



**Energy Efficiency / Demand Response
Plan: Plan Year 4 (6/1/2011-5/31/2012)
Evaluation Report:
Residential Fridge and Freezer
Recycle Rewards Program**

FINAL

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Commonwealth Edison Company**

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E. Executive Summary

The goal of this report is to present a summary of the findings and results from the evaluation of the Program Year 4 (PY4) Residential Fridge and Freezer Recycle Rewards (FFRR) program. The FFRR program was designed to achieve energy savings through the retirement and recycling of older, inefficient refrigerators, freezers, and room air conditioners (Room ACs). 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.

E.1 Evaluation Objectives

The objectives of the evaluation are to: (1) quantify net energy and peak demand savings impacts from the program during Program Year 4 (PY4); and (2) to determine key process-related program strengths and weaknesses and provide recommendations to improve the program.

E.2 Evaluation Methods

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

Table E-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
	Participating Retailers	Contacts from Program Implementer	Representatives from all three participating retailers	3	August 10, 15 and 28, 2012
	Used Appliance Dealers	Purchased data from Scientific Telephone Samples	Representatives from non-participating used appliance dealers	5	Aug. 24-Sept. 1, 2012
CATI Phone Surveys	Program Participants	Tracking Database	Stratified Random Sample of AR Program Participants	200 Total – 150 Refrig., 50 Freezer, 19 Room AC	August 2012

E.3 Key Impact Findings and Recommendations

The following list summarizes the key impact findings and recommendations from the study:

Savings Impacts:

Finding. The starting PY4 net energy savings goal for this program was 33,371 MWh, which represents an 8% increase over the final PY3 goal of 30,900 MWh. The ex-ante net energy savings was 62,627 MWh. The evaluation-verified energy savings is somewhat higher – 72,302 MWh, for an overall realization rate of 1.15. Although the evaluation team and ComEd both performed the same calculation, applying the PY2 regression coefficients to the mix and characteristics of units collected in PY4, the evaluation team was unable to reproduce ComEd’s numbers. The differences lie solely in the details of the gross savings calculation since the part-use factors and Net-to-Gross ratios used in both calculations are identical.

Recommendation. ComEd should revisit how it calculates ex-ante savings.

Verification Rate:

Finding. The evaluation verification rate for this program is 1.00. This is based on 100% of phone survey respondents answering “yes” to a question asking if they recalled having their refrigerator, freezer and/or Room AC picked up by JACO.

Tracking Data Issues:

Finding. As in past evaluations, our review of the tracking data provided to the evaluation team also uncovered some problems, most notably that there was incomplete data in several fields. Although there has been some improvement in this area, lack of complete data in certain fields continues to hamper evaluation efforts.

Recommendation. As in past evaluations, we continue to recommend the program tracking data receive periodic reviews for data quality and completeness. Data exported for the evaluation team should also be checked for anomalies. Incomplete data fields need to be populated *where feasible*, particularly those data fields that are critical to the evaluation, such as appliance brand, model number, age/year manufactured, size, configuration and location. In addition, information obtained from participating customer phone surveys can be used to plug missing data fields where applicable (i.e., for fields related to the location of the prior unit, and whether or not the unit was replaced).

In-Situ Metering Study:

Finding. As part of the PY4 evaluation activities, an in situ metering study was completed. The results of this study are being used in the Illinois Statewide TRM to estimate deemed savings values in future years, and we commend this approach.

A total of 51,050 units was picked up by the program during PY4. Over 80% of these units were refrigerators, another 14% were freezers, and just 2% were Room ACs. Table E-2 below provides the breakdown of recycled units by measure type

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

Measure Type	Number of Units	Percent of Units
Refrigerators	43,097	84%
Freezers	7,140	14%
Room Air Conditioners	813	2%
Total Units Recycled	51,050	100%

Source: Program tracking database

Table E-3 below provides the PY4 evaluation-verified gross and net energy and demand savings. The evaluation-verified net energy savings shown in this table is approximately 115% of the ex ante net energy savings estimates. The evaluation-verified savings is based on an in-depth review and analysis of tracking data, application of the deemed savings factors approved in the Illinois Commerce Commission’s Order 10-0570, dated December 21, 2010, and a separate verification of units being picked up by the program via telephone survey.

Table E-3. PY4 Evaluation Verified Savings Estimates

Savings Estimate	Energy Savings (MWh)	Demand Savings (MW)
Ex Ante Gross Savings	-	-
Ex Ante Net Savings	62,267	-
Evaluation-Verified Gross Savings	97,039	14.8
Evaluation-Verified Net Savings	72,302	11.0

Source: EM&V analysis

The starting PY4 net energy savings goal for this program was 33,371 MWh, which represents a strong 8% increase over the final PY3 goal of 30,900 MWh. The ex-ante net energy savings was 62,627 MWh. The evaluation-verified energy savings is somewhat higher – 72,302 MWh, for an overall realization rate of 1.15. Although the evaluation team and ComEd both used the same algorithm, applying the PY2 regression coefficients to the mix and characteristics of units collected in PY4, the evaluation team was unable to fully reproduce ComEd’s numbers. The differences lie solely in the details of the gross savings calculation since the part-use factors and Net-to-Gross ratios used in both calculations are identical. These details are in how the regression equation is actually applied, and include the following:

- The ComEd calculation assumes it is a single door if it is not a side-by-side or bottom door unit. The Evaluation team calculation only assumes it is a single door if the type specifies “Single Door”).
- The ComEd calculation computes the age by subtracting 2009 from the manufacturer year, while the Evaluation team calculation takes the year of the pickup date minus the manufacturer year.
- If the year of manufacture is missing, the ComEd calculation backfills it with 1995, while the Evaluation team backfills it with 1987, which was the average in the PY3 evaluation.
- If amps is 0, it is backfilled with 5 by ComEd, while the Evaluation Team uses a model to impute missing amps values (as was done in PY2).
- For the age15plus variable, the ComEd calculation flags if the manufacturer year is less than 1994, while the Evaluation team uses less than 1992 to flag the value.

E.4 Key Process Findings and Recommendations

Program Incentive Levels:

Finding. The program appears to be in a very good position as the rebate amount, convenience of service, and guarantee that each appliance will be recycled in a responsible manner, seem to be in balance. The program continues to achieve higher unit counts with little change in customer satisfaction.

Recommendation. It would appear that maintaining current rebate levels, with occasional 'special' offerings will be an effective method of reaching higher savings targets.

Participant Satisfaction:

Finding. Customers and retailer partners are highly satisfied with the program. Continuing to maintain such high levels of satisfaction during PY4, given the growth of the program, is an outstanding accomplishment.

Recommendation. It will be important, as the program continues to progress, to routinely review program processes and procedures in order to maintain these satisfaction levels.

Environmental Benefits of Program:

Finding. All three retail partners who participate in the program are motivated by the environmental benefits of the program in addition to the competitive advantage that an additional rebate provides.

Recommendation. If the program wishes to pursue additional retail partnerships, the program's tie-in to green corporate practices may be one benefit to highlight. A previous relationship with JACO for other recycling programs or disposal services is also a key factor in two retail partnerships.

Customer Education:

Finding. The cost to operate the recycled unit is viewed as an important reason for disposal by just over one-third of recyclers of both unit types (refrigerators and freezers).

Recommendation. This is an area where further education of ComEd customers might be helpful by pointing out the considerable expense associated with running these older, less efficient units. We recommend that ComEd include messaging in its program marketing literature and advertising to highlight the cost per year of operating older refrigerators and freezers.

1. Introduction to the Program

1.1 Program Description

The FFRR program was designed to achieve energy savings through the retirement and recycling of older, inefficient refrigerators, freezers, and Room ACs. 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 program’s primary focus is on resource acquisition, that is, cost-effective energy savings. It is **not** seeking to transform the market for recycling older appliances; for example, by developing the private sector’s capability to provide recycling as a paid-for service.

The table below shows the energy saving goals of the program in PY4 as provided by the ComEd EM&V manager.

Table 1-1. ComEd Residential Fridge and Freezer Recycle Rewards Program PY4 Goals

Goals	Net MWh Goal	Associated Units ¹
PY4	33,371	42,000
Ex-Ante Net Savings PY4²	62,627	51,050

Source: ComEd Program Staff

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

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

Program savings are based on the accelerated removal, dismantling and recycling of these older, inefficient units. The FFRR program began operation in June 2008. Program Year 4 (PY4) began on June 1, 2011 and ended on May 31, 2012. The program offers free pickup and recycling services for older, working refrigerators and freezers, and Room ACs that households no longer want.

The program is marketed through a combination of methods – bill inserts, radio ads, newspaper and newsletter advertisements, online marketing, and word-of-mouth. ComEd also used a direct mail campaign 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 FFRR Program in PY4. 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; program tracking and reporting; and incentive fulfillment.

1.1.1 Measures and Incentives

In exchange for participating in the program, ComEd pays participants an incentive for up to two recycled refrigerators or freezers per scheduled pickup. In order to meet aggressive PY4 goals, ComEd continued to work closely with the three retailers that were involved in the program in PY3; two national chain stores and a local appliance retailer. ComEd used a combination of higher incentives and "specials" to promote the program. In the spring (ending on May 31, 2012), a special, short term offer incentive was \$50 but was subsequently reduced to the standard level of \$35. Participants contributing working Room AC units also received the full program incentive up until February 1, 2012, at which time the incentive was reduced to \$10. Operational Room AC units can only be picked up from sites where the recycler, JACO, is already collecting a refrigerator and/or freezer.

1.2 Evaluation Questions

The evaluation sought to answer the following key researchable questions:

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? 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 PY3? If so, how, why, and was this an advantageous change?
2. How do customers become aware of the program? What marketing strategies could be used to boost program awareness?
3. 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?
4. How well are retail partnerships working? Are retail partner training, customer marketing and customer sign-up working well? How can the retail partnership program be improved?
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?

2. Evaluation Methods

This section describes the analytic methods and data collection activities implemented as part of the PY4 process and impact evaluation of the FFRR program, including the data sources and sample designs used as a basis for the data collection activities.

Note that the approach described in this section is based on the EM&V activities completed during the PY4 evaluation.

2.1 Analytical Methods

2.1.1 Impact Evaluation Methods

2.1.1.1 Evaluation-Verified Gross Savings Method

The evaluation-verified savings for the FFRR program are based on an in-depth review and analysis of tracking data, application of the deemed savings approach as approved in the Illinois Commerce Commission's Order 10-0570, dated December 21, 2010, and a separate verification of units being picked up by the program via telephone survey. The verification was based on a screening question in the telephone survey to verify the appliances were picked-up as reported in the program tracking database.

The energy (kWh) and demand (kW) savings for this program are straightforward. All values in the calculation are deemed, with the exception of the quantity, which is verified through a telephone survey. Per the ICC order, savings per unit are based on the gross savings impact approach verified in PY2 and filed by ComEd as deemed values, which reflects the use of a regression based approach. Savings for PY4 are computed by applying the PY2 regression coefficients to the mix and characteristics of units collected in PY4. Evaluation verified savings are computed by taking the savings for each unit, summing across all units collected, and multiplying times the adjustment (if any) for installation.

2.1.1.2 Research Findings Gross Savings Method

Refrigerators and Freezers.

In-Situ Metering Study. The research findings gross savings estimates for both energy (kWh) and peak demand (kW) rely on regression equations developed from the metering study of *in situ* metered units. This methodology corresponds to Option D (Calibrated Simulation) in PJM's Manual 18b, Energy Efficiency Measurement and Verification. This Option allows the use of a model, in this case the regression equations that have been calibrated using actual data (in this case, the *in situ* metered data). Gross energy savings are expressed in terms of Full-year Unit Energy Consumption (UECs). UEC estimates have been made using a regression-based approach that models full-year energy savings as a function of several independent variables. These include appliance characteristics (e.g., age and size), and several dummy variables (e.g., unit type, configuration, whether the unit was manufactured before 1993 or not).

Data collection (Metering Study). The metering study collected 5-minute interval demand and average kWh (from power meters), 5-minute interval internal temperature data, and light usage (on/off). The metering was done on a staggered basis between July 2011 and March 2012. The evaluation team also recorded appliance characteristics that have been associated with energy consumption in previous metering

studies, including characteristics that are already recorded by the ComEd FFRR program. Each unit was metered for an average of three weeks before being removed for final deconstruction and recycling through the FFRR program.

In total, 121 refrigerators and 34 freezers, resulting in 130 valid sample points for analysis were successfully metered. This sample was drawn so as to be representative of the population of units collected by the program during the 12 months immediately preceding the start of *in situ* metering. The sample of 130 units is designed to meet ComEd’s requirement for 90/10 confidence/precision.

Savings Algorithm. The algorithm for estimating kWh and kW savings is derived from the metering study and is specified as a regression equation. The final regression model below resulted from sensitivity analysis of multiple alternative models conducted to date (including re-estimation of the previous program model) and stakeholder feedback.¹ It is to be used for estimating gross UEC for refrigerators and freezers recycled through the ComEd FFRR program.

Table 2-1. ComEd in Situ Metering Model (Model C)
(Dependent variable: Annual UEC in kWh) (n=130, R2 = 0.38)

Variable Description	Coefficient	Robust t-statistic ²
Intercept	-103.39	-0.45
Freezer dummy (=1 if freezer)	433.40	2.73
Side-by-side dummy (= 1 if side-by-side)	614.91	3.96
Chest dummy (= 1 if chest freezer)	-490.78	-2.55
Single door dummy (= 1 if single door)	-797.90	-1.80
Age	23.93	3.11
Pre-1993 dummy (=1 if manufactured pre-1993)	289.82	2.00
Cubic Feet	13.52	1.28
Manual defrost dummy (= 1 if manual defrost)	-381.23	-3.03

Source: EM&V analysis

This model is preferred to the previous approach and was chosen for this analysis because it is specific to ComEd’s customers and climate zone. It is based on primary data from 130 PY4 ComEd program units, and applies to typical weather conditions in ComEd territory. As noted previously, this model results in

¹ As detailed in a memo dated August 10, 2012 and previously provided to ComEd and ICC staff, detailing results of the metering study (ComEd Fridge Freezer Recycling_PY4 Metering Study_Results_08-10-2012.docx).

² Robust t-statistic use a heteroskedasticity-consistent covariance matrix (HCCM) to adjust standard errors for observed heteroskedasticity (related to magnitude of observed & Stage 1 UEC estimates). A version of HCCM called HC3 was used that has improved small-sample properties (n<about 250) as compared to the HC0 robust estimator of variance (a.k.a. Huber or White estimator). The HC3 estimator was first proposed by MacKinnon and White (1985) and is available in Stata 11. Source: Long and Erwin (2000).

much lower gross savings estimates than the program has used in previous years, on the order of half of prior evaluations’ per-unit kWh and kW savings estimates.

The primary reason for this large difference and lower per-unit kWh and kW savings estimates is that the prior year estimates were based on the Department of Energy (DOE) laboratory-based metering protocols. These protocols are a prescribed procedure for metering unit energy consumption, which includes metering each unit at a constant ambient temperature of 90 degrees Fahrenheit. The advantage of this procedure is that it is uniformly applied under a controlled setting, and therefore the metering results can potentially be applied to units in any jurisdiction. The disadvantage in using the DOE metering protocols is that the metering results do not reflect real-world (*in situ*) usage conditions. The DOE-based models have been the best available option for this program evaluation to date; however, with the ComEd *in situ* metering study newly, we now have primary data and a model that is based on a representative sample of metering for ComEd’s own customers.

To arrive at final program savings for PY4, the regression equation expressed above was then 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 telephone survey of program participants.

Table 2-2 below lists the average value of each of these variables for the refrigerators collected by the program in PY4.

Table 2-2. Average Refrigerator Characteristics for In Situ Metering Model Independent Variables

Independent Variables	
Freezer dummy (=1 if freezer)	0
Side by side dummy (= 1 if unit is side-by-side)	19.0%
Chest dummy (= 1 if chest freezer)	0.7%
Single door dummy (= 1 if single door)	6.9%
Age	24.8
Pre-1993 dummy (=1 if manufactured pre-1993)	69.2%
Cubic Feet	19.0
Manual defrost dummy (= 1 if manual defrost)	12.0%

Source: EM&V analysis

To compute energy savings for the average refrigerator, the coefficients from Table 2-1 are applied to the values from Table 2-2. A similar procedure is used to estimate UECs for freezers.

These regression values should continue to be used by ComEd to estimate and track ex-ante savings going forward into Program Year 5 until otherwise instructed.

Part-Use Adjustment. This full-year UEC value was then adjusted for part-use, based on self-reported findings from the completed telephone surveys. The responses from the phone surveys reflect the actual intended use of units by a representative sample of program participants. 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 review document (included in the appendices) 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 Energy Efficiency Rating (EER) for equipment of this type

1000 is the conversion factor from Watts to kW

2.1.1.3 Evaluation-verified Net Savings Analysis

The evaluation-verified net savings for the FFRR program is based on the application of the deemed Net-to-Gross ratios approved in the Illinois Commerce Commission's Order 10-0570, dated December 21, 2010. These values were verified in the evaluation results in Program Year 2. They are based on participant self-reported information from the telephone surveys on alternative disposal methods in the program's absence. Responses that correspond to a method that permanently removes the unit from the grid are considered free riders.

