezer, or would you have kept it?

- 1 Gotten rid of it
- 2 Kept it
- 8 (Don't know)
- 9 (Refused)

**[ASK IF C10=1 ELSE SKIP TO D2]**

**C11b.** If the ComEd program hadn't been available, would you have gotten rid of the freezer within 6 months of when you did, within a year of when you did, or would it have taken longer than a year for you to get rid of this freezer?

- 1. Within 6 months
- 2. Within a year
- 3. Over a year
- 8. (Don't know)
- 9. (Refused)

## SECTION D: CONSIDERATION OF ALTERNATIVES SECTION

**D1** Now suppose that the ComEd appliance recycling program hadn't been available. I am going to read a list of alternative ways that you could have disposed of this freezer. Please tell me which one you would have been most likely to use to get rid of this freezer. Would you have...

1. Sold it
2. Given it away for free
3. Have it removed by the dealer you got your new or replacement freezer from
4. Taken it to a dump or recycling center, or
5. Hired someone to take it to a dump or recycling center?
6. (Keep it)
8. (Don't know)
9. (Refused)

**D2** What was the condition of the freezer? Would you say ...

- 1 It worked and was in good physical condition
- 2 It worked but needed minor repairs like a door seal or handle
- 3 It worked but had some bigger problems
- 4 (It wasn't working)
- 8 (Don't know)
- 9 (Refused)

**D3** Thinking about the freezer that ComEd picked up, how much money do you think it would have cost each month to run it if it were running full-time?

- 1 Nothing
- 2 \$1 to \$5
- 3 \$6 to \$10
- 4 \$11 to \$15
- 5 \$16 to \$20
- 6 More than \$20
- 8 (Don't know)
- 9 (Refused)

**[ASK D4A THRU D4E IF C10=2. OTHERWISE, SKIP TO D5]**

**D4A.** You mentioned you would have kept this freezer if the ComEd appliance recycling program wasn't available. If you had kept the freezer, would it have been stored unplugged, or would you have continued using it?

- 1 Stored it unplugged
- 2 Continued using it
- 3 (Both-store it and use it)
- 4 (Would not have kept it)
- 8 (Don't know)
- 9 (Refused)

**[ASK IF D4A=2 or 3, ELSE D5]**

**D4B** For how many years would you have used this additional freezer? IF NEEDED: Your best estimate is fine. -

[NUMERIC OPEN END]

- 00 (Less than 1 year)
- 96 (Until it broke, indefinitely)
- 98 (Don't know)
- 99 (Refused)

**D4C.** Where would this freezer have been located if you hadn't gotten rid of it and had continued using it? IF NEEDED, CLARIFY: What room? IF NEEDED: Your best estimate is fine.

- 01 (Kitchen)
- 02 (Garage)
- 03 (Porch)
- 04 (Basement)
- 00 (Other (SPECIFY:\_\_\_))
- 98 (Don't know)
- 99 (Refused)

[SKIP TO D4E IF D4C=1, 98,99]

**D4D.** Would this have been a heated space?

- 1. Yes
- 2. No
- 3. (Part of the year)
- 8. (Don't know)
- 9. (Refused)

**[SKIP to D5 IF D4C=98,99]**

**D4E** Would this have been an air-conditioned space?

- 1 Yes
- 2 No
- 3 (Part of the year)
- 8. (Don't know)
- 9. (Refused)

D5. There may have been a number of reasons why you chose to get rid of the freezer that we've been discussing. Using a 0 to 10 scale where 0 is not at all important and 10 is extremely important, please tell me how important each reason was in your decision to get rid of it?

- a. The freezer was expensive to run -
- b. I did not use the freezer very much -  
[ASK D5C AND D5D IF C7=1 ELSE SKIP TO E00] -
- c. The freezer was old and I wanted something with more modern features -
- d. I wanted a bigger freezer [SKIP IF C8E1 =2,3] -

## AC Section

[READ IF AC\_NUM=1]

### SECTION E: ROOM AIR CONDITIONER CHARACTERISTICS

Next, I'm going to ask you some specific questions about the air conditioner you had picked up.