2.1.1.4 Research Findings Net Savings Analysis

The primary objective of the research findings net savings analysis for the FFRR 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. This program is functioning in a dynamic market where there are an increasing number of disposal options outside of the ComEd program. These options include traditional methods such as giving the unit away to a friend or relative, selling the unit to a used appliance dealer, or paying to have the unit taken away and permanently recycled or destroyed. In addition, there are new avenues for disposal, such as using Craigslist.com to identify a purchaser or taker of the appliance or having an appliance retailer remove the unit after a new one is purchased.

We have heard anecdotally that big box appliance retailers would dispose of the unit by recycling it on their own if ComEd's program were not available. To date, ComEd's program has had only modest participation by appliance retailers, so this channel has not had a significant influence on the program NTGR. We expect that this is likely to change in the future as program participation goals increase and the program turns increasingly to this channel as a source of units for the program.

To-date, we have relied exclusively on participant self-reported information on alternative disposal methods to calculate the program NTGR. However, our belief is that a more in-depth market assessment

was needed to fully understand how this market would function if the program were not available. For PY4, we conducted a comprehensive market assessment to provide a more complete understanding, for each sub-segment of the program (retailer pick-ups, traditional JACO recycling) of how the unit would be disposed of absent the program. This assessment included the following:

- *In-depth interviews with participating retailers.* These findings were used to determine the disposition of used appliances absent the program for those who purchase a new unit via these channels and who indicated they would have had the retailer remove the unit if the ComEd program had not been available.
- *In-depth interviews with the largest used appliance dealers in the ComEd territory.* Anecdotally we had heard that units over 10 years old have little or no resale value and are generally destroyed. These interviews served to corroborate or correct this information. This information was to be used to interpret responses from those with older units so that those that aren't credible will be eliminated (i.e., a response that a 25-year old unit would have been sold to a used appliance dealer would be thrown out).
- *Telephone surveys with participating customers.* As in previous years, we relied heavily on findings from telephone surveys of participating customers to determine how their units would have been disposed of if the program hadn't picked them up. One difference this year was that the survey probed in greater detail on their possible use of new avenues for disposal, such as using Craigslist.com to sell or transfer a unit to another user. We are unaware of any evaluation studies to-date that have explored this issue in detail, yet this disposal method is rapidly becoming more mainstream for getting rid of unwanted items.

For PY4, 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

As in previous years, the process evaluation consisted of telephone surveys with a large sample of program participants. In addition, in-depth interviews were conducted with participating retailers, and with five used appliance dealers, to provide a more comprehensive picture of the markets being addressed by the program.

Participant 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).

Retailer Surveys. The interviews with participating retailers focused on their practices for disposing of appliances that they pick up at the time a new appliance is being purchased and delivered (e.g., do

they recycle, discard at land fill, or feed into secondary market, and does this vary by age or condition of the appliance).

Used Appliance Dealer Surveys. The interviews with used appliance dealers sought to gauge whether owners/managers of these companies are noticing any change(s) to the secondary appliance market, as a result of consumers choosing to participate in ComEd’s FFRR program.

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 2-3 below summarizes the key data collection activities in support of this evaluation.

Table 2-3. 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
	Participating Retailers	Contacts from Program Implementer	Representatives from all three participating retailers	3	August 10, 15 and 28, 2012, Dec. 13, 2012
	Used Appliance Dealers	Purchased data from Scientific Telephone Samples	Representatives from non-participating Used Appliance Dealers	5	August 24 – September 1, 2012, Dec. 14, 2012
CATI Phone Surveys	Program Participants	Tracking Database	Stratified Random Sample of AR Program Participants	200 Total – 150 Refrig., 50 Freezer, 19 Room AC Recyclers	August 2012

† Note the number of appliances represented exceeds the number of completed surveys. This is because some interviewees had two or more measures.

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

Evaluation Verified Impact Evaluation

The evaluation-verified savings for the FFRR program is based, in part, on application of a factor from the telephone survey reflecting a separate verification of units being picked up by the program. The

verification was based on a screening question in the telephone survey to verify the appliances were picked-up as reported in the program tracking database.

Research Results Impact Evaluation

Estimation of gross savings/UECs. The tracking database was a key source of data for the impact analysis. All of the required data inputs to the regression equation used to develop final estimates of the research findings gross unit energy consumption for refrigerators and freezers were obtained from the program tracking database. The telephone 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. The secondary research, retailer interview findings and telephone surveys with participants provided all inputs needed for the calculation of the program's research findings part-use factor and net-to-gross ratio as discussed below.

Part-Use Factor. The Part-use factor is used to adjust annualized Unit Energy Consumption values (which presume 8,760 hours of use) for the actual hours of operation. The part-use factor accounts 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 from a unit that would have been used only three months of the year is only one-quarter (3/12) the savings from a unit with year-round use. Participant survey responses provided information on the self-reported months of use for the unit if the program had not removed it, and these are used to calculate the part-use factor.

Net-to-Gross Ratio. The participant survey also provided: (1) the self-reported percentage of recycled refrigerators that would have been kept by a household but not used, and (2) the self-reported percentage of refrigerators that would have been discarded by a household through a method in which the refrigerator would have been destroyed. Units that would have been kept but not used and those that would have been discarded and destroyed absent ComEd's program are considered free riders. All of these components were used in the determination of the program's NTG ratio, which was calculated upon the completion of PY4. Self-reported findings from the telephone survey of program participants was the primary data source for both the research findings part-use factor and the research findings net-to-gross ratio. For the research findings Net-to-Gross ratio, the primary data sources were the Participating Customer survey (for units that were not replaced), and Participating Retailer surveys (for replaced units). It was also planned that the Used Appliance Dealer survey findings could be used to validate the self-reported findings from the Participant survey. Because of the relatively small sample size and the fact that those interviewed did not provide very specific responses to questions regarding the maximum age at which units would be resold into the secondary market, the findings proved to be too limited to inform the program net-to-gross ratio.

Process Evaluation

The process evaluation relied primarily on two data sources: program staff interviews, and a telephone survey of program participants. Retailer surveys largely focused on issues related to the impact portion of the evaluation.

Retailer Surveys. The interviews with participating retailers focused on their practices for disposing of appliances that they pick up at the time a new appliance is being purchased and delivered (e.g., do they recycle, discard at land fill, or feed into secondary market, and does this vary by age or condition of the appliance).

Participating Customer 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).

2.3 *Sampling Plan*

Participant survey. The sample of FFRR 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 1,134 participants who recycled more than one of the same types of a major appliance were dropped from the survey effort for ease of survey administration. (Also, 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, 2,169 participants were dropped because of duplicate or missing phone numbers or because the tracking database indicated they were a business. 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 44,956 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.³ Quotas were then set for each stratum. The Freezer strata were oversampled to ensure sufficient data would be available to support the impact and process analysis. Because of the oversampling, weights were then constructed for each stratum that reflects that stratum’s share of the FFRR program population.

The survey staff were then instructed to randomly select and dial participants until they had reached the following quotas – 150 Refrigerator Recyclers (some with ACs) and 50 Freezer Recyclers (some with ACs), for a total of 200 completed surveys. There was no separate quota for Room AC Recyclers. Table 2-4 shows the population sizes and number of completed surveys for each of the six strata.

³ Participants who recycled both a refrigerator and a freezer were randomly assigned a major appliance for the survey to limit survey fatigue.

Table 2-4. PY4 Participant Survey Population and Sample Sizes by Stratum

Strata (Types of Units Recycled)	Population Size* (N)	Completed Surveys (n)
Primary Refrigerator	7,688	33
Secondary Refrigerator	32,761	103
Primary Refrigerator and AC Unit	177	4
Secondary Refrigerator and AC unit	479	11
Freezer	5,989	40
Freezer and AC Unit	114	4
Refrigerator, Freezer and AC Unit	38	0
Room AC Unit	4	0
Total	48,161	200

* Source: PY4 FFRR Participant Survey Sample Frame from Program Tracking Database

2.4 Sampling Error

Table 2-5 gives population sizes, completed interviews and the associated statistical confidence intervals for each appliance type. A 90% confidence interval was used in the analysis.

Table 2-5. PY4 Participant Survey Population, Sample Sizes and Sampling Error by Appliance Type

Strata	Population Size* (N)	Completed Surveys (n)	Sampling Error (90% CI)
Recycled Refrigerators	43,097	151	6.86%
Recycled Freezers	7,140	44	10.84%
Totals	50,237	200	5.90%

*Source: PY4 FFRR Participant Survey Sample Frame from Program Tracking Database

2.4.1 Survey Disposition

Table 2-6 shows the final dispositions for the 2,225 program participants we attempted to contact for this evaluation. As the table shows, we completed interviews with 200 participants, or 8.99%. We were unable to reach 47% for a variety of reasons such as no one answering, an answering machine, or a busy signal. Another 8% requested to be called back later to complete the survey but did not end up doing so. There were problems with the phone number, such as a disconnected number, for 11%. Finally 20% of participants who answered refused to participate in the survey.

The remaining reasons why surveys were not completed included participants terminated mid-interview (2%), the participant claimed they signed up for the program but the appliance was never picked up (0.09%), or ComEd was not their electric utility (0.31%). For these latter two categories, we cannot say if the participant database included some people in error or if these respondents had recall problems.

Table 2-6. Participant Survey Sample Disposition

Sample Disposition	Customers	%
Participants Attempted to Contact	2,225	100%
Completes	200	8.99%
Appliance not picked up	2	0.09%
Appliance type not known	27	1.21%
Electric company not ComEd	7	0.31%
Refusal	441	19.82%
Unable to Reach	1044	46.92%
Language Barrier	34	1.53%
Phone Number Issue	236	10.61%
Non-Specific Callback/Appointment Scheduled	183	8.22%
Mid Interview Terminate	51	2.29%

Source: PY4 FFRR Participant Survey

3. Evaluation Results

This section presents the results of the evaluation-verified impact and process evaluations of the FFRR program during PY4.

3.1 Impact Evaluation Results

3.1.1 Verification and Due Diligence

Participant survey results continue to indicate that the program tracking database correctly records units recycled as indicated by a verification rate of 100% to the question, “our records show that you had (appliance description) picked up by ComEd’s subcontractor JACO, is that correct?”. Therefore the number of units by appliance type as derived from ComEd’s tracking data, and shown below in Table 3-1 are valid. Given modest changes in the program design, this topic was not revisited. Greater detail is provided in the PY1 Report that provides more information.

3.1.2 Tracking System Review

The FFRR tracking data for PY4 contained 51,050 records which included a record 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.

3.1.2.1 Distribution by Appliance Type

About 84% of these units were refrigerators, another 14% were freezers, and the remaining 2% were Room ACs. 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	43,097	84%
Freezers	7,140	14%
Room Air Conditioners	813	2%
Total Units Recycled	51,050	100%

Source: EM&V analysis

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. FFRR Program: Appliance Type Documenting Number of Units Turned In

Refrigerators	Freezers	Room AC Units	Number of Applications	Number of Participants
		1	1	4
	1		1	5,905
1			1	39,476
	2		2	84
2			2	972
1		1	2	587
1	1		2	911
	1	1	2	110
1	1	1	3	38
	2	1	3	4
2		1	3	69

Source: Program Tracking Database

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

- There are 48,160 unique participants, and most recycled one unit (39,476 refrigerators, 5,905 freezers, 4 Room ACs).
- A total of 1,971 participants (4%) recycled 2 major units (defined as a refrigerator and/or freezer), and of these, about 0.02% 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 were 4 participants who recycled only a single Room AC unit
- ComEd does not pay pick-up costs for the above noted point.

3.1.2.2 Problems Found with Program Tracking Data

As in past evaluations, our review of the program tracking data provided to the evaluation team also uncovered some issues, most notably they include:

Incomplete records for several 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). Also, we commend ComEd and JACO for continuing its practice of improving the completeness of the Room AC data fields, which started in PY3. The AC size field is still unpopulated, however, making it difficult to use the remaining data to calculate per-unit energy savings. However, some of the tracked fields continued to be sparsely populated in PY4, or the entry was designated ‘unknown’ or ‘N/A’. These included:

Prior Location of Recycled Unit. A substantial number of records had ‘other’ or ‘unknown’. Possibly these are default values in the database, but they are not useful for evaluation purposes. JACO should gather this information during the scheduling call, if at all possible.

Is Unit Replaced? This, potentially, is an important field for evaluation, however, in many cases it is populated with ‘unknown’. This represents an improvement over PY3, when this information was never collected. Again, this should always be gathered by JACO during the scheduling call.

Prior Unit Usage, Season When Used. These fields are rarely populated. In PY3, it was recommended they be dropped from the database, and this recommendation still holds. They are not used by the program or by evaluation.

JACO noted that the missing customer survey data is almost exclusively from the retail participants. Following the PY3 evaluation recommendations, JACO resolved to develop strategies for collecting the customer survey data from retail customers. . In PY4, JACO developed several strategies for securing customer survey data from retail customers. These strategies have delivered some survey data from retail customers in PY4. However, survey data was still not collected from the majority of retail participants. JACO still has some ideas for increasing the capture rate further that they intend to present and discuss with ComEd in the future. In addition, information obtained from participating customer phone surveys can be used to plug missing data fields where applicable (i.e., for fields related to the location of the prior unit, and whether or not the unit was replaced).

Although we were able to complete the evaluation without these incomplete data, it would be better if these problem areas could be addressed in the future. Data exported for the evaluation team should also be checked for anomalies.

3.1.3 Gross Program Impact Parameter Estimates

3.1.3.3 Refrigerators and Freezers

Evaluation-verified savings are based on data from extensive research elsewhere, specifically, regression equations for estimating refrigerator and freezer Unit Energy Consumption (UEC) that are based on a large database of over 2,000 previously metered units in California based on the U.S. Department of Energy’s (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 were specific to ComEd’s program.

3.1.3.4 Room Air Conditioners

The savings contribution of this measure to the program is extremely small – it accounts for only 0.1% of program savings. The deemed savings memo called for the energy consumption of residential Room AC units to be estimated using an engineering algorithm. Although more data are included in the tracking database than in PY3, there still is insufficient data to do the calculation. However, since the savings contribution of this measure to the program is extremely small, we have elected to accept ComEd’s ex-ante gross savings estimates.

3.1.4 Gross Program Impact Results

Table 3-3 below provides the PY4 Evaluation-Verified Gross Savings kWh savings estimates for each measure. The resulting verified total program gross savings is 97,039 MWh.

Table 3-3. PY4 Gross Impact Parameter and Savings Estimates (MWh)

Gross and Net Impact Parameter and Savings Estimates				Total Program
	Refrigerators	Freezers	Room AC	
Total units recycled through the Program	43,097	7,140	813	51,050
Verified Annual kWh Savings Impacts				
- Verified annual Gross kWh savings per unit (full-load operating hours)	2,193	2,321	---	---
- Part-Use Factor	87%	89%	---	---
- Verified annual Gross kWh savings per unit adjusted for part-use	1,908	2,066	80	---
Verified Program Gross MWh	82,225	14,749	65	97,039

Source: EM&V Analysis

Table 3-4 below provides the PY4 Evaluation-Verified Gross Savings kW savings estimates for each measure. For PY4, for refrigerators and freezers, the electricity saved by the program is based on the deemed values, derived from the Program Year 2 evaluation. For Room AC units, ComEd’s ex-ante planning estimates for per-unit kW savings were used.

Table 3-4. PY4 Gross Impact Parameter and Savings Estimates (kW)

Gross and Net Impact Parameter and Savings Estimates				Total Program
	Refrigerators	Freezers	Room AC	
Total units recycled through the Program	43,097	7,140	813	51,050
Verified Annual kW Savings Impacts				
Annual Gross kW savings per unit (full-load operating hours)	0.30	0.26	0.04	---
Verified Program Gross kW	12,929	1,856	33	14,818

Source: EM&V Analysis

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 deemed Program Net-to-Gross (NTG) ratios of 0.73 for refrigerators, 0.82 for freezers, and 0.72 for Room ACs. 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.

3.1.6 Evaluation-Verified Net Program Impact Results

Table 3-5 below provides the evaluation-verified net impact results for the PY4 FFRR program. As this figure shows, the ex post program-level fourth-year evaluation-verified net energy savings estimate resulting from this evaluation is somewhat higher – 72,302 MWh, for an overall realization rate of 1.15. Although the evaluation team and ComEd both used the same savings algorithm, applying the PY2 regression coefficients to the mix and characteristics of units collected in PY4, the evaluation team was unable to fully reproduce ComEd’s numbers. The differences lie solely in the details of the gross savings

calculation since the part-use factors and Net-to-Gross ratios used in both calculations are identical. These details are in how the regression equation is actually applied, and include the following:

- The ComEd calculation assumes the refrigerator is a single door if it is not a side-by-side or bottom door unit. The Evaluation team calculation only assumes it is a single door if the type specifies “Single Door”)
- The ComEd calculation computes the age by subtracting 2009 from the manufacturer year, while the Evaluation team calculation takes the year of the pickup date minus the manufacturer year.
- If the year of manufacture is missing the ComEd calculation backfills it with 1995, while the Evaluation team backfills it with 1987, which was the average in the PY3 evaluation.
- If amps is 0, it is backfilled with 5 by ComEd, while the Evaluation Team uses a model to impute missing amps values (as was done in PY2).
- For the age15plus variable, the ComEd calculation flags if the manufacturer year is less than 1994, while the Evaluation team uses less than 1992.