**E00** Was this your own AC or were you discarding someone else's unit?

- 01. (My own unit)
- 02. (Someone else's unit)
  - 03. (Landlord updating appliances for apartment building)
- 00. (Something else) (RECORD VERBATIM)
  - 98. (Don't know)
  - 99. (Refused)

SKIP TO G1 IF E00 IS NOT = TO 1 OR 3

ASK IF E00=1, ELSE E5

**E1** At the time the room air conditioner was picked up, was it your only AC, or did you have additional AC units?

- 1 Only AC
- 2 Had additional ACs
- 8 (Don't know)
- 9 (Refused)

E2 Thinking just about the most recent summer that you still had this AC, was it plugged in and running?

- 1. Yes
- 2. No
- 8. (Don't know)
- 9. (Refused)

[ASK E3 IF E2=1 ELSE SKIP TO E5]

E3. Still thinking about this last summer that you had the room AC unit, did you run it most days regardless of the temperature or only on days when the temperature reached a certain level?

- 1. Most days
- 2. Only when temperature reached a certain level
- 3. It was never plugged in and running.
- 8. (Don't know)
- 9. (Refused)

[ASK E3A IF E3=2, ELSE E4]

E3a. How hot did it have to get inside your home or condominium before you ran the room AC unit?

- 01 Less than 70 degrees
- 02 70 to 75 degrees
- 03 76 to 80 degrees
- 04 81 to 85 degrees
- 05 Above 85 degrees
- 00 Other (record verbatim)
- 98. (Don't know)
- 99. (Refused)

E4. When you were cooling your home or condominium, did you tend to run the room AC unit all day long, or only when you were home or using that room?

1. All the time
2. Only when home/using the room
8. (Don't know)
9. (Refused)

E5 In what room was the room AC unit located? (IF NEEDED: Please tell me the room where it was most often located.)

1. (Bedroom)
2. (Living room)
3. (Dining room)
4. (Kitchen)
5. (Hallway)
6. (Other)
8. (Don't know)
9. (Refused)

E6. At the time of the pick-up, how old was the room air conditioner?

- [NUMERIC OPEN END RECORD IN YEARS] -
- 00 (Less than one year) -
  - 98 (Don't know) -
  - 99 (Refused) -

E7 Did you replace the AC unit ComEd picked up with a different one? [IF NEEDED: This could have been a different type of AC unit, such as a central AC unit.]

1. Yes
2. No
8. (Don't know)
9. (Refused)

[ASK IF E7=1 ELSE SKIP TO 10]

E8aa. Did you get the replacement AC before or after the old AC was picked up?

- 1 Before [read in before in E8] -
- 2 After [read in after in E8] -
- 3 (Got it the same day) Skip to E8a -
- 8 (Don't know) Skip to E8a -

9 (Refused) Skip to E8a

E8 How long <before/after> the old one was picked-up did you get the replacement AC?

RECORD TIME INTERVAL

- 01 Within one to two weeks
- 02 Within one month
- 03 Within two to three months
- 04 Within four to six months
- 05 Within six to twelve months/ one year
- 06 More than one year later
- 00 (Other (record verbatim))
- 98 (Don't know)
- 99 (Refused)

E8A. Was the replacement another room air conditioner or a central AC system?

- 1. Room air conditioner
- 2. Central AC
- 8. (Don't know)
- 9. (Refused)

E8B. Was the replacement AC brand new or used?

- 1. Brand new
- 2. Used
- 8. (Don't know)
- 9. (Refused)

[ASK IF E8B=2, ELSE E8D]

E8C. How old is the replacement air conditioner?