Table 3-5. PY4 Evaluation-Verified Net Impact Parameter and Savings Estimates

Verified Annual Net MWh Savings Impacts	Refrigerators	Freezers	Room AC	Total Program
Verified Program Gross MWh	82,225	14,749	65	97,039
Net-to-Gross Ratio (1-Free Rider %)	0.73	0.82	0.72	---
Total Fourth-Year Evaluation-verified Net MWh Savings	60,161	12,094	47	72,302
Net MWh Savings Claimed by the Program				62,627
Net MWh Evaluation-verified gross realization rate				115%
Verified Annual Net kW Savings Impacts				
Verified Program Gross kW	6,120	1,014	33	7,166
Net-to-Gross Ratio (1-Free Rider %)	0.73	0.77	0.58	---
Total Fourth -Year Evaluation-verified Net kW Savings	4,478	777	19	5,273

Source: EM&V Analysis

3.2 Process Evaluation Results

The process evaluation component of the FFRR 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 and in-depth interviews with the ComEd Program Manager, participating retailers, and the used appliance haulers.

3.2.1 Process Themes

As indicated above, in Section 3, due to the way samples were drawn, participant survey results have been weighted. The weights were created to ensure that survey results are representative of the population of program participants by strata group.

3.2.1.1 Changes to Program

Program goals have increased substantially for PY4. The program targeted 50,000 units for pick up toward the goal of achieving a total of 33,371 MWh of net savings. The unit goal represents a 24% increase over the number of units picked up in PY3. The MWh goal, however, is only a slight increase, 1% over the PY3 ex-ante claimed savings. This reflects the program’s expectation of collecting somewhat newer, smaller (and less energy intensive) units as time goes on. In order to meet these increased goals, ComEd used a combination of higher incentives and ‘specials’ to promote the program. In the spring (and ending on May 31, 2012) a short term special offer rebate was \$50 but was subsequently reduced to the standard level of \$35.

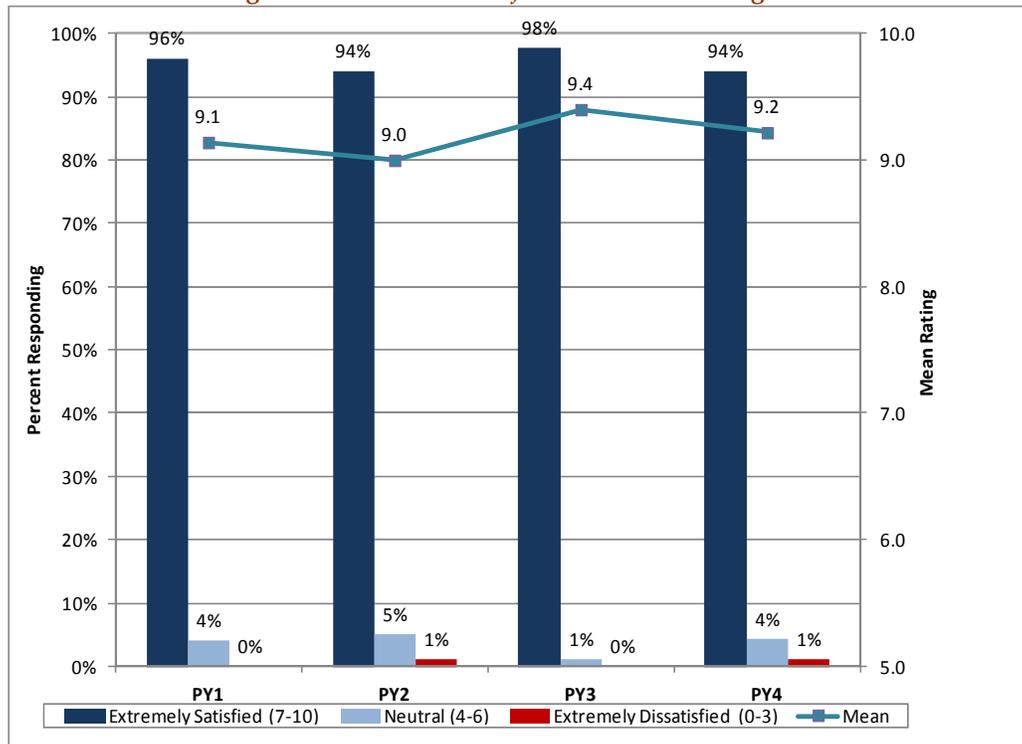
For PY4, ComEd continued to partner with three appliance retailers. One is a local retailer and the other two are national chain stores. The partnership with the local retailer began in PY1, when they began enrolling customers in the program at their single Illinois location. The partnerships with the two national chain stores began in PY3, and by the end of PY3, more than 80 of the retail stores in ComEd territory participated in the program. Retail partners are responsible for marketing the program to ComEd customers, verifying customer eligibility, enrolling customers in the program, and removing unwanted appliances from participant homes (usually upon delivery of a new appliance). The program implementer is responsible for providing ongoing training, point-of-sale materials, enrollment software and support, as well as ensuring that program tracking for units enrolled through retail partners is consistent with the standard program. Operational Room AC units are also eligible for pickup and recycling but can only be picked up from sites where JACO, the implementation contractor, 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 received the \$35 program rebate up until February 1, 2012, at which time the incentive was reduced to \$10.

Beyond retail partnerships, program marketing did not change substantially in PY4. The program distributes monthly bill inserts, changing the design and messaging each month and advertises through Valpak, a coupon mailing service. Customers learning about the program through other promotional efforts typically contact JACO directly and arrange for unit pick up.

3.2.1.2 Overall Program Satisfaction

Figure 3-1 below shows findings related to participant satisfaction with the program in general. Overall satisfaction among participants was quite high again this year, with 94% of respondents indicating they were satisfied with the service they received throughout their entire experience (rating of 7 or higher on a 0-10 scale), representing an average rating of 9.2. This is similar to prior years. For example, in PY3 98% of respondents indicated a rating of 7 or higher (with an average rating of 9.4).

Figure 3-1. Overall Satisfaction with the Program



Source: EM&V Analysis

We asked the respondents who had indicated an overall satisfaction rating of five or greater to describe what they particularly liked about the program. Top reasons for high satisfaction included the convenience or ease of the service (34%); not having to dispose of the appliance by oneself (27%), and the \$35 incentive (26%). Notably, these were the same top reasons given in PY3.

When asked how likely they were to recommend the program to a friend or colleague, 97% indicated a high likelihood of recommendation (rating of 7 or higher on a 0-10 scale). This proportion is identical to that in PY3.

Satisfaction with particular program components was also relatively high, with 85% of respondents indicating high satisfaction (rating of 7 or higher) with the size of payment they received and 88% of respondents indicating high satisfaction (rating of 7 or higher) with the amount of time it took to receive it. These satisfaction levels are similar to those in PY3 when 88% of respondents indicated high satisfaction with both the size of payment and with the time it took to receive it.

Just over one-third of respondents (36%) said they have seen a reduction in their energy bill since their appliance was removed, the same proportion as those who reported seeing a reduction in PY3. Respondents who had recycled a refrigerator through the program were more likely to have noticed energy savings than those who had recycled a freezer (44% vs. 21%).⁴ However, a little over half of the

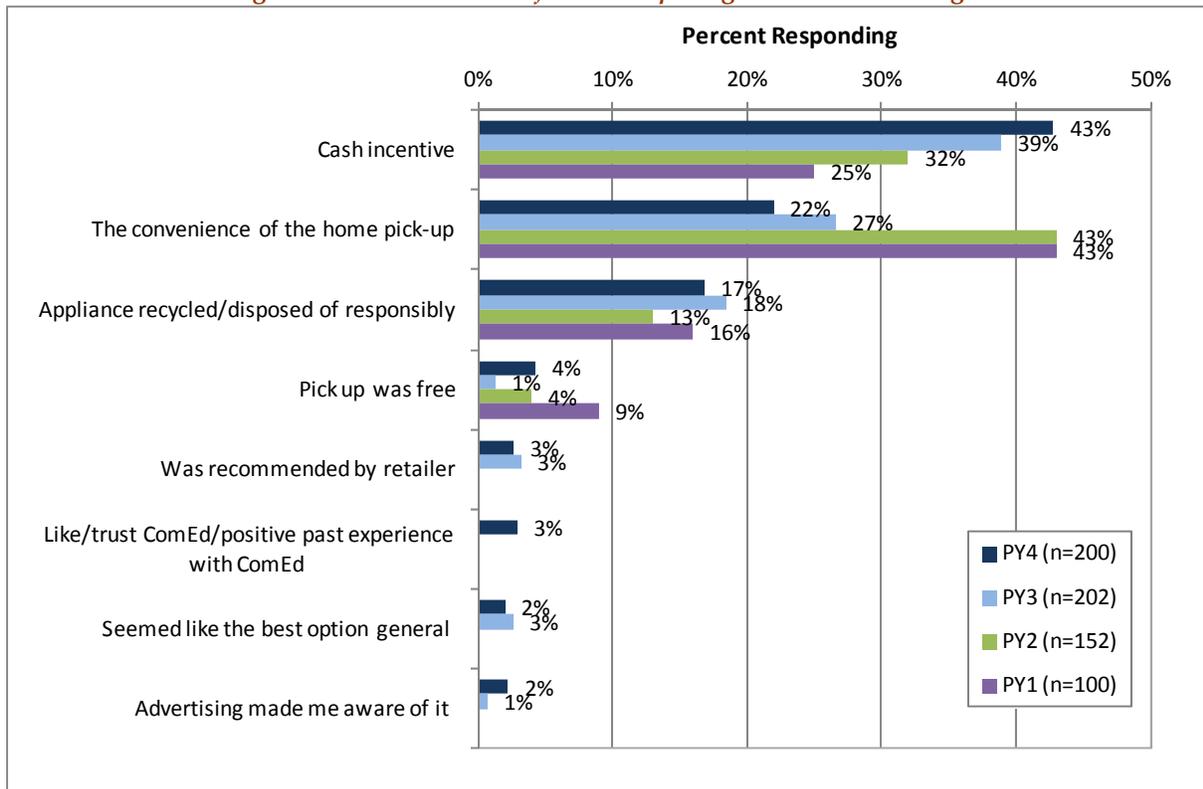
⁴ This analysis was conducted by comparing those who had recycled a refrigerator to those who had recycled a freezer. Participants who recycled both were excluded from the analysis as were those stating they did not know or who refused to answer. Chi-square test of significance, $p < .05$, $df = 1$.

respondents (53%) this year had not noticed a change in their electric bill and 10% were not sure if they had seen a decrease. The reasons for this are unclear. These are similar to the PY3 proportions in which 51% had not seen a decrease and 13% were not sure.

3.2.1.3 Drivers of Participation

The incentive level of \$35 per refrigerator or freezer appears to have had an effect on why customers chose to participate in the program. Overall, 43% of respondents this year indicated that it was the main reason they chose to participate in the program—similar to the 39% of respondents indicating the same thing in PY3. Nearly a quarter of respondents stated that the convenience of the home pick up was the main reason—similar to the 27% of respondents indicating the same thing in PY3. Rounding out the top reasons for participation were the environmental benefits, indicated by 17% of respondents (nearly the same as the 18% in PY3). A variety of other reasons for participation (each mentioned by three percent or fewer of participants) are also shown in Figure 3-2 below.

Figure 3-2. Main Reasons for Participating in the ComEd Program



* Responses mentioned by less than 2% of PY4 respondents are not shown.

Source: EM&V Analysis

3.2.1.4 Reasons for Disposing of the Appliance

Participants were asked why they disposed of their appliances through the program. Table 3-6 below summarizes the most important reasons provided.

Table 3-6. Reasons for Disposing of Appliance

Reasons for Disposing Unit	Percent Rating Reason As Important (score of 7 and higher)	
	Refrigerators	Freezers
Unit was a spare that I did not use very much	33%	50%
Unit was old, I wanted something with more modern features	46%	33%
Unit was expensive to run	38%	36%
I wanted a bigger unit	32%	29%

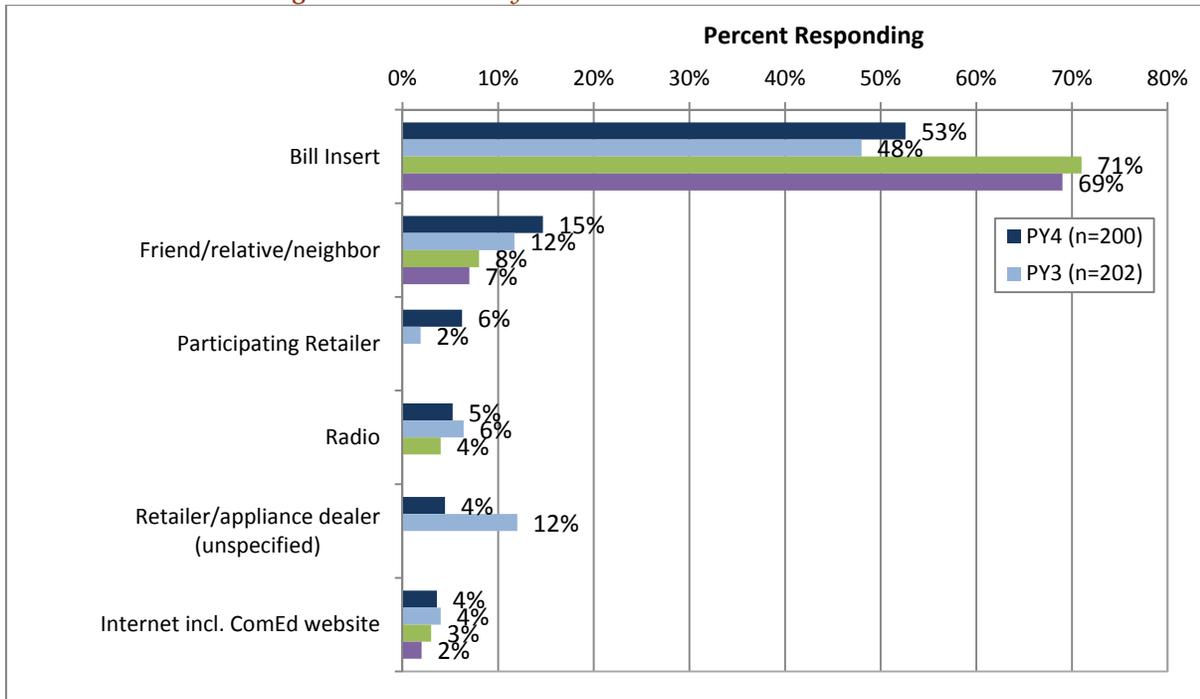
Source: EM&V Analysis

Across all FFRR respondents, the most important motivation was to upgrade their units to something with more up-to-date features. For comparison, in PY3 the top reason among those recycling a refrigerator was also to upgrade their units to something with more up-to-date features (46% of PY3 respondents), but among those recycling freezers the top reason was to get rid of the unit because it was not used very often (50% of PY3 respondents). Similar to last year, the cost to operate the unit among those recycling refrigerators and freezers was viewed as an important reason for disposal by just over one-third of the respondents. This may be an area where further education of ComEd customers is needed, to make them aware of the considerable expense associated with running these older units.

3.2.1.5 Marketing and Promotion Strategy

When asked unprompted how they had first learned about the program, over half of participants (53%) recalled seeing the program mentioned in a bill insert. Another 15% of respondents indicated that they first heard about the program from a friend, relative, or neighbor. These findings are similar to those in PY3 and are shown in the figure below.

Figure 3-3. How did you FIRST learn about the PROGRAM?



Source: EM&V Analysis

Retail partners market the program through in-store materials such as flyers, tear sheets, and refrigerator “cling” (stick-on advertising), most of which are provided by the ComEd program. One retail partner also advertises the program through newspaper and in-store ads, and community outreach (relying less on ComEd materials).

Sales associates are trained to discuss the program – including eligibility requirements – with appliance customers on the sales floor or at the point of sale, often in context of what they might do with an older unit. Sales associates at two retail partners are trained to ask a set of disposal questions, which in ComEd territory includes whether they are ComEd customers, disposal intentions for their unwanted or secondary appliance, and appliance eligibility. Prompts for haul-away options are also part of the point-of-sale software at two retail partners, and include utility haul-away options, where applicable.

3.2.1.6 Program Enrollment

Participants have multiple options to sign up for the program – they can call ComEd to schedule an appointment, go through the ComEd website, or they can signed up at one of the three participating retailers (through a kiosk or sales associate).

Distribution of Enrollment by Channel

Retailers have contributed an increasing proportion of sign-ups to the program – from 1% in PY1 to 10% in PY2 to 17% in PY3, to 21% in PY4. An analysis of program tracking data reveals the following breakdown of sign-ups among the various channels available (see Table 3-7).

Table 3-7. Distribution of Enrollment by Program

Channel	Room AC	Freezer	Refrigerator	Total
JACO pick up	813	6,937	32,463	40,213
Retailer Channel:				
Local retailer #1		88	6,458	6,546
National chain store – retailer #2		102	3,606	3,708
National chain store – retailer #3		13	570	583
Total	813	7,140	43,097	51,050

Source: Program tracking database

Retail partners market the program through in-store materials such as flyers, tear sheets, and refrigerator “cling” (stick-on advertising), most of which are provided by the ComEd program. One retail partner also advertises the program through newspaper and in-store ads, and community outreach (relying less on ComEd materials).