[NUMERIC OPEN END RECORD IN YEARS]

- 00 (Less than one year)
- 98 (Don't know)
- 99 (Refused)

[ASK IF E8A=1, ELSE E8E]

**E8D** Is your replacement AC larger, smaller or the same size as the one it replaced? -

- 1 Larger
- 2 Smaller
- 3 Same Size
- 8 (Don't know)
- 9 (Refused)

**E8E** Is the replacement AC energy-efficient?

- 1. Yes
- 2. No
- 8. (Don't know)
- 9. (Refused)

**E9** Can you provide me any more information about the replacement AC unit, such as the brand name and model number, size in tons, or any other characteristics?

[OPEN END: RECORD INFORMATION ON BRAND NAME, MODEL #, ETC.]

- 96. No
- 98. (Don't know)
- 99. (Refused)

Now let's get back to the room air conditioner that you had disposed of.

**E10.** When you first heard that ComEd would pick up an AC along with your other appliance, were you already considering getting rid of this room air conditioner? This could have been by selling it, giving it away, having someone pick it up, or taking it to the dump or a recycling center.

- 1 Yes
- 2 No
- 8 (Don't know)
- 9 (Refused)

**E11A** If you had been unable to get rid of your AC through the ComEd appliance recycling program, would you have still gotten rid of the AC, or would you have kept it?

- 1 Gotten rid of it
- 2 Kept it

- 8 (Don't know)
- 9 (Refused)

**[ASK IF E11a=1 ELSE SKIP TO F3a]**

E11b. If the ComEd program hadn't been available, would you have gotten rid of the AC within 6 months of when you did, within a year of when you did, or would it have taken longer than a year for you to get rid of this AC?

- 1. Within 6 months
- 2. Within a year
- 3. Over a year
- 8. (Don't know)
- 9. (Refused)

**SECTION F: CONSIDERATION OF ALTERNATIVES SECTION**

F1 Now suppose that the ComEd appliance recycling program hadn't been available. I am going to read a list of alternative ways that you could have disposed of this AC. Please tell me which one you would have been most likely to use to get rid of this AC. Would you have...

- 1. Sold it
- 2. Given it away for free
- 3. Taken it to a dump or recycling center
- 4. Hired someone to take it to a dump or recycling center
- 5. (Keep it)
- 8. (Don't know)
- 9. (Refused)

F2 What was the condition of the AC? Would you say ...

- 1 It worked and was in good physical condition
- 2 It worked but needed minor repairs
- 3 It worked but had some bigger problems
- 4 (It wasn't working)
- 8 (Don't know )
- 9 (Refused)

**[ASK F3A THRU F3E IF E11a=2. OTHERWISE, SKIP TO F4]**

F3A. You mentioned you would have kept this air conditioner if the ComEd appliance recycling program weren't available. If you had kept the AC, would you have used this AC or would you have stored it and not used it?

- 1 Used it
- 2 Stored it and not used it
- 3 (Both-store it and use it)
- 4 (Would not have kept it)
- 8 (Don't know)
- 9 (Refused)

**[ASK IF F3A=1 or 3, ELSE F4]**

F3B For how many years would you have used this AC? IF NEEDED: Your best estimate is - fine. -

[NUMERIC OPEN END]

- 00 (Less than 1 year)
- 96 (Until it broke, indefinitely)
- 98 (Don't know)
- 99 (Refused)

F4. There may have been a number of reasons why you chose to get rid of the air conditioner that we've been discussing. Using a 0 to 10 scale where 0 is not at all important and 10 is extremely important, please tell me how important each reason was in your decision to get rid of it?

- a. The AC was expensive to run (0 to 10 Scale)
- b. I did not use the AC very much(0 to 10 Scale)
- c. The AC was old and wasn't cooling the best anymore(0 to 10 Scale)
- (Skip if E8D=2,3) d. I wanted a bigger AC unit or system(0 to 10 Scale)

**PROCESS QUESTIONS**

Next I have some questions about your experiences with the ComEd Appliance Recycling Program.

G1. How did you first learn about the Appliance Recycling Program?