Sales associates are all trained to discuss the program – including eligibility requirements – with appliance customers on the sales floor or at the point of sale, often in context of what they might do with an older unit. Sales associates at two retail partners are trained to ask a set of disposal questions, which in ComEd territory includes whether they are ComEd customers, disposal intentions for their unwanted or secondary appliance, and appliance eligibility. Prompts for haul-away options are also part of the point-of-sale software at two retail partners, and include utility haul-away options, where applicable.

3.2.1.7 Retail Program Implementation

The three appliance retailers currently partnering with the program implementer are highly satisfied with program processes, program communication, and training. From their perspective the primary benefit of participating in the program is the additional rebate they can offer customers, which provides a competitive advantage. The program is an opportunity to improve customer service, particularly for customers who may have recycled their appliance through the program after installing a new appliance, which may have required scheduling two appointments. The program also adds promotional value to their appliance offers – particularly Energy Star – because it ties into their “green” messaging and initiatives. In fact, one retail partner wishes that the program could offer a higher rebate amount to customers that buy Energy Star, to further reinforce the energy-saving potential of Energy Star appliances. One retail partner reported that the ComEd program is one of their “strongest performers” in terms of the number of units scheduled for recycling.

All three retail partners report that hands-on training (including webinars) and frequent store visits from the program implementer are useful and very effective in training staff to discuss the program and sign up customers. Training new staff on the program is a continual challenge for retail partners, especially in areas where other rebate programs are running concurrently. While retail partners train their own staff members, the program implementer’s site visits help to cover the benefits of the program, how to use the software system (QuickLink), and eligibility requirements. Frequent communication (weekly or as

needed) between the program implementer and corporate retail contacts keeps stores well-informed of program information and changes.

3.2.1.8 Alternative Disposal Practices

In PY4, we again explored alternative disposal options available to ComEd customers through retail partners or outside of the ComEd program. Findings from PY3 on this same topic are essentially unchanged.

All participating retail partners offer a disposal service to customers outside of the ComEd program, for both working and non-working appliances. The fee for each service varies by retailer, but is usually free or low-cost (\$10). Disposal through all three services can result in the unit being de-manufactured or recycled, but only one of the three retailers consistently recycles. Delivery services staff at all three retailers pick up unwanted appliances upon delivery of new units, and bring them back to retail warehouses. Two of the three retail partners maintain contracts with third-party appliance hauling services to remove unwanted units from retail warehouses, and neither of these contracts dictate disposal practices – third-party haulers can determine whether they wish to decommission and recycle or sell it for parts, or fix and re-sell it on the secondary appliance market (likely based on cost of repair and perceived market for the appliance type). The unwanted appliances are removed by each store’s staff upon delivery of the new units, and are brought back to the retail store or a warehouse where they are picked up by a third party or loaded on their own truck for disposal.

Based on in-depth interviews, appliance delivery and recycling program managers at these two retail partners estimate that few unwanted appliances in ComEd territory that are disposed through standard haul-away services (an estimated 10-15%) are ultimately re-sold by third-party vendors, as many are not working or too old to be worth fixing. However, it should be noted this sample size is very small (N=3).

3.2.1.9 Appliance Collection Process

The appliance collection process, including JACO’s advance call practices, has remained primarily unchanged from last year. When delivering a new appliance to a participant in the ComEd program, the delivery teams from these two retailers will haul the old appliance back to their warehouse where the units will be sorted and held in a separate area for JACO to pick up.

3.2.1.10 Influence of Program on Energy-Saving Behavior

The program continues to influence additional energy saving behavior(s) among its participants. Based on their participation in the program, 61% of respondents said they have taken additional actions to save energy in their home, compared to 71% in PY3. Of the respondents who have taken additional actions, the most common changes are the installation of CFLs (34%) and the purchase or use of energy efficient appliances (20%). These were also the top two reported changes in PY3. Among other top PY4 changes were the installation of new HVAC equipment (18%) and turning off lights when not in use (16%). PY3 respondents also reported these changes at similar rates.

Another 7% of respondents indicated that they have participated in other ComEd energy efficiency or pricing programs following their participation in the program. This is similar to the PY3 rate of 10%. The lighting discount/ energy efficient bulbs program was listed most by respondents (34%); and similar to PY3, the central air conditioning programs (AC Cycling and CACES) was also listed frequently by respondents (33%).

3.2.2 Program Theory

Given modest changes in the program design, this topic was not revisited. Please refer to the PY1 report for a discussion of program theory.

4. Findings and Recommendations

This section highlights the findings and recommendations from the evaluation of the FFRR 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 4 (PY4); 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 Key Impact Findings and Recommendations

Savings Impacts:

Finding. The starting PY4 net energy savings goal for this program was 33,371 MWh, which represents an 8% increase over the final PY3 goal of 30,900 MWh. The ex-ante net energy savings was 62,627 MWh. The evaluation-verified energy savings is somewhat higher – 72,302 MWh, for an overall realization rate of 1.15. Although the evaluation team and ComEd both used the same algorithm, applying the PY2 regression coefficients to the mix and characteristics of units collected in PY4, the evaluation team was unable to reproduce ComEd’s numbers. The differences lie solely in the details of the gross savings calculation since the part-use factors and Net-to-Gross ratios used in both calculations are identical.

Recommendation. ComEd should revisit how it calculates ex-ante savings.

Verification Rate:

Finding. The evaluation verification rate for this program is 1.00. This is based on 100% of phone survey respondents answering ‘yes’ to a question asking if they recalled having their refrigerator, freezer and/or Room AC picked up by JACO.

Tracking Data Issues:

Finding. As in past evaluations, our review of the tracking data provided to the evaluation team also uncovered some problems, most notably that there was incomplete data in several fields. Although there has been some improvement in this area, lack of complete data in certain fields continues to hamper evaluation efforts.

Recommendation. As in past evaluations, we continue to recommend the program tracking data receive periodic data quality reviews for data quality and completeness. Data exported for the evaluation team should also be checked for anomalies. Incomplete data fields need to be populated *where feasible*, particularly those data fields that are critical to the evaluation, such as appliance brand, model number, age/year manufactured, size, configuration and location. In addition, information obtained from participating customer phone surveys can be used to plug missing data fields where applicable (i.e., for fields related to the location of the prior unit, and whether or not the unit was replaced).

4.2 *Key Process Findings and Recommendations*

Program Incentive Levels:

Finding. The program appears to be in a very good position as the rebate amount, convenience of service, and guarantee that each appliance will be recycled in a responsible manner, seem to be in balance. The program continues to achieve higher unit counts with little change in customer satisfaction.

Recommendation. Maintaining current rebate levels, with occasional 'special' offerings will be an effective method of reaching higher savings targets.

Participant Satisfaction:

Finding. Customers and retailer partners are highly satisfied with the program. Continuing to maintain such high levels of satisfaction during PY4, given the growth of the program, is an outstanding accomplishment.

Recommendation. It will be important, as the program continues to progress, to routinely review program processes and procedures in order to maintain these satisfaction levels.

Customer Education:

Finding. The cost to operate the recycled unit is viewed as an important reason for disposal by just over one-third of recyclers of both unit types (refrigerators and freezers).

Recommendation. This is an area where further education of ComEd customers might be helpful by pointing out the considerable expense associated with running these older, less efficient units. We recommend that ComEd include messaging in its program marketing literature and advertising to highlight the cost per year of operating older refrigerators and freezers.

5. Appendix

5.1 Glossary

High Level Concepts

Program Year

- EPY1, EPY2, etc. Electric Program Year where EPY1 is June 1, 2008 to May 31, 2009, EPY2 is June 1, 2009 to May 31, 2010, etc.
- GPY1, GPY2, etc. Gas Program Year where GPY1 is June 1, 2011 to May 31, 2012, GPY2 is June 1, 2012 to May 31, 2013.

There are two main tracks for reporting impact evaluation results, called Verified Savings and Impact Evaluation Research Findings.

Verified Savings composed of

- Verified Gross Energy Savings
- Verified Gross Demand Savings
- Verified Net Energy Savings
- Verified Net Demand Savings

These are savings using deemed savings parameters when available and after evaluation adjustments to those parameters that are subject to retrospective adjustment for the purposes of measuring savings that will be compared to the utility's goals. Parameters that are subject to retrospective adjustment will vary by program but typically will include the quantity of measures installed. In EPY4/GPY1 ComEd's deemed parameters were defined in its filing with the ICC. The Gas utilities agreed to use the parameters defined in the TRM, which came into official force for EPY5/GPY2.

Application: When a program has deemed parameters then the Verified Savings are to be placed in the body of the report. When it does not (e.g., Business Custom, Retrocommissioning), the evaluated impact results will be the Impact Evaluation Research Findings.

Impact Evaluation Research Findings composed of

- Research Findings Gross Energy Savings
- Research Findings Gross Demand Savings
- Research Findings Net Energy Savings
- Research Findings Net Demand Savings

These are savings reflecting evaluation adjustments to any of the savings parameters (when supported by research) regardless of whether the parameter is deemed for the verified savings analysis. Parameters that are adjusted will vary by program and depend on the specifics of the research that was performed during the evaluation effort.

Application: When a program has deemed parameters then the Impact Evaluation Research Findings are to be placed in an appendix. That Appendix (or group of appendices) should be labeled Impact Evaluation Research Findings and designated as "ER" for short. When a program does not have deemed parameters (e.g., Business Custom, Retrocommissioning), the Research Findings are to be in the body of the report as the only impact findings. (However, impact findings may be summarized in the body of the report and more detailed findings put in an appendix to make the body of the report more concise.)

Program-Level Savings Estimates Terms

N	Term Category	Term to Be Used in Reports‡	Application†	Definition	Otherwise Known As (terms formerly used for this concept)§
1	Gross Savings	Ex-ante gross savings	Verification and Research	Savings as recorded by the program tracking system, unadjusted by realization rates, free ridership, or spillover.	Tracking system gross
2	Gross Savings	Verified gross savings	Verification	Gross program savings after applying adjustments based on evaluation findings for only those items subject to verification review for the Verification Savings analysis	Ex post gross, Evaluation adjusted gross
3	Gross Savings	Verified gross realization rate	Verification	Verified gross / tracking system gross	Realization rate
4	Gross Savings	Research Findings gross savings	Research	Gross program savings after applying adjustments based on all evaluation findings	Evaluation-adjusted ex post gross savings
5	Gross Savings	Research Findings gross realization rate	Research	Research findings gross / ex-ante gross	Realization rate
6	Gross Savings	Evaluation-Adjusted gross savings	Non-Deemed	Gross program savings after applying adjustments based on all evaluation findings	Evaluation-adjusted ex post gross savings
7	Gross Savings	Gross realization rate	Non-Deemed	Evaluation-Adjusted gross / ex-ante gross	Realization rate
1	Net Savings	Net-to-Gross Ratio (NTGR)	Verification and Research	1 – Free Ridership + Spillover	NTG, Attribution
2	Net Savings	Verified net savings	Verification	Verified gross savings times NTGR	Ex post net
3	Net Savings	Research Findings net savings	Research	Research findings gross savings times NTGR	Ex post net
4	Net Savings	Evaluation Net Savings	Non-Deemed	Evaluation-Adjusted gross savings times NTGR	Ex post net
5	Net Savings	Ex-ante net savings	Verification and Research	Savings as recorded by the program tracking system, after adjusting for realization rates, free ridership, or spillover and any other factors the program may choose to use.	Program-reported net savings

‡ “Energy” and “Demand” may be inserted in the phrase to differentiate between energy (kWh, Therms) and demand (kW) savings.

† **Verification** = Verified Savings; **Research** = Impact Evaluation Research Findings; **Non-Deemed** = impact findings for programs without deemed parameters. We anticipate that any one report will either have the first two terms or the third term, but never all three.

§ Terms in this column are not mutually exclusive and thus can cause confusion. As a result, they should not be used in the reports (unless they appear in the “Terms to be Used in Reports” column).

Individual Values and Subscript Nomenclature

The calculations that compose the larger categories defined above are typically composed of individual parameter values and savings calculation results. Definitions for use in those components, particularly within tables, are as follows:

Deemed Value – a value that has been assumed to be representative of the average condition of an input parameter and documented in the Illinois TRM or ComEd’s approved deemed values. Values that are based upon a deemed measure shall use the superscript “D” (e.g., delta watts^D, HOU-Residential^D).

Non-Deemed Value – a value that has not been assumed to be representative of the average condition of an input parameter and has not been documented in the Illinois TRM or ComEd’s approved deemed values. Values that are based upon a non-deemed, researched measure or value shall use the superscript “E” for “evaluated” (e.g., delta watts^E, HOU-Residential^E).

Default Value – when an input to a prescriptive saving algorithm may take on a range of values, an average value may be provided as well. This value is considered the default input to the algorithm, and should be used when the other alternatives listed for the measure are not applicable. This is designated with the superscript “DV” as in X^{DV} (meaning “Default Value”).

Adjusted Value – when a deemed value is available and the utility uses some other value and the evaluation subsequently adjusts this value. This is designated with the superscript “AV” as in X^{AV}

Glossary Incorporated From the TRM

Below is the full Glossary section from the TRM Policy Document as of October 31, 2012⁵.

Evaluation: Evaluation is an applied inquiry process for collecting and synthesizing evidence that culminates in conclusions about the state of affairs, accomplishments, value, merit, worth, significance, or quality of a program, product, person, policy, proposal, or plan. Impact evaluation in the energy efficiency arena is an investigation process to determine energy or demand impacts achieved through the program activities, encompassing, but not limited to: *savings verification, measure level research, and program level research*. Additionally, evaluation may occur outside of the bounds of this TRM structure to assess the design and implementation of the program.

Synonym: **Evaluation, Measurement and Verification (EM&V)**

Measure Level Research: An evaluation process that takes a deeper look into measure level savings achieved through program activities driven by the goal of providing Illinois-specific research to facilitate updating measure specific TRM input values or algorithms. The focus of this process will primarily be driven by measures with high savings within Program Administrator portfolios, measures with high uncertainty in TRM input values or algorithms (typically informed by previous savings verification activities or program level research), or measures where the TRM is lacking Illinois-specific, current or relevant data.

⁵ IL-TRM_Policy_Document_10-31-12_Final.docx

Program Level Research: An evaluation process that takes an alternate look into achieved program level savings across multiple measures. This type of research may or may not be specific enough to inform future TRM updates because it is done at the program level rather than measure level. An example of such research would be a program billing analysis.

Savings Verification: An evaluation process that independently verifies program savings achieved through prescriptive measures. This process verifies that the TRM was applied correctly and consistently by the program being investigated, that the measure level inputs to the algorithm were correct, and that the quantity of measures claimed through the program are correct and in place and operating. The results of savings verification may be expressed as a program savings realization rate (verified ex post savings / ex ante savings). Savings verification may also result in recommendations for further evaluation research and/or field (metering) studies to increase the accuracy of the TRM savings estimate going forward.

Measure Type: Measures are categorized into two subcategories: custom and prescriptive.

Custom: Custom measures are not covered by the TRM and a Program Administrator’s savings estimates are subject to retrospective evaluation risk (retroactive adjustments to savings based on evaluation findings). Custom measures refer to undefined measures that are site specific and not offered through energy efficiency programs in a prescriptive way with standardized rebates. Custom measures are often processed through a Program Administrator’s business custom energy efficiency program. Because any efficiency technology can apply, savings calculations are generally dependent on site-specific conditions.

Prescriptive: The TRM is intended to define all prescriptive measures. Prescriptive measures refer to measures offered through a standard offering within programs. The TRM establishes energy savings algorithm and inputs that are defined within the TRM and may not be changed by the Program Administrator, except as indicated within the TRM. Two main subcategories of prescriptive measures included in the TRM:

Fully Deemed: Measures whose savings are expressed on a per unit basis in the TRM and are not subject to change or choice by the Program Administrator.

Partially Deemed: Measures whose energy savings algorithms are deemed in the TRM, with input values that may be selected to some degree by the Program Administrator, typically based on a customer-specific input.

In addition, a third category is allowed as a deviation from the prescriptive TRM in certain circumstances, as indicated in Section 3.2:

Customized basis: Measures where a prescriptive algorithm exists in the TRM but a Program Administrator chooses to use a customized basis in lieu of the partially or fully deemed inputs. These measures reflect more customized, site-specific calculations (e.g., through a simulation model) to estimate savings, consistent with Section 3.2.

5.2 Research Findings Impact Results

This section presents the results of the Research Findings impact evaluation of the FFRR program.

Note that the numerical results described in this section are based on the EM&V activities completed during the PY4 evaluation, whereas the evaluation verified values discussed in section 4 are based on deemed values derived from the Program Year 2 evaluation of ComEd’s program.

5.2.1 Research Findings Impact Evaluation Results

5.2.1.1 Research Findings Gross Program Impact Parameter Estimates

5.2.1.2 Refrigerators and Freezers

Annualized Unit Energy Consumption (UEC)

As detailed in the Research Findings Gross Impact Method described in Section 3, 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 PY4 and their associated characteristics yielded the following UECs for each type of appliance (Table 5-1).