- 01. (Retailer)
- 02. (Internet)

- 03. (Bill Insert)
- 04. (ComEd Energy at Home Newsletter)
- 05. (Friend/relative/neighbor)
- 06. (ComEd website)
- 07. (Municipal Website or Municipal newsletter)
- 08. (Radio)
- 09. (Newspaper)
- 00. (Other\_\_\_\_)
- 98. (Don't know)
- 99. (Refused)

G2. Since you first learned about the program, have you heard about the program from any other sources? If yes, where else? (Categories eliminated based on QG1)

- 01. (Retailer)
- 02. (Internet)
- 03. (Bill Insert)
- 04. (ComEd Energy at Home Newsletter)
- 05. (Friend/relative/neighbor)
- 06. (ComEd website)
- 07. (Municipal Website or Municipal newsletter)
- 08. (Radio)
- 09. (Newspaper)
- 00. (Other\_\_\_\_)
- 96. (No/No other sources)
- 98. (Don't know)
- 99. (Refused)

[SKIP IF G1=03 OR G2=03]

G2a. Have you seen the program mentioned in a ComEd bill insert?

- 1 Yes
- 2 No
- 8 (Don't know)
- 9 (Refused)

G3. The appliance recycling program includes not only the pick-up service, but also consumer education. At the time you found out about the pick-up service, did you receive information or learn that older refrigerators and freezers are less efficient and use more energy than newer ones?

- 1. Yes, received information

- 2. No
- 8. (Don't know)
- 9. (Refused)

G3aa. And did you learn that the refrigerator or freezer that is picked up by the program would be recycled, which means that the coolant in the unit would be safely removed and the materials that the unit is made of would be reused?

- 1. Yes, received information
- 2. No
- 8. (Don't know)
- 9. (Refused)

G3a. There are a number of ways you could have gotten rid of your appliance(s). What is the MAIN reason you chose the ComEd Appliance Recycling Program instead of some other way?

- 01. (\$25/cash incentive)
- 02. (The convenience of the home pick-up/Don't have to take it someplace myself)
- 03. (Pick up was free)
- 04. (Appliance was recycled/Was disposed of in a way that was good for environment)
- 05. (Was recommended by friend/family)
- 06. (Was recommended by retailer)
- 07. (Did not know of any other way/No other option)
- 00. (Other\_specify)
- 98. (Don't know)
- 99. (Refused)

G3b. Were there any other reasons? (Categories eliminated based on QG3a)

- 01. (\$25/cash incentive)
- 02. (The convenience of the home pick-up/Don't have to take it someplace myself)
- 03. (Pick up was free)
- 04. (Appliance was recycled/Was disposed of in a way that was good for environment)
- 05. (Was recommended by friend/family)
- 06. (Was recommended by retailer)
- 07. (Did not know of any other way/No other option)
- 00. (Other\_specify)
- 96. (No other reason)
- 98. (Don't know)
- 99. (Refused)

G4aa. Once you decided to participate, the first step was signing up for the program. Are you the one that took care of this, or did someone else in your household sign up?

1. I signed up
2. Someone else signed up
8. (Don't know)
9. (Refused)

[ASK if G4aa=1, ELSE G8b]

G4b. Did you sign up online, on the phone or in person at Abt (Pronounced: "Apt") Electronics?

01. Telephone
02. Online
03. In person at Abt Electronics
00. (Other [OPEN END])
98. (Don't know)
99. (Refused)

[ASK IF G4b=02, ELSE G4f ]

G4c. Was it easy to find the sign up screen on the website?

1. Yes
2. No
8. (Don't know)
9. (Refused)

G4d. Did the website answer all your questions about the appliance recycling program?

1. Yes
2. No
3. (Not applicable)
8. (Don't know)
9. (Refused)

G4e. Did you receive confirmation that your sign up had been successful?

1. Yes
2. No
3. (Not applicable)

- 8. (Don't know)
- 9. (Refused)

[ASK IF G4b=1, ELSE G4i]

G4f. Was the representative you spoke to on the telephone polite and courteous?

- 1. Yes
- 2. No
- 3. (Not applicable)
- 8. (Don't know)
- 9. (Refused)

G4g. Did the representative answer all your questions about the program?

- 1. Yes
- 2. No
- 3. (Not applicable)
- 8. (Don't know)
- 9. (Refused)

G4h. Did you have to call more than once?

- 1. Yes
- 2. No
- 3. (Not applicable)
- 8. (Don't know)
- 9. (Refused)

[ASK IF G4b=3, ELSE G5]

G4i. Was the employee you spoke to at Abt (Pronounced: "Apt") polite and courteous?

- 1. Yes
- 2. No
- 3. (Not applicable)
- 8. (Don't know)
- 9. (Refused)

G4j. Did the employee answer all your questions about the program?

- 1. Yes

- 2. No
- 3. (Not applicable)
- 8. (Don't know)
- 9. (Refused)

G5. Were you able to schedule a pick-up date and time that was convenient for you?

- 1. Yes
- 2. No
- 8. (Don't know)
- 9. (Refused)

G4. On a scale of 0 to 10 where 0 is very dissatisfied and 10 is very satisfied, how satisfied are you with the sign up experience?

- 0. 0
- 1. 1 -
- 2. 2 -
- 3. 3 -
- 4. 4 -
- 5. 5 -
- 6. 6 -
- 7. 7 -
- 8. 8 -
- 9. 9 -
- 10. 10 -
- 98. (Don't know)
- 99. (Refused)

(ASK IF G4=0,1,2,3, ELSE G6)

G4a. Why did you rate it that way?

- 00 (OPEN END) -
- 98 (Don't know) -
- 99 (Refused) -

G6. How much time passed between when you scheduled the appointment and when your appliance(s) was/were picked up? (NOTE TO INTERVIEWER: IF RESPONDENT SAYS "ABOUT A WEEK", RECORD AS 1 WEEK)

00[ENTER DAYS AND WEEKS]

98. (Don't know)

99. (Refused)

G7. On a scale of 0 to 10 where 0 is very dissatisfied and 10 is very satisfied, how satisfied are you with the time it took between when you scheduled the appliance pickup and when it actually got picked up?

0. 0

1. 1

2. 2

3. 3

4. 4

5. 5

6. 6

7. 7

8. 8

9. 9

10. 10

98. (Don't know)

99. (Refused)

G8b. Just before the pick-up took place, did you receive a call in advance to confirm the appointment or to let you know the collection team was coming?

1. Yes

2. No

3. (Not applicable)

8. (Don't know)

9. (Refused)

G8c. Did the collection team arrive on time?

1. Yes

2. No

3. (Not applicable)

8. (Don't know)

9. (Refused)

G8. On a scale of 0 to 10 where 0 is very dissatisfied and 10 is very satisfied how satisfied were you with the collection team who picked up your appliance(s)? [REPEAT SCALE IF NECESSARY]

- 0. 0
- 1. 1 -
- 2. 2 -
- 3. 3 -
- 4. 4 -
- 5. 5 -
- 6. 6 -
- 7. 7 -
- 8. 8 -
- 9. 9 -
- 10. 10 -
- 11. (Wasn't at home)
- 98. (Don't know)
- 99. (Refused)

(ASK IF G8=0, 1,2,3, ELSE G9)

G8a. Why did you rate it that way?

- 00 (OPEN END) -
- 98 (Don't know) -
- 99 (Refused) -

G9. On that same scale from 0 to 10, how satisfied are you with the size of the payment you received as a result of your participation in the ComEd Appliance Recycling Program? [REPEAT SCALE IF NECESSARY]

- 0. 0
- 1. 1 -
- 2. 2 -
- 3. 3 -
- 4. 4 -
- 5. 5 -
- 6. 6 -
- 7. 7 -
- 8. 8 -
- 9. 9 -
- 10. 10 -

98. (Don't know)

99. (Refused)

(ASK IF G9=0, 1,2,3, ELSE G10)

G9a. Why did you rate it that way?