Table 5-1. Estimated UECs

Annualized UECs	Refrigerators	Freezers
kWh	960	1,410

Source: EM&V analysis

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 two reasons:

1. Because of a change in energy efficiency 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 is efficiency over time, as the unit ages.

Table 5-2 and Table 5-3 below provide the age and size characteristics of the units collected in PY4 through ComEd’s program.

Table 5-2. 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	Average
Refrigerators	1%	5%	14%	18%	21%	16%	12%	6%	8%	24.76
Freezers	0%	1%	3%	9%	18%	22%	21%	11%	14%	30.57
Room Air Conditioners	1%	2%	7%	10%	17%	19%	22%	9%	13%	29.60

Source: Program tracking database

Table 5-3. 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	Average
Refrigerators	3%	16%	44%	38%	19.04
Freezers	10%	38%	42%	10%	15.84

Source: Program tracking database

From these data, the following observations can be made:

Age

Fully 63% of refrigerators, 86% of freezers, and 80% of Room AC units are over 20 years old

Approximately 40% of refrigerators and freezers are between 21 and 30 years old

One-fourth of refrigerators (26%) and 46% of freezers are over 30 years old

The following percentages of appliances collected by the program were made before the 1993 standards change: 63% of refrigerators and 86% of freezers

The average age of recycled refrigerators is just under 25 years old, freezers average more than 30 years old and Room AC units average nearly 30 years old. These figures indicate the program is still hitting its primary target of removal of very old and inefficient units.

Note that it is a program requirement for all appliances picked up to be in working condition (even those over 30-40 years old). The truck driver tests the unit to ensure this is the case at the time of pick up.

Size

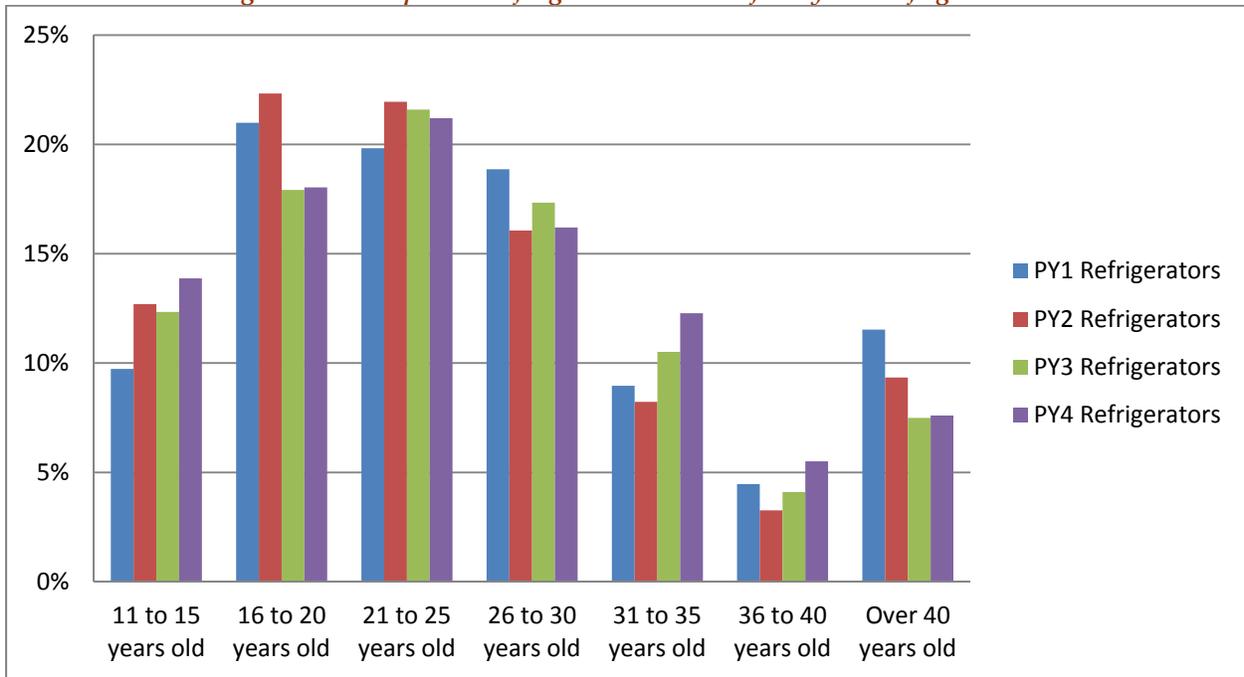
More than three-fourths of the refrigerators (82%) and over half of the freezers (52%) collected are 16 cubic feet and larger, more than one third of refrigerators are larger than 20 cubic feet

Recycled refrigerators tend to be larger on average than recycled freezers. The average size of recycled refrigerators is just over 19 cubic feet, while for freezers it is slightly less than 16 cubic feet.

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 16 cubic feet to over 20 cubic feet.

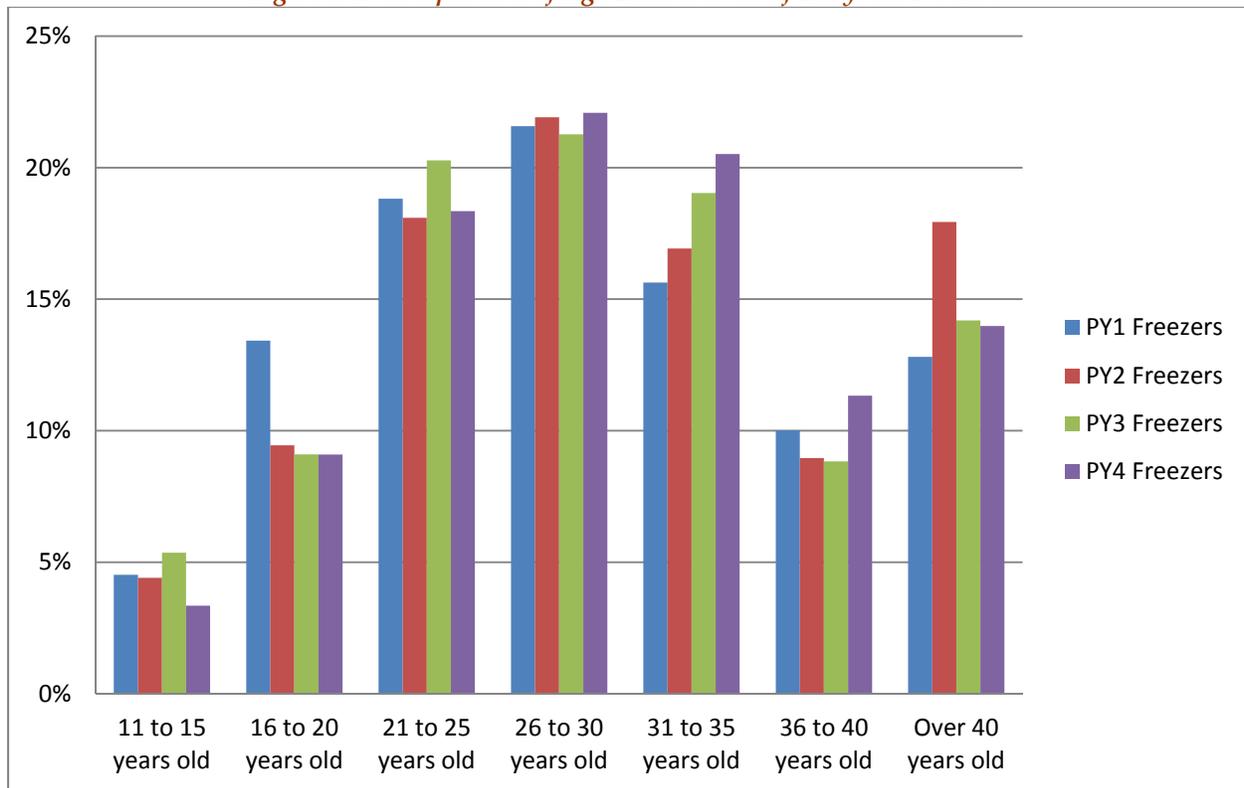
Since the age of recycled units is a major driver of unit energy consumption, we also looked at the trend in the age distribution of units collected through the program from PY1 to PY4. Figure 5-1 provides a comparison of the age distribution of recycled refrigerators, while Figure 5-2 has similar information for recycled freezers.

Figure 5-1. Comparison of Age Distribution of Recycled Refrigerators



Source: EM&V analysis of program tracking database

Figure 5-2. Comparison of Age Distribution of Recycled Freezers



Source: EM&V analysis of program tracking database

With respect to refrigerators, the PY4 program has picked up roughly the same proportions of older units (particularly those over 25 years old) as in PY3, higher than in PY2, but comparable to PY1. The trend is similar for freezers. This suggests 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 per-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 85% or 0.85. The program ex-ante gross impact estimate was based on an assumption that the part-use factor for refrigerators was 90%.

Freezers. For freezers, the average part-use factor is based on a similar question for all participants who disposed of a freezer. This average was determined to be 75% or 0.75. 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 also 75%, based on the PY3 value.

Table 5-4 below reports the distribution of unit usage by appliance type and frequency of use for both refrigerators and freezers. The predominant response by participants is that they would have used the unit ‘always’ if the program had not picked it up.

Table 5-4. 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%	8%	1%	0%	0%	86%	152
Freezers	15%	10%	4%	2%	0%	69%	48

Source: EM&V survey

5.2.1.3 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 813 kWh per year, and freezer savings/unit to 1,063 kWh/year. These estimates are provided in Table 5-5 below.

Table 5-5. Research Findings Gross Savings (UECs) Adjusted for Part Use

Appliance Type	Gross Savings (UECs)	Part-Use Factor	Adjusted Gross Savings (kWh/unit)
Refrigerators	960	85%	813
Freezers	1,410	75%	1,063

Source: EM&V analysis

5.2.1.4 Room Air Conditioners

The savings contribution of this measure to the program is extremely small – it accounts for only 0.1% of program savings. The deemed savings memo called for the energy consumption of residential Room AC units to be estimated using an engineering algorithm. Although more data are included in the tracking database than in PY3, there still is insufficient data to do the calculation. However, since the savings contribution of this measure to the program is extremely small, we have elected to accept ComEd’s ex-ante gross savings estimate of 80 kWh per year.

5.2.2 Research Findings Gross Program Impact Results

Table 5-6 below provides the fourth-year Research Findings Gross Savings kWh savings estimates for each measure. The resulting Research Findings total program gross savings quantity is 31,416 MWh. This

value includes the application of the part-use factor. The ex-ante gross savings claimed by the program is 62,627 MWh⁶. Gross savings per unit (without adjustment for the part-use factor) for the research findings savings estimates are approximately half of the level assumed by ComEd in its ex-ante estimates. The primary reason for this large discrepancy between program-reported energy savings and verified gross savings is the change in gross savings estimation methodology from the secondary-based lab metered algorithm to the primary *in situ* metering study algorithm. The gross savings per-unit from the primary *in situ* metering study are approximately half the magnitude as the values formerly based on the secondary-based lab metered algorithm.

The primary reason for this large difference is that the prior year estimates were based on a metering approach that is based on the Department of Energy (DOE) laboratory-based metering protocols. These protocols are a prescribed procedure for metering unit energy consumption, which includes metering each unit at a constant ambient temperature of 90 degrees Fahrenheit. The advantage of this procedure is that it is uniformly applied under a controlled setting, and therefore the metering results are transferable to units in any jurisdiction. The disadvantage is that the metering results do not reflect real-world (*in situ*) usage conditions. Up until now, the DOE-based models were the best available option for this program evaluation. The *in situ* metering study completed in ComEd’s service territory now provides us with primary data and a model that is based on a representative sample of metering for ComEd’s own customers.

Additional small differences are associated with 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 0.90 for refrigerators and 0.75 for freezers. The research findings part-use factors are 0.85 for refrigerators and 0.75 for freezers, respectively. Table 5-6 shows the PY4 research findings based upon gross impact parameter and savings estimates. Total program gross MWh savings is 42,697.

Table 5-6. PY4 Research Findings 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	43,097	7,140	813	51,050
Research Findings Annual kWh Savings Impacts				
- Research Findings annual Gross kWh savings per unit (full-load operating hours)	960	1,410	---	---
- Part-Use Factor	85%	75%	---	---
- Research Findings annual Gross kWh savings per unit adjusted for part-use	813	1,063	80	---
Research Findings Program Gross MWh	35,040	7,591	65	42,697

Source: EM&V Analysis

⁶ As reported in *ComEd PY4 Ex Ante Table.xls* provided by ComEd.

Table 5-7 below provides the fourth-year Research Findings Gross Savings kW savings estimates for each measure. For PY4, for refrigerators and freezers, the electricity saved by the program is based on the results of the in situ metering study discussed earlier. For Room AC units, ComEd’s ex-ante planning estimates for per-unit kW savings were used.

Table 5-7. PY4 Research Findings Gross 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	43,097	7,140	813
Research Findings Annual kW Savings Impacts				
Annual Gross kW savings per unit (full-load operating hours)	0.142	0.142	0.04	---
Research Findings Program Gross kW	6,120	1,014	33	7,166

Source: EM&V analysis

5.2.3 Research Findings 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. Given that program units are sourced from two channels (retailer and home pick-ups), participants include both retailers and customers. To date, the evaluation has only considered survey-based feedback from participating customers in the calculation of the program net-to-gross ratio. For PY4, we conducted a comprehensive market assessment to provide a full understanding, for each sub-segment of the program (retailer pick-ups, traditional JACO recycling) of how the unit would be disposed of absent the program. The Research Findings program NTG ratio encompasses free ridership from each of these segments in terms of:

- Participating retailers who indicated they would have otherwise:
 - Deconstructed the unit (including re-selling and/or recycling its component parts)
 - Taking the unit to a landfill/dump/scrap dealer
- Participating customers who indicated they would have otherwise:
 - Sent the unit to a recycling facility, or
 - Taken the unit to a landfill/dump/scrap dealer

The research findings program NTGR for PY4 is thus a weighted average based on responses from each participating retailer and each participating customer for units sourced from each source, respectively.

Participating Customer findings. In total, 24 out of 152 refrigerator respondents (16%), 11 of 48 freezer respondents (22%), and 8 out of 19 Room AC respondents (42%) 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 for traditional JACO recycling customers are 0.84 for refrigerators, 0.78 for freezers, and 0.58 for Room ACs. These values were applied to units sourced from traditional JACO recycling in calculating the Research Findings program NTG ratio.

Participating Retailer findings. The three participating retailers in the program were interviewed thoroughly to learn of their appliance disposal practices in the absence of ComEd’s program. Retailers were asked a series of questions regarding the following:

- Pickup and disposal services for replaced units
 - Charges, if any for such services
 - Percentage of customers that receive such services
- Recycling and/or deconstruction of units picked up by the retailer
 - Approach for Units outside of ComEd’s program – percentage of units affected
 - Approach prior to the start-up of ComEd’s program – percentage of units affected
- Other disposition of units
 - Percentage that are picked up by a hauler/third party and resold (i.e., remain grid connected)

Each retailer provided specific answers to each of these topic areas. From this information, we were able to construct a retailer specific NTG ratio, representing 1 minus the percentage of units that would otherwise have been recycled or deconstructed in the absence of ComEd’s program. The results, by retailer, are shown below in Table 5-8.

Table 5-8. PY4 Net-to-Gross Ratios by Participating Retailer

Retailer	Free Rider % **	NTGR ratio	Percentage of Program Units
Retailer # 1 – local firm	70.5%	0.295	15%
Retailer #2 – national chain	63%	0.37	1%
Retailer #3 – national chain	55%	0.45	8%
Total Retailer Units			24%

** Self-reported percentage of units that are recycled or deconstructed in the absence of ComEd’s program. These are based on each Retailer’s direct responses.

Source: EM&V analysis

Based on these results, free ridership is fairly high among the current participating retailers. Therefore, we recommend that ComEd exercise caution when enrolling new retailers in the program, making sure to screen out retailers that are already deconstructing and/or recycling units on their own, independent of ComEd’s program.

Research Findings Program NTG ratios. The weighted average Research Findings NTG ratios, derived from combining the customer and retailer self-reported results, are 0.77 for refrigerators and freezers, and 0.58 for Room AC units. These vary from PY3, when values were 0.67 for refrigerators, 0.75 for freezers and 0.70 for Room ACs. For its ex-ante planning estimates, ComEd has used values of 0.67 for refrigerators, 0.77 for freezers and 0.70 for Room ACs, based on the PY3 evaluation results.

Interviews with five used appliance dealers did not provide any evidence to counter these findings. The sample size was relatively small (n=5) and the businesses dealt with a mix of both working and nonworking units. The small sample size reflected only those larger firms with websites that were the real target of the interview - used dealers. Respondents were reluctant to provide definitive estimates of the age range at which units still had resale market value, preferring to make statements like, “We only sell the newer ones. ... the nice looking ones”, and referring to operating condition rather than a given age range.