(OPEN END) -

(Don't know) -

(Refused) -

G10b. How long did it take to get the check after your appliance was picked up?

01. 1 week or less

02. 2 weeks

03. 3 weeks

04. 4 weeks

05. 5 weeks

06. 6 weeks

07. 7 weeks

08. 8 weeks or more

00. (Other, specify)

98. (Don't know)

99. (Refused)

G10. How satisfied are you with the amount of time it took to receive your payment from ComEd, using the same scale from 0 to 10? [REPEAT SCALE IF NECESSARY]

0. 0

1. 1

2. 2

3. 3

4. 4

5. 5

6. 6

7. 7

8. 8

9. 9

10. 10

98. (Don't know)

99. (Refused)

(ASK IF G10=0, 1,2,3, ELSE G11)

G10a. Why did you rate it that way?

00 (OPEN END) -

98 (Don't know) -

99 (Refused) -

G11. Thinking about your entire experience with the ComEd Appliance Recycling Program, overall, how satisfied are you with the service, using the same scale from 0 to 10?

[REPEAT SCALE IF NECESSARY]

0. 0

1. 1

2. 2

3. 3

4. 4

5. 5

6. 6

7. 7

8. 8

9. 9

10. 10

98. (Don't know) – Skip to G13

99. (Refused) – Skip to G13

[ASK G11A IF G11 >= 5, ELSE G11B]

G11A. What aspects of the program did you particularly like? [Multiple Response accept 3]

01. (Positive comment about pick-up team)

02. (The service was easy/Didn't have to dispose of appliance myself)

03. (Short wait between signing up and pick-up)

04. (It was free)

05. (The \$25 payment)

06. (Like that appliance was recycled/helps the environment.)

00. (Other-specify)

96. (None of it/Didn't like any of it)

98. (Don't know/Not sure)

99. (Refused)

[ASK G11B IF G11 <= 5, ELSE G13]

G11B. What aspects of the program did you particularly dislike? [Multiple Response accept 3]

- 01. (Pick up team did not arrive on time)
- 02. (Other negative comment about pick-up team)
- 03. (Had to wait a long time to get appointment)
- 04. (Other negative comment about scheduling appointment)
- 05. (Someone had to be home for pick-up)
- 06. (Refund wasn't as much as I was told/false advertising)
- 07. (Took too long to receive payment; haven't received payment yet)
- 00. (Other-specify)
- 96. (None of it/Was satisfied with all)
- 98. (Don't know)
- 99. (Refused)

G13. Overall how satisfied are you with ComEd, using the same scale from 0 to 10? [REPEAT SCALE IF NECESSARY]

- 0. 0
- 1. 1
- 2. 2
- 3. 3
- 4. 4
- 5. 5
- 6. 6
- 7. 7
- 8. 8
- 9. 9
- 10. 10
- 98. (Don't know)
- 99. (Refused)

(ASK IF G13=0,1,2,3, ELSE G14)

G13a. Why did you rate it that way?

- 00 (OPEN END) -
- 98 (Don't know) -
- 99 (Refused) -

G14. Would you say participating in this program has made you feel more favorable, less favorable, or no different about ComEd?

- More favorable about ComEd
- Less favorable about ComEd
- No different about ComEd
- 8. (Don't know)
- 9. (Refused)

G15. How long have you been a ComEd customer at any location?

(NUMERIC OPEN END 1-99)

- 00. Less than one year
- 98. (Don't know)
- 99. (Refused)

G16. Based on your participation in the ComEd Appliance Recycling Program, have you taken any additional actions to save energy in your home?

- Yes
- No
- 8. (Don't know)
- 9. (Refused)

[ASK G16a IF G16=1, ELSE G16B]

G16a. What energy saving actions have you taken?

- 00. (OPEN END)
- 98. (Don't know)
- 99. (Refused)

G16b. Since participating in the program, have you participated in any other ComEd energy efficiency programs?

- 1 Yes
- 2 No
- 8 (Don't know)
- 9 (Refused)

[ASK G16c and G16d IF G16b=1, ELSE G17]

G16c. Which other program did you participate in?

- 00 (OPEN END) -
- 98 - (Don't know) -
- 99 - (Refused)

G16d. How did you hear about this program?

- 01. (Retailer)
- 02. (Internet)
- 03. (Bill Insert)
- 04. (ComEd Energy at Home Newsletter)
- 05. (Friend/relative/neighbor)
- 06. (ComEd website)
- 07. (Municipal Website or Municipal newsletter)
- 08. (Radio)
- 09. (Newspaper)
- 00. (Other\_\_\_\_)
- 98. (Don't know)
- 99. (Refused)

G17. Have you noticed a reduction in the amount of your electric bill since your appliance(s)  
[was/were] removed?

- 1. Yes
- 2. No
- 8. (Don't know)
- 9. (Refused)

I have just a few questions left for background purposes only.

H1. Do you own or rent your home?

- Own -
- Rent -
- 8. (Don't Know)
- 9. (Refused)

[ASK IF H1 = 2, ELSE H3]

H2. Do you pay your own electric bill or is it included in your rent?

Pay bill -

Included in Rent -

8. (Don't Know)

9. (Refused)

H3. How many people live in your household year-round?

[NUMERIC OPEN END]

98. (Don't Know)

99. (Refused)

H4. What is the age of the Head-of-the Household? (IF THE ROLE IS SHARED, PLEASE ASK THEM TO PROVIDE AN AVERAGE)

[NUMERIC OPEN END]

98. (Don't Know)

99. (Refused)

H5. What is the approximate square footage of home that you live in?

[NUMERIC OPEN END] -

99998. (Don't Know) -

99999. (Refused) -

[ASK H5a IF H5 = DK, ELSE H6]

H5a. Is it...

01. Less than 500 square feet

02. 500 to less than 1000 square feet

03. 1000 to less than 1500 square feet

04. 1500 to less than 2000 square feet

05. 2000 to less than 2500 square feet

06. 2500 to less than 3000 square feet

07. 3000 to less than 4000 square feet

08. 4000 to less than 5000 square feet

09. 5000 square feet or more

98. (Don't Know)

99. (Refused)

H6. How long have you lived at your current residence?

[RECORD YEARS]

- 00. Less than 1 year
- 98. (Don't Know)
- 99. (Refused)

H6a. Was your total family income in 2008 before taxes UNDER OR OVER \$50,000?

- 1. Under \$50,000
- 2. Over \$50,000
- 3. (Exactly \$50,000)
- 8. (Don't know)
- 9. (Refused)

[ASK IF H6a=1, ELSE H6c]

H6b. Was it under \$15,000, between \$15,000 and \$30,000 or between \$30,000 and \$50,000?

[INTERVIEWER NOTE: IF EXACTLY \$30,000 ENTER AS '3. \$30,000-\$50,000']

- 1. Under \$15,000
- 2. \$15,000-\$30,000
- 3. \$30,000-\$50,000
- 8. (Don't know)
- 9. (Refused)

[ASK IF H6a=2, ELSE H7]

H6c. Was it between \$50,000 and \$75,000 or between \$75,000 and \$100,000 or was it over \$100,000?

[INTERVIEWER NOTE: IF EXACTLY \$75,000 ENTER AS '2. \$75,000-\$100,000'. IF EXACTLY \$100,000 ENTER AS '3. OVER \$100,000']

- 1. \$50,000-\$75,000
- 2. \$75,000-\$100,000
- 3. Over \$100,000
- 8. (Don't know)
- 9. (Refused)

H7. What is the highest level of education you have completed?

- 01. Less than high school

- 02. High school graduate or equivalent (e.g., GED)
- 03. Attended some college (includes junior/community college)
- 04. Bachelors degree
- 05. Advanced degree
- 00. (Other, Specify)
- 98. (Don't know)
- 99. (Refused)

## 5.1.2 Nonparticipant Survey



ComEd Appliance  
Recycling Nonparticipa