5.2.4 Net Program Impact Results

Table 5-9 below provides the program-level research findings net impact results for the PY4 FFRR program. As this figure shows, the ex post program-level fourth-year verified net energy saving estimate resulting from this evaluation is 32,834 MWh, falling short of program claimed estimates by 29,793 MWh, and resulting in a net Evaluation-verified gross realization rate of 52%. The difference between the ex-ante net savings and evaluation-verified net savings is primarily due to the change in the gross savings estimation methodology from the secondary-based lab metered algorithm used in previous years to the primary *in situ* metering study algorithm. The gross savings per-unit from the primary *in situ* metering study are approximately half the magnitude as the values formerly based on the secondary-based lab metered algorithm. For PY4, the verified kW saved by the program for Refrigerators and Freezers are also based on the metering study results. These likewise are significantly lower than those based on ComEd’s ex-ante planning estimates for these measure types. There is also a small difference in the part-use factor applied to refrigerators. The program verified part-use factor was 85% for refrigerators, while the ex-ante assumption was 90%. The net-to-gross ratio for the ex-ante estimates was somewhat lower than evaluation-verified for refrigerators (0.67 ex-ante vs. 0.77 for evaluation-verified), nearly identical for freezers (0.75 ex-ante vs. 0.77 for evaluation-verified), and substantially lower for Room ACs (1.00 for ex-ante vs. 0.58 for evaluation-verified).

Table 5-9. PY4 Research Findings Net Impact Parameter and Savings Estimates

Research Findings Annual Net MWh Savings Impacts				Room AC	Total Program
	Refrigerators	Freezers			
Research Findings Program Gross MWh	35,040	7,591		65	42,697
Net-to-Gross Ratio (1-Free Rider %)	0.77	0.77		0.58	---
Total Fourth-Year Research Findings Net MWh Savings	26,981	5,815		38	32,834
Net MWh Savings Claimed by the Program					62,627
Net MWh Research Findings Gross Realization rate					52%
Research Findings Annual Net kW Savings Impacts					
Research Findings Program Gross kW	6,120	1,014		33	7,166
Net-to-Gross Ratio (1-Free Rider %)	0.77	0.77		0.58	---
Total Fourth-Year Research Findings Net kW Savings	4,712	777		19	5,508

Source: EM&V analysis

5.3 Data Collection Instruments

The data collection instruments used in this evaluation consisted of (1) a participating customer survey; (2) in-depth interview guides for the ComEd program manager and JACO program management and implementers; (3) interview guides for participating and nonparticipating retailers; and (4) an interview guide for used appliance dealers/haulers.

5.3.1 ComEd FFRR Participant Survey

PY4 COMED RESIDENTIAL APPLIANCE RECYCLING PARTICIPANT SURVEY Final 2012-07-30

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. May I please speak with [CUSTOMER_NAME]? 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.

Are you the person who was most involved and familiar with the removal?

IF NO, NOT RIGHT PERSON: May I please speak to the person who would know the most about the removal? REPEAT INTRODUCTION AND CONTINUE

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

IF YES, 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.

CP1. Are you currently talking to me on a regular landline phone or a cell phone?

1. (Regular landline phone)
2. (Cell phone)
8. (Don't Know)
9. (Refused)

<SKIP IF CP1=1>

CP2. Are you currently in a place where you can talk safely and answer my questions?

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

SCREENING QUESTIONS

U1. Is ComEd your electric company or do you receive electricity from someone else?

1. ComEd [CONTINUE WITH S1]
2. Someone Else [U2]
8. (Don't know)

9. (Refused)

U2 Is your electricity supplier a municipal electric utility or a retail electricity supplier such as Bluestar, Direct Energy or another such supplier?

- 1 Municipal electric utility [TERMINATE]
- 2 Retail energy supplier
- 98 Don't know
- 99 Refused

IF U2 = 2, 98, 99 CONTINUE

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?

- 1 Yes, correct
- 2 No, it was [RECORD VERBATIM and TERMINATE]
- 98 Don't know [TERMINATE]
- 99 Refused [TERMINATE]

[READ IF ALL_RECYCLED_NUM=1]

S2a Next, I'm going to ask you some specific questions about the [REFRIGERATOR if REF_NUM=1, FREEZER if FRZ_NUM=1, AIR CONDITIONER if AC_NUM=1] that was picked up.

[READ IF ALL_RECYCLED_NUM>1]

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

[Read Section A if REF_NUM>=1 and if REFRIGERATOR_QUOTA not met]

SECTION A: REFRIGERATOR CHARACTERISTICS

A0. According to our records, you had a refrigerator removed that was made by [REF_MANUF]. Is this correct?

- 1. Yes
- 2. No, it was [RECORD MANUFACTURER VERBATIM]
- 8. (Don't know) [TERMINATE IF ALL_RECYCLED_NUM=1, ELSE C0]
- 9. (Refused) [TERMINATE IF ALL_RECYCLED_NUM=1, ELSE C0]

A1 At the time this refrigerator was picked up, were you using it as your main refrigerator, or had it been a secondary or spare? (Interviewer: a main refrigerator is typically in the kitchen, a secondary or spare is usually kept someplace else and might or might not be running. If the person recently bought a new main refrigerator and was just waiting for the old one to be picked up, it should be classified as "main.")

- 1 Main
- 2 Secondary or Spare
- 98 Don't know
- 99 Refused

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 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]

- 0 (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
- 98 Don't know
- 99 Refused

[ASK A4, A4A and A5 IF A3=02 OR 03]

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 OR HALF MONTH)

[RECORD IN MONTHS]

- 0 (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
- 98. (Don't know)
- 99. (Refused)

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

- 1 (Kitchen)
- 2 (Garage)
- 3 (Porch/Patio)
- 4 (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 (Yes - Heated part of the year)
- 98 Don't know
- 99 Refused

A5C Was the space air-conditioned or not?

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

A6 How old was the refrigerator when ComEd removed it?

- [NUMERIC OPEN END RECORD IN YEARS]
- 0 (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 install 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 A8b
- 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 install the replacement refrigerator? RECORD TIME INTERVAL

- 1 (Same day)
- 2 (Within one to two weeks)
- 3 (Within one month)
- 4 (Within two to three months)
- 6 (Within four to six months)
- 7 (Within six to twelve months/ one year)
- 8 (More than one year later)
- 00 (Other (record verbatim))
- 98 (Don't know)
- 99 (Refused)

A8b Was this refrigerator brand new or used?

- 1. Brand new

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

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

- 1 A single door, with a freezer compartment inside
- 2 Two doors, side by side
- 3 A Top freezer
- 4 Or a Bottom freezer?
- 00 Other (SPECIFY:___)
- 98 (Don't know)
- 99 (Refused)

A8d Is the replacement refrigerator frost free or manual defrost?

- 1 Frost free
- 2 Manual defrost
- 00 Other (SPECIFY:___)
- 98 (Don't know)
- 99 (Refused)

A8e What size is this replacement refrigerator in cubic feet? IF NEEDED: Your best estimate is fine.
CLARIFY FRACTIONS TO GET TO NEAREST NUMBER.

- [NUMERIC OPEN END]
- 98 (Don't know)
- 99 (Refused)

[ASK A8e1 ONLY IF A8e IS 98 (DK) OR 99 (REF)]

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

- 1 Larger
- 2 Smaller
- 3 Same Size
- 98 (Don't know)
- 99 (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)

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
- 98 (Don't know)
- 99 (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
- 98 (Don't know)
- 99 (Refused)

[ASK IF A10a = 1]

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
- 98. (Don't know)
- 99. (Refused)

SECTION B: CONSIDERATION OF ALTERNATIVES SECTION

[ASK OF ALL RESPONDENTS]

B1 I am now going to read a list of alternative ways that you could have disposed of this refrigerator. For each, tell me if this is a method you had considered using or doing. Did you consider... [ROTATE 1-5; Multiple response]

- 1. Selling it
- 2. Giving it away for free
- 3. Having it removed by the dealer you got your new or replacement refrigerator from
- 4. Taking it to a dump or recycling center
- 5. Hiring someone else to haul it away
- 6. [ASK IF A10a=1,8,9] Keeping it

98 (DON'T KNOW)

99 (REFUSED)

[ASK IF B1=1]

B1a. You said you considered selling your refrigerator. Did you consider selling the refrigerator to an appliance dealer, or to a private party (like a friend, relative or by running an ad)?

- 1. Dealer

- 2. Private party (friend, relative, or by running ad)
- 3. Both
- 98. (Don't know)
- 99. (Refused)

B1ab Have you ever heard of Craigslist.com? [IF NEEDED: Craigslist.com is a website that is used for buying, selling and giving away new and used items. It performs functions similar to classified ads in newspapers.]

- 1 Yes
- 2 No
- 98 (Don't know)
- 99 (Refused)

[ASK IF B1ab=1]

B1ac Have you ever used Craigslist to buy, sell or give away used furniture or appliances?

- 1 Yes
- 2 No
- 98 (Don't know)
- 99 (Refused)

[ASK IF B1ac=1]

B1ac1 What did you use it for?

- 00 Other (RECORD VERBATIM)
- 98 Don't know
- 99 Refused

[ASK IF B1=1,2 AND B1ab=1]

B1ad If the ComEd program hadn't been available, would you have used Craigslist.com to sell or give away your refrigerator?

- 1 Yes – would have sold on Craigslist
- 2 Yes – would have given away on Craigslist
- 3 No
- 00 Other (RECORD VERBATIM)
- 98 (Don't know)
- 99 (Refused)

[ASK IF B1ad=1]

B1ad1 How much would you have sold it for?

- 0 Numeric Open End (Record Dollars)
- 9998 Don't know
- 9999 Refused

[ASK IF B1=2 AND B1ad DOES NOT EQUAL 2]

B1b. You said you considered giving away your refrigerator. Did you consider giving it to a private party (like a friend, relative or by running an ad), or to a charitable organization? (IF NEEDED: examples of a charitable organization could be Goodwill Industries or a Church)

- 1. Private party (friend, relative or by running an ad)
- 2. Charitable organization

- 3. Both
- 98. (Don't know)
- 99. (Refused)

[ASK IF B1=4]

B1c. You said you considered taking away the refrigerator. Did you consider taking it to a dump, or to a recycling center?

- 1. Dump
- 2. Recycling Center
- 3. Both
- 98. (Don't know)
- 99. (Refused)

[ASK IF A10a=2 or B1=6]

B1d. You said you considered keeping the refrigerator. Did you consider storing it unplugged, or using it as a spare?

- 1 Storing it unplugged
- 2 Using it as a spare
- 3 Both
- 98 (Don't know)
- 99 (Refused)

B7 Now suppose that ComEd appliance recycling program hadn't been available. Which one of these alternatives that we've just discussed would you have been most likely to do, if the ComEd appliance recycling program had not been available? [INDICATE ONE RESPONSE ONLY]

- 1. [ASK IF B1a=2,3] Selling it to a private party
- 2. [ASK IF B1a=1,3] Sell it to an appliance dealer
- 3. [ASK IF B1b=1,3] Give it away to a private party
- 4. [ASK IF B1b=2,3] Give it away to a charity organization, such as Goodwill Industries or a church
- 5. [ASK IF B1=3] Have it removed by the dealer you got your new or replacement refrigerator from
- 6. [ASK IF B1c=1,3] Haul it to the dump
- 7. [ASK IF B1c=2,3] Haul it to the recycling center
- 8. [ASK IF B1=5] Hired someone else to haul it away
- 9. [ASK IF B1d=1,3] Keep it and store it unplugged
- 10. [ASK IF B1d=2,3] Keep it and use it as a spare
- 00. (Some other way (SPECIFY: _____))
- 98. (Don't know)
- 99. (Refused)

Plans for keeping and using refrigerator as a spare

[ASK B4B THRU B4E IF B1d=2,3, else skip to B2]

B4B You mentioned [if B7=10, read "you would have kept this refrigerator and used it as a spare"] [if B1d=2,3 & B7<10, read "you considered keeping this refrigerator and using it as a spare"] if the ComEd appliance recycling program weren't available. For how many years would you have used this refrigerator as a spare? IF NEEDED: Your best estimate is fine.

[NUMERIC OPEN END]

- 77 (Until it broke, indefinitely)
- 0 (Less than 1 year)
- 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.

- 1 (Kitchen)
- 2 (Garage)
- 3 (Porch)
- 4 (Basement)
- 00 Other (SPECIFY:___)
- 98 Don't know
- 99 Refused

SKIP IF A5=B4C=2 OR A5=B4C=3 OR A5=B4C=4B4D. Would this have been a heated space?

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

[SKIP IF A5=B4C=2 OR A5=B4C=3 OR A5=B4C=4]

B4E Would this have been an air-conditioned space?

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

[ASK IF B1a=1-3]

B8. You mentioned that you considered selling your refrigerator to [IF B1a=1, read in "an appliance dealer"] [IF B1a=2, read in, "a private party"] [If B1a=3, read in "an appliance dealer or private party"]. Did you actually attempt to sell your refrigerator in this way before participating in the program?

- 1. Yes
- 2. No
- 98. (Don't know)
- 99. (Refused)

[ASK IF B8=1 & B1a=3]

B8a. Did you attempt to trade in or sell the refrigerator to an appliance dealer, or to a private party? (IF NEEDED: Private party could be a friend, family member, neighbor or someone you find through running an ad)

- 1. To a dealer
- 2. To a private party
- 3. Both
- 98. (Don't know)

99. (Refused)

[ASK IF B8=1]

B8b. Why did you not follow through with this transaction?

1. (Couldn't find an interested dealer/non-dealer at the price I wanted)
2. (Couldn't find an interested dealer/non-dealer because of the unit's condition)
3. (Decided recycling unit was more important than selling it)
4. (Other (SPECIFY :___))
98. (Don't know)
99. (Refused)

[ASK IF (B8=1 & B1a=1) OR B8a=2,3]

B8c. If you had sold this refrigerator to a private party (e.g. not a dealer), how much money do you think you would have received for it?

1. Dollars _____ (\$1 to 2,000)
98. (Don't know)
99. (Refused)

[ASK IF (B8=1 & B1a=2) OR B8a=1,3]

B8d. If an appliance dealer were to take it away, how much, if anything, do you think you would have to pay for this service?

1. Nothing /free service
2. Dollars _____ (\$1 to 2,000)
98. (Don't know)
99. (Refused)

[ASK IF B1=4]

B2g. One factor in disposing of a refrigerator is being able to physically move and transport it. Do you have the ability to do this yourself, or would you need assistance such as renting or borrowing a truck or having someone other than your immediate family help you?

1. Yes, could do it myself
2. No
98. (Don't know)
99. (Refused)

[ASK B2, B3, B5, B6 of all refrigerator participants]

B2 What was the condition of the refrigerator when you signed up for the ComEd program? 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 problems
- 4 (It didn't work)
- 98 (Don't know)
- 99 (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
- 98 Don't know
- 99 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. [ASK IF A1=2] The refrigerator was a spare that I did not use very much
- c. [ASK IF A7=1] The refrigerator was old and I wanted something with more modern features
- d. [ASK IF A7=1 & A8E1=1,98,99] I wanted a bigger refrigerator

B6 Were there any other reasons you chose to get rid of the refrigerator?

[OPEN END; accept up to two]

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

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

C0. According to our records, you had a freezer removed that was made by [FRZ_MANUF]. Is this correct?

- 1. Yes
- 2. No [RECORD MANUFACTURER VERBATIM]
- 8. (Don't know) [TERMINATE IF ALL_RECYCLED_NUM=1, ELSE E0]
- 9. (Refused) [TERMINATE IF ALL_RECYCLED_NUM=1, ELSE E0]

C1 How long had you been using this freezer? [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]

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

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

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 OR HALF MONTH)

[RECORD IN MONTHS]

- 0 (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
- 8. (Don't know)
- 9. (Refused)

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

- 1 (Kitchen)
- 2 (Garage)
- 3 (Porch/Patio)
- 4 (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 (Yes - Heated part of the year)
- 98 Don't know
- 99 Refused

[SKIP IF C5=98 or 99]

C5C Was the space air-conditioned or not?

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

C6 How old was the freezer when ComEd removed it?

[NUMERIC OPEN END RECORD IN YEARS]

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

C7 Did you replace the freezer that ComEd picked up with another one? (NOTE: We are only interested in stand-alone freezers, not freezers that are part of your refrigerator)

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

[ASK IF C7=1 else skip to C9]

C8aa. Did you install 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 install the replacement freezer? RECORD TIME INTERVAL

- 1 (Same day)
- 2 (Within one to two weeks)
- 3 (Within one month)
- 4 (Within two to three months)
- 6 (Within four to six months)
- 7 (Within six to twelve months/ one year)
- 8 (More than one year later)
- 00 (Other: record verbatim)
- 98 (Don't know)
- 99 (Refused)

C8b Was this freezer brand new or used?

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

C8c Was your replacement freezer ... (READ)

- 1 A chest freezer or
- 2 An upright freezer
- 00 (Other - Specify)
- 98 (Don't know)
- 99 (Refused)

C8d Is the replacement freezer frost free or manual defrost?

- 1 Frost free

- 2 Manual defrost
- 00 Other (SPECIFY:___)
- 98 Don't know
- 99 Refused

C8e What size is this replacement freezer in cubic feet? IF NEEDED: Your best estimate is fine. CLARIFY FRACTIONS TO GET TO NEAREST NUMBER.

- 1. Less than 10 cubic feet
- 2. 10 to 15 cubic feet
- 3. 16 to 20 cubic feet
- 4. More than 20 cubic feet
- 00. Other (SPECIFY:)
- 98 Don't know
- 99 Refused

[ASK C8e1 ONLY IF C8e IS 98 (DK) OR 99 (REF), ELSE C8f]

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

- 1 Larger
- 2 Smaller
- 3 Same Size
- 98 Don't know
- 99 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)

C8g How old is this replacement freezer?

[NUMERIC OPEN END RECORD IN YEARS]

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

[ASK IF C10=1]

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 I am now going to read a list of alternative ways that you could have disposed of this freezer. For each, tell me if this is a method you had considered using or doing. Did you consider... [ROTATE 1-5; Multiple response]

- 1. Selling it
- 2. Giving it away for free
- 3. Having it removed by the dealer you got your new or replacement freezer from
- 4. Taking it to a dump or recycling center
- 5. Hiring someone else to haul it away
- 6. [ASK IF C10=1,8,9] Keeping it
- 98 (DON'T KNOW)
- 99 (REFUSED)

[ASK IF D1=1]

D1a. You said you considered selling your freezer. Did you consider selling the freezer to an appliance dealer, or to a private party (like a friend, relative or by running an ad)?

- 1. Dealer
- 2. Private party (friend, relative, or by running ad)
- 3. Both
- 98. (Don't know)
- 99. (Refused)

[SKIP IF B1ab=1, 2]

D1ab.... Have you ever heard of Craigslist.com? [IF NEEDED: Craigslist.com is a website that is used for buying, selling and giving away new and used items. It performs functions similar to classified ads in newspapers.]

- 1 Yes
- 2 No
- 98 (Don't know)

99 (Refused)

[ASK IF D1ab=1]

D1ac Have you ever used Craigslist to buy, sell or give away used furniture or appliances?

- 1 Yes
- 2 No
- 98 (Don't know)
- 99 (Refused)

[ASK IF D1ac=1]

D1ac1 What did you use it for?

- 00 Other (RECORD VERBATIM)
- 98 Don't know
- 99 Refused

[ASK IF D1=1,2 and (B1ab=1,2 OR D1ab=1)]

D1ad If the ComEd program hadn't been available, would you have used Craigslist.com to sell or give away your freezer?

- 1 Yes – would have sold on Craigslist
- 2 Yes – would have given away on Craigslist
- 3 No
- 00 Other (RECORD VERBATIM)
- 98 (Don't know)
- 99 (Refused)

[ASK IF D1ad=1]

D1ad1 How much would you have sold it for?

- 0 Numeric Open End (RECORD DOLLARS)
- 9998 Don't know
- 9999 Refused

[ASK IF D1=2]

D1b. You said you considered giving away your freezer. Did you consider giving it to a private party (like a friend, relative or by running an ad), or to a charitable organization? (IF NEEDED: examples of a charitable organization could be Goodwill Industries or a Church)

- 1. Private party (friend, relative or by running an ad)
- 2. Charitable organization
- 3. Both
- 98. (Don't know)
- 99. (Refused)

[ASK IF D1=4]

D1c. You said you considered taking away the freezer. Did you consider taking it to a dump, or to a recycling center?

- 1. Dump
- 2. Recycling Center
- 3. Both
- 98. (Don't know)

99. (Refused)

[ASK IF C10=2 or D1=6]

D1d. You said you considered keeping the freezer. Did you consider storing it unplugged, or using it as a spare?

- 1 Storing it unplugged
- 2 Using it as a spare
- 3 Both
- 98 (Don't know)
- 99 (Refused)

D7 Now suppose that ComEd appliance recycling program hadn't been available. Which one of these alternatives that we've just discussed would you have been most likely to do, if the ComEd appliance recycling program had not been available? [INDICATE ONE RESPONSE ONLY]

- 1. [ASK IF D1a=2,3] Sell it to a private party
- 2. [ASK IF D1a=1,3] Sell it to an appliance dealer
- 3. [ASK IF D1b=1,3] Give it away to a private party
- 4. [ASK IF D1b=2,3] Give it away to a charity organization, such as Goodwill Industries or a church
- 5. [ASK IF D1=3] Have it removed by the dealer you got your new or replacement freezer from
- 6. [ASK IF D1c=1,3] Haul it to the dump
- 7. [ASK IF D1c=2,3] Haul it to the recycling center
- 8. [ASK IF D1=5] Hire someone else to haul it away
- 9. [ASK IF D1d=1,3] Keep it and store it unplugged
- 10. [ASK IF D1d=2,3] Keep it and use it as a spare
- 00. (Some other way (SPECIFY:_____))
- 98. (Don't know)
- 99. (Refused)

Plans for keeping and using freezer as a spare

[ASK D4B THRU D4E IF D1d=2,3, else skip to D2]

D4B You mentioned [if D7=10, read "you would have kept this freezer and used it as a spare"] [if D1d=2,3 & D7<>10, read "you considered keeping this freezer and using it as a spare"] if the ComEd appliance recycling program weren't available. For how many years would you have used this freezer as a spare? IF NEEDED: Your best estimate is fine.

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

D4C. Where would this freezer 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.

- 1 (Kitchen)
- 2 (Garage)
- 3 (Porch)

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

[SKIP IF C5=D4C=2 OR C5=D4C=3 OR C5=D4C=4]

D4D. Would this have been a heated space?

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

[SKIP IF C5=D4C=2 OR C5=D4C=3 OR C5=D4C=4]

D4E Would this have been an air-conditioned space?

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

[ASK IF D1a=1-3]

D8. You mentioned that you considered selling your freezer to [IF D1a=1, read in "an appliance dealer" [IF D1a=2, read in, "a private party" [If D1a=3, read in "an appliance dealer or private party"]. Did you actually attempt to sell your freezer in this way before participating in the program?

- 1. Yes
- 2. No
- 98. (Don't know)
- 99. (Refused)

[ASK IF D8=1 & D1a=3]

D8a. Did you attempt to trade in or sell the freezer to an appliance dealer, or to a private party? (IF NEEDED: Private party could be a friend, family member, neighbor or someone you find through running an ad)

- 1. To a dealer
- 2. To a private party
- 3. Both
- 98. (Don't know)
- 99. (Refused)

[ASK IF D8=1]

D8b. Why did you not follow through with this transaction?

- 1. (Couldn't find an interested dealer/non-dealer at the price I wanted)
- 2. (Couldn't find an interested dealer/non-dealer because of the unit's condition)
- 3. (Decided recycling unit was more important than selling it)
- 4. (Other (SPECIFY :___)
- 98. (Don't know)
- 99. (Refused)

[ASK IF (D8=1 & D1a=1) OR D8a=2,3]

D8c. If you had sold this freezer to a private party (e.g. not a dealer), how much money do you think you would have received for it?

- 1. Dollars _____(\$1 to 2,000)
- 98. (Don't know)
- 99. (Refused)

[ASK IF (D8=1 & D1a=2) OR D8a=1,3]

D8d. If an appliance dealer were to take it away, how much, if anything, do you think you would have to pay for this service?

- 1. Nothing /free service
- 2. Dollars _____(\$1 to 2,000)
- 98. (Don't know)
- 99. (Refused)

[ASK IF D1=4]

D2g. One factor in disposing of a freezer is being able to physically move and transport it. Do you have the ability to do this yourself, or would you need assistance such as renting or borrowing a truck or having someone other than your immediate family help you?

- 1. Yes, could do it myself
- 2. No
- 98. (Don't know)
- 99. (Refused)

[ASK D2, D3, D5, D6 of all freezer participants]

D2 What was the condition of the freezer when you signed up for the ComEd program? 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 problems
- 4 (It didn't work)
- 98 (Don't know)
- 99 (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
- 98 Don't know
- 99 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
- c. [ASK IF C7=1] The freezer was old and I wanted something with more modern features
- d. [ASK IF C7=1 AND C8E1=1,98,99] I wanted a bigger freezer

D6 Were there any other reasons you chose to get rid of the freezer?

[OPEN END; accept up to two]

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

AC Section

[READ IF AC_NUM=1]

SECTION E: ROOM AIR CONDITIONER CHARACTERISTICS

E0. According to our records, you also had a room air conditioner removed by ComEd. Is this correct?

1. Yes
2. No [TERMINATE IF ALL_RECYCLED_NUM=1, ELSE G1]
8. (Don't know) [TERMINATE IF ALL_RECYCLED_NUM=1, ELSE G1]
9. (Refused) [TERMINATE IF ALL_RECYCLED_NUM=1, ELSE G1]

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

1. My own unit
2. Someone else's unit
3. Something else (RECORD VERBATIM)
98. (Don't know)
99. (Refused)

IF E00=1, THEN CONTINUE, ELSE E6

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
- 98 Don't know
- 99 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
98. (Don't know)
99. (Refused)

[ASK E3 IF E2=1 ELSE SKIP TO E6]

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
98. (Don't know)
99. (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?

- 1 Less than 70 degrees
- 2 70 to 75 degrees
- 3 76 to 80 degrees
- 4 81 to 85 degrees
- 5 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
98. (Don't know)
99. (Refused)

E5 In what room was the room AC unit 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]

- 0 (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 E10]

E8aa. Did you install the replacement AC before or after the old refrigerator 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 E8b]
- 8 (Don't know) [Skip to E8b]
- 9 (Refused) [Skip to E8b]

E8 How long <before/after> the old one was picked-up did you install the replacement AC? (RECORD TIME INTERVAL)

- 1 Same day
- 2 Within one to two weeks
- 3 Within one month
- 4 Within two to three months
- 6 Within four to six months
- 7 Within six to twelve months/ one year
- 8 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]

- 0 (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
- 98 Don't know
- 99 Refused

E8E Is it 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.]

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

E11AIf 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
- 98 Don't know
- 99 Refused

[ASK E11b IF E11a = 1, ELSE F1]

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

[ASK IF E11a=1 ELSE SKIP TO F3A]

F1 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 AC. Please tell me which one you would have been most likely to use to get rid of this AC. Would you have... [ROTATE 1-4]

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)
- 00. (Other – Specify)
- 8. (Don't know)
- 9. (Refused)

[ASK IF F1=1, ELSE F1b]

F1a. Would you have sold the AC to a used appliance dealer or to a private party, either someone you know or by running an ad?

- 1. Sold it to a used appliance dealer
- 2. Sold it to a private party
- 8. (Don't know)
- 9. (Refused)

[IF B1ab=1, 2 OR D1ab=1,2 THEN SKIP, ELSE ASK]

F1ab..... Have you ever heard of Craigslist.com? [IF NEEDED: Craigslist.com is a website that is used for buying, selling and giving away new and used items. It performs functions similar to classified ads in newspapers.]

- 1 Yes
- 2 No
- 98 (Don't know)
- 99 (Refused)

[ASK IF F1ab=1]

F1ac Have you ever used Craigslist to buy, sell or give away used furniture or appliances?

- 1 Yes
- 2 No
- 98 (Don't know)
- 99 (Refused)

[ASK IF F1ac=1]

F1ac1 What did you use it for?

- 00 Other (RECORD VERBATIM)
- 98 Don't know
- 99 Refused

[ASK IF F1ab=1,2 AND (B1ab=1, 2 OR D1ab=1,2 OR F1ab=1,2)]

F1ad If the ComEd program hadn't been available, would you have used Craigslist.com to sell or give away your room air conditioner?

- 1 Yes – would have sold on Craigslist
- 2 Yes – would have given away on Craigslist
- 3 No
- 00 Other (RECORD VERBATIM)
- 98 (Don't know)
- 99 (Refused)

[ASK IF F1ad=1]

- F1ad1 How much would you have sold it for?
- 00 Other (RECORD VERBATIM)
 - 98 Don't know
 - 99 Refused

[ASK IF F1=2]

- F1b. Would you have given the AC to someone you know or to a charity organization?
- 1. Given AC to someone you know
 - 2. Given to a charity organization
 - 8. (Don't know)
 - 9. (Refused)

[ASK IF F1=4, ELSE F2]

- F1c. Would you have taken the AC to a dump or to a recycling center?
- 1. Dump
 - 2. Recycling Center
 - 8. (Don't know)
 - 9. (Refused)

[ASK F3A THRU F3C IF E11a=2OR F1=5, OTHERWISE, SKIP TO F11]

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)
- 98 Don't know
- 99 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]
- 77 (Until it broke, indefinitely)
 - 0 (Less than 1 year)
 - 98 Don't know
 - 99 Refused

F3C. Where would this AC have been located if you hadn't gotten rid of it and had used it? IF NEEDED, CLARIFY: What room?.

- 1. (Bedroom)
- 2. (Living room)
- 3. (Dining room)
- 4. (Kitchen)
- 5. (Hallway)
- 6. (Other)

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

[ASK F2, F4, F5 of all AC participants]

F2 What was the condition of the AC when you signed up for the ComEd program? 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 problems
- 4 (It wasn't working)
- 8 (Don't know)
- 9 (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? [ROTATE]

- a. The AC was expensive to run (0 to 10 Scale)
- b. The AC was a spare that I did not use very much(0 to 10 Scale)
- c. The AC was old and wasn't cooling the best anymore(0 to 10 Scale)
- d. [SKIP IF E8D=2.3] I wanted a bigger AC unit or system(0 to 10 Scale)

F5. Were there any other reasons you chose to get rid of the AC?

[OPEN END]

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

PROCESS QUESTIONS

[IF NO RECALL OF ANY APPLIANCE: TERMINATE]

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. (Internet)
- 02. (Bill Insert)
- 03. (ComEd Energy at Home Newsletter)
- 04. (Friend/relative/neighbor)
- 05. (ComEd website)
- 06. (Radio)
- 07. (Newspaper)
- 08. (Municipal website or newsletter)
- 09. (ABT Electronics)
- 10. (Best Buy)
- 11. (Sears)
- 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 G1)

- 01. (Internet)
- 02. (Bill Insert)
- 03. (ComEd Energy at Home Newsletter)
- 04. (Friend/relative/neighbor)
- 05. (ComEd website)
- 06. (Radio)
- 07. (Newspaper)
- 08. (Municipal website or newsletter)
- 09. (ABT Electronics)
- 10. (Best Buy)
- 11. (Sears)
- 00. (Other_____)
- 96. (No/No other sources)
- 98. Don't know
- 99. Refused

[Generate "retailer" variable = "ABT Electronics" if G1=09 or G2=09; "Best Buy" if G1=10 or G210; "Sears" if G1=11 or G2=11]

[ASK IF G1=9,10,11 OR G2=9,10,11]G2a. At <retailer>, how did you first hear about the program?

- 1. Store employee
- 2. Print or display materials (like a poster, flyer, or sticker)
- 00. Other (Specify)
- 98. Don't Know
- 99. Refused

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

- 1 (Yes, received information)
- 2 (No)
- 98 (Don't know)
- 99 (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)
- 98 (Don't know)
- 99 (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?

- 1. The cash incentive)

- 2. (The convenience of the home pick-up)
- 3.(Don't have to take it someplace myself)
- 4. (Pick up was free)
- 5. (Appliance was recycled/Was disposed of in a way that was good for environment)
- 6. (Was recommended by friend/family)
- 7. (Was recommended by retailer)
- 00. (Other_specify)
- 96. (Did not know of any other way/No other option)
- 98. (Don't know)
- 99. (Refused)

G3b. Were there any other reasons? (Categories eliminated based on G3a)

- 1. (The cash incentive)
- 2. (The convenience of the home pick-up)
- 3. (Don't have to take it someplace myself)
- 4. (Pick up was free)
- 5. (Appliance was recycled/Was disposed of in a way that was good for environment)
- 6. (Was recommended by friend/family)
- 7. (Was recommended by retailer)
- 00. (Other_specify)
- 96. (Did not know of any other way/No other option)
- 98. (Don't know)
- 99. (Refused)

G9. 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
- 11. (Don't know)
- 12. (Refused)

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

G9a. Why did you rate it that way?

- (OPEN END)
- (Don't know)
- (Refused)

G10. How satisfied are you with the amount of time it took to receive your payment from ComEd?

[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. Don't know
- 12. Refused

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

G10a. Why did you rate it that way?

- (OPEN END)
- (Don't know)
- (Refused)

G11. Thinking about your entire experience with the ComEd Appliance Recycling Program, overall, how satisfied are you with the service?

[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. Don't know
- 12. Refused

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

G11A. What aspects of the program did you particularly like? [Multiple Response accept 3] (NOTE to interviewer: If the respondent says "like all of it" or "entire program", record that response and probe for particular aspects)

01. (The service was easy)
02. (Didn't have to dispose of appliance myself)
03. (Like that appliance was recycled/helps the environment.)
04. (The incentive/\$35 payment)
05. (Short wait between signing up and pick-up)
06. (Positive comment about pick-up team)
07. (It was free)
08. (Signing up online)
09. (Liked entire program)
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 G12]

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

[OPEN END]

(Don't know)

(Refused)

G12. This time, on a scale of 0 to 10 where 0 is "not at all likely" and 10 is "very likely," how likely are you to recommend the ComEd Appliance Recycling program to a friend or colleague?

0. 0
1. 1
2. 2
3. 3
4. 4
5. 5
6. 6
7. 7
8. 8
9. 9
10. 10
11. Don't know
12. Refused

(ASK IF G12=0,1,2,3, ELSE G16)

G12a. Why did you rate it that way?

(OPEN END)

(Don't know)

(Refused)

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

1. Yes
2. No
3. (Don't know)
4. (Refused)

IF G16=1, THEN ASK, ELSE G17.

G16a. What actions have you taken?

(OPEN END)

98. (Don't know)
99. (Refused)

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

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

[ASK G16c IF G16b=1, ELSE G17]

G16c. Which other program did you participate in?

- 1 Energy Audit/Home Assessment
- 2 Central AC program
- 3 Lighting Discounts/Energy Efficient Light bulbs
- 4 Hourly pricing program
- 5 (Fridge and Freezer Recycling Program – another unit)
- 00 (OPEN END)
- 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
3. Don't know
4. Refused

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

H1. Do you own or rent your home?

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

H1a Do you own rental property that is leased to others?

- 1 (Yes, lease to others)
- 2 (No, don't lease to others)
- 3 (Other, RECORD VERBATIM)
- 98 (Don't know)
- 99 (Refused)

[ASK IF H1 = 2, ELSE H3]

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

1. Pay bill
2. 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...

1. Less than 500 square feet
2. 500 to less than 1000 square feet
3. 1000 to less than 1500 square feet
4. 1500 to less than 2000 square feet
5. 2000 to less than 2500 square feet
6. 2500 to less than 3000 square feet
7. 3000 to less than 4000 square feet
8. 4000 to less than 5000 square feet
9. 5000 square feet or more
98. (Don't Know)
99. (Refused)

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

[RECORD YEARS/MONTHS GIVEN]

98. (Don't Know)
99. (Refused)

H6a. Was your total family income in 2010 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?

- 1. Less than high school
- 2. High school graduate or equivalent (e.g., GED)
- 3. Attended some college (includes junior/community college)
- 4. Bachelors degree
- 5. Advanced degree
- 00. (Other, Specify)
- 98. (Don't know)
- 99. (Refused)

5.3.2 ComEd FFRR Participating Retailer Survey

**ComEd Appliance Recycling - PY4
Participating Retailer Surveys – Abt, Sears and Best Buy**

Abt Electronics

1. Confirm findings from last year’s interview
 - a. As a reminder, we interviewed you last year about your involvement in the program.
 - b. We know that your firm sells new appliances and want to confirm the additional services you provide in conjunction with these sales, for example:
 - i. **Pickup of Replaced Units.** Last year you indicated that Abt offers its own pickup or disposal service for all appliances. I presume you mean all replaced appliances, correct? And I want to confirm that you do not use another firm to do the pick-ups.
 - ii. **Recycling.** You also stated that you’ve been recycling for 20 years or more, perhaps even 30 years. You said you recycle ‘everything’. I want to clarify that answer to make sure we are understanding it correctly.
 1. *If someone buys an appliance from you, and you pick up their old unit, is that unit then deconstructed and recycled?*
 2. *I assume Abt was providing this recycling service even prior to the start-up of ComEd’s program. Correct?*
 3. *What if the unit is still fairly new? Are all such units de-manufactured and/or regardless of their age and condition?*
 4. *You mentioned there is ‘usually’ a charge to the customer for the recycling service. How much do you charge? Do 100% of your customers replacing units pay this charge? And if not, how is it that Abt recycles ‘everything’? or did you instead mean deconstructed (crushed) or recycled? Or?*
 - iii. **Used appliances.** From last year’s interview, I concluded that none of the replaced units collected by Abt end up in the used appliance market. *is that correct?*
2. **Net to Gross questions**
 - a. If ComEd’s program were not available, what would your company have done with the appliances that were recycled through the program? *(Probe to determine if units would have been left with the customer, re-sold, collected and deconstructed/crushed, or recycled.)*

Sears

3. Confirm findings from last year’s interview
 - a. As a reminder, we interviewed you last year about your involvement in the program.
 - b. We know that your firm sells new appliances and want to confirm the additional services you provide in conjunction with these sales, for example:

- i. **Pickup of Replaced Units.** Last year you indicated that Sears offers a pickup and disposal service for customers that purchase new refrigerators or freezers. You said ‘we have haul away for everything we sell.’ Is that correct?
 - 1. We asked if you had a charge for units that were hauled away and you said it’s about 50/50, in that when you had free pickup and delivery, there is no charge – presumably this is about half the time, correct?
 - 2. You also said the customer has to spend over \$399 to qualify for free pick up, correct?
 - 3. And I want to confirm that you do use another firm to do the pick-ups, is that correct? Which firm does Sears use in the Chicago area? You mentioned Mike’s Appliances in the interview, *can you provide the name/phone number of your contact there?*
- ii. **Recycling.** You also said all utility haul aways are either recycled or decommissioned. And further, if the unit is Standard and not associated with a Utility program, Sears turns the unit over to a 3rd party **recycler**. Is this correct? Or is it a 3rd party hauler, who may either resell the unit or have it destroyed/recycled, depending on the condition it is in.
- iii. I want to clarify that answer to make sure we are understanding it correctly.
 - 1. *If someone buys an appliance from you, and you pick up their old unit, if they are not associated with any utility program is that unit then deconstructed and recycled by the 3rd party recycler? Or is it simply removed and the 3rd party then decides what to do with the unit? (either sell as used, destroy/crush or recycle) Does Sears require the 3rd party to have it destroyed/recycled as a condition of using them?*
 - 2. *I assume Sears was providing this haul away service even prior to the start-up of ComEd’s program. Correct?*
 - 3. *What if the unit is still fairly new? Are all such units de-manufactured and/or recycled regardless of their age and condition?*
- iv. **Used appliances.** From last year’s interview, I concluded that only about 10% of the collected units end up in the used appliance market. *is that correct?*

4. **Net to Gross questions**

- a. If ComEd’s program were not available, what would Sears have done with the appliances that were recycled through the program? *(Probe to determine if units would have been left with the customer, re-sold, collected and deconstructed/crushed, or recycled.)*
- b. In other states or regions without utility pickup-recycling programs, what does Sears do with the appliances that are replaced and the customer no longer wants? *(Probe to determine if units would have been left with the customer, re-sold, collected and deconstructed/crushed, or recycled.)*

Best Buy

5. Confirm findings from last year's interview
 - a. As a reminder, we interviewed you last year about your involvement in the program.
 - b. We know that your firm sells new appliances and want to confirm the additional services you provide in conjunction with these sales, for example:
 - i. **Pickup of Replaced Units.** Last year you indicated that Best Buy offers a standard free haul-away service for up to two old appliances in all stores. You said that you partner with two major recyclers – 3rd party companies. These companies determine if there is value in the secondary units. In ComEd territory, you said that Appliance Distribution, Inc., a subcontractor to JACO performs this service. Is that correct?
 1. Prior to ComEd's program, you were already offering this same service, correct? Were you using ADI/JACO at that time?
 2. Is there a minimum amount the customer has to spend to qualify for free pick up?
 3. Does the service pick up both working and non-working units?
 4. Besides ADI/JACO is there another firm that you use for reselling working units that are still relatively new and have resale value? Which firm does Sears use in the Chicago area? *Can you provide the name/phone number of your contact there?*
 - ii. **Recycling.** What happens to Standard (non-utility program) units that are hauled away? What percentage are recycled versus decommissioned/destroyed? Are there criteria that are applied to determine which units are selected for each? Is there a charge to the customer for recycling non-utility program units, and if so, what is it?
 - iii. I want to clarify that answer to make sure we are understanding it correctly.
 1. *If someone buys an appliance from you, and you pick up their old unit, if they are not associated with any utility program is that unit then deconstructed and recycled by the 3rd party recycler? Or is it simply removed and the 3rd party then decides what to do with the unit? (either sell as used, destroy/crush or recycle) Does ADI/JACO require the 3rd party to have it destroyed/recycled as a condition of using them?*
 2. *I assume ADI/JACO was providing this haul away service even prior to the start-up of ComEd's program. Correct?*
 3. *What if the unit is still fairly new? Are all such units de-manufactured and/or recycled regardless of their age and condition?*
 - iv. **Used appliances.** From last year's interview, I concluded that only about 10-15% of the collected units end up in the used appliance market. *is that correct?*

6. Net to Gross questions

- a. If ComEd's program were not available, what would Best Buy have done with the appliances that were recycled through the program? *(Probe to determine if units would have been left with the customer, re-sold, collected and deconstructed/crushed, or recycled.)*
- b. In other states or regions without utility pickup-recycling programs, what does Best Buy do with the appliances that are replaced and the customer no longer wants? *(Probe to determine if units would have been left with the customer, re-sold, collected and deconstructed/crushed, or recycled.)*

5.3.3 ComEd FFRR Used Appliance Dealer Survey

Com Ed PY4 Appliance Recycling Evaluation Used Appliance Dealer Survey - Final

Background

This guide is intended for use with owners or managers of used appliance stores/firms. The goal of these interviews is to develop a characterization of the used appliance market.

Introduction

Hello. My name is _____ with Itron. I am part of a team that has been asked by ComEd to conduct an evaluation of their Residential Appliance Recycling Program. One of the goals of this evaluation is to understand the characteristics of the market for used refrigerators and freezers.

Basics

1. Do you pickup/remove used refrigerators and or freezers? (Yes/No) **[IF NO, TERMINATE INTERVIEW: 'I'm sorry but we are only interested in talking to firms that haul away and sell used refrigerators and freezers. On behalf of ComEd, thank you very much for your time.']**
2. Do you work directly with customers or on behalf of new appliance retailers?
 - a. Please explain (both if necessary, as well as the percent of each).

Background

1. Is your primary business used appliances? **[IF NEEDED: Does more than 50% of your company's revenue come from the sales of used appliances?]**
2. Do you sell new appliances, used appliances or both?
3. Optional: Does your company have more than one location? If so, how many, and how do those locations compare to each other in size and sales?

Acquiring Appliances

1. How do you go about acquiring used appliances? **(INTERVIEWER: the following list is for reference only. Use it to probe and as a check list. Make a list for later use.)**
 - a. Homeowners pay us to pick-up appliances
 - b. We provide free pick-up from homeowners
 - c. We allow people to drop-off refrigerators
 - d. We work with community waste management programs to obtain refrigerators and freezers
 - e. We obtain refrigerators through contracts with new appliance dealers such as Sears, Best Buy, Abt, Lowe's, etc.
 - f. We obtain stock from other used appliance dealers
 - g. Other sources, **please identify**

Obtains directly from homeowners [IF APPLICABLE]

1. Earlier, you mentioned that homeowners pay you to pick-up appliances, or your firm provides free pick-up. How do customers find out about your services?

- a. Word-of-mouth
 - b. Yellow pages
 - c. Local advertising such as Penny Saver
 - d. Other media such as cable, TV, radio
 - e. Through new appliance dealers
 - f. The internet
 - g. Other, please identify
2. When you make contact with a homeowner do you screen for certain types of appliances, for example, working appliances, or do you take anything that comes your way? If you screen, what criteria do you use?

Community Pick-ups [IF APPLICABLE]

1. Earlier, you mentioned that you work with community waste management programs to obtain refrigerators and freezers. In about how many communities do you do pick-ups?
2. Optional: Do you pay the community for the right to haul, do you provide the hauling removal service for free, or does the community pay you to haul the refrigerators? If the latter, can you tell me approximately how much per unit?
3. Do you take all of the refrigerators you find or just certain ones? If just certain ones, which ones do you take? Do you know what happens to those that are left behind?

Obtain from new appliance dealers [IF APPLICABLE]

1. Earlier, you mentioned that you obtain used units from new appliance dealers. With roughly how many appliance dealers do you have contracts?
2. Which new appliance retailers?
3. Do you pay for the machines, does the dealer pay you, or do you remove the machines for free?
4. For these dealers, do you resell all the appliances or just certain ones?
5. What percent are resold? Why are they selected for resale?
6. What happens to the other units?

Quantities by source

1. Can you tell me roughly how many refrigerators and freezers (each) you actually acquire annually whether working or not?
2. Thinking about the various sources we have discussed, roughly what percentage comes from each source? (**INTERVIEWER – HIGHLIGHT the relevant sources based on previous answers and proceed.**)
 - a. Homeowners pay us to pick-up appliances - # refrigerators____, # freezers____
 - b. We provide free pick-up from homeowners - # refrigerators____, # freezers____
 - c. We allow people to drop-off refrigerators - # refrigerators____, # freezers____
 - d. We work with community waste management programs to obtain refrigerators - # refrigerators____, # freezers____
 - e. We obtain refrigerators through contracts with new appliance dealers such as Sears, Best Buy, Abt, etc. - # refrigerators____, # freezers____

- f. Obtain stock from other used appliance dealers - # refrigerators _____, # freezers _____
- g. Other sources, **specify** - # refrigerators _____, # freezers _____

What the dealer does with the used refrigerators and freezers

1. What do you do with the used refrigerators and freezers that you receive? (probe to make sure you have all of the paths)
 - a. Sell them through a store or stores
 - b. Sell them to other dealers
 - c. Sell them to overseas brokers
 - d. Sell them to operators of multifamily units
 - e. De-manufacture them and recover resources
 - f. Take to a landfill
 - g. Other (please describe)
2. How do you determine what to do with each of the refrigerators and freezers that you receive? (i.e., Sell vs. de-manufacture)
3. Roughly what percentage of the refrigerators and freezers that you obtain are disposed of by each method? [Record percent for each option]
 - a. Sell them through a store or stores _____%
 - b. Sell them to other dealers _____%
 - c. Sell them to overseas brokers _____%
 - d. Sell them to operators of multifamily units _____%
 - e. De-manufacture them and recover resources _____%
 - f. Take to a landfill _____%
 - g. Other (please describe) [Other _____] _____%
4. If you sell through stores or to other dealers, who are the customers likely to be?
5. What percentage of the refrigerators and freezers that you sell do you think are likely to be used as a primary unit? A secondary unit?

How the dealer/operator processes the used refrigerators and freezers that are obtained

1. When you receive used refrigerators and freezers how do you process them?
 - a. Do you screen them for working, repairable, or unfixable?
 - b. Roughly what percentage come in each condition?
 - c. Do you assess what to do with used refrigerators and freezers based on market value?
 - d. If so what criteria, do you use? Size, color, age (**probe on specific age cut off, e.g., >10 years old**), configuration
 - e. What percentage of used refrigerators and freezers that are working or repairable do you dispose of if they don't meet your market criteria?
 - f. How do you dispose of these machines?
2. Do you de-manufacture used refrigerators and freezers and sell the insulation, plastics and metals?

The Used appliance Market Optional

1. Are you able to sell all of the used refrigerators and freezers that you obtain?
2. Could you sell more used refrigerators and freezers if you could get more?
3. If you could sell more, roughly how many more could you sell?
4. What are the most important market segments for the used market?
5. What do you think those customers would do if they were not able to obtain used refrigerators and freezers from companies such as yours?

Awareness of the ComEd Residential Appliance Recycling Program

1. Are you aware of the ComEd Residential Appliance Recycling Program?
2. Do you think that that program is influencing your business? If so, how?
3. Are there ways in which you think your business might be able to cooperate with the program? If so, how?
4. Do you believe ComEd's program has affected the market for secondary refrigerators and freezers in Illinois? How so?

Given everything we have discussed, is there anything else that you would like to tell us or talk about?

5.3.4 Room Air Conditioner Deemed Savings Review

Room Air Conditioners. The energy consumption of residential HVAC can be estimated using the following equation.

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

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

Assumptions. The program documentation assumes savings of 80 kWh annually and 0.04 of peak kW. DOE-2 modeling is listed as the source of these savings estimates.

Results. We propose to estimate recycled AC unit savings using the algorithm stated above. Required data will be obtained from multiple sources including tracking data, phone surveys, and professional judgment.

The program is collecting data on capacity, but we must make judgments on the FLEH and unit efficiency. We can use other tracking data as proxies for these factors.

Full-Load Equivalent Hours. For FLEH our estimate will be based on whether the machine is the primary or secondary cooling system in a house. This information will be gathered via the phone surveys of participants. In the residential HVAC programs ComEd is assuming approximately 750 FLEH for central AC equipment as a primary system. Secondary systems would have fewer hours.

Unit Efficiency/SEER. For unit efficiency, we can use age as a proxy for estimating efficiency. New equipment will have higher efficiency with the newest equivalent to the current code minimum about 9.7 EER for most window units. Older equipment will have degraded efficiency due to age and more lax minimum efficiency standards in the past.

The following values can be used in the consumption algorithm for the removed appliance:

FLEH	
Primary	750
Secondary	350
Unknown	150

Source: DEER

Efficiency/SEER vs. Age	
Since 2000	9.7
1990 – 1999	8.5
1980 – 1989	7.5
1970 – 1979	6.8
Pre 1970	6.0

Source: DEER

Savings depends on the status of site cooling after the unit is removed. In all cases we would assume same capacity replacements. We propose the following assumptions for site cooling after a window AC unit is replaced.

If it is a primary unit removed, we assume it will be replaced by central AC with a minimum efficiency of 13.0 SEER or another window unit with a minimum efficiency of 9.7 EER running for 750 FLEH.

If it is a secondary unit removed it will be replaced by central AC with a minimum efficiency of 13.0 SEER and 750 FLEH or another window unit with a minimum efficiency of 9.7 EER running for 350 FLEH.

Undefined systems will be replaced by a 9.7 EER window unit operating 150 hours.