Crew Training and Quality Assurance

Because program participation in the Appliance Recycling Program waxes with warm weather and wanes with cooler weather, a greater number of employees are needed during the busy season. JACO adjusts its staffing levels accordingly. Its drivers and navigators must pass background and motor vehicle record checks. New staffers receive several days of training with a manager to learn the specific tasks involved and to competently explain the particulars of the Duke Energy program when interacting with customers. New employees are then paired with a more experienced partner to ensure that protocols are clear and followed consistently. Senior JACO managers hold weekly webinars with the location managers for each region to discuss operations, policies, and safety practices. The location managers, in turn, meet with their crews to pass along the information.

As one of the nation's leading appliance recycling firms, JACO holds its collection crews to high standards. To confirm that quality is maintained, every few weeks the location managers secretly shadow their crews, driving behind them to ensure that they are following traffic laws, parking appropriately, wearing designated gear and ID badges, and walking to the door together. After three or four customers, the manager retraces the route to speak with customers about their experiences with the crew. Employees are scored and managers discuss any necessary improvements. Duke Energy maintains the option to participate in the quality control efforts, but has not felt the need to engage in such field inspections.

Dismantling and Recycling

All dismantling and recycling activities are specific to JACO and not the responsibility of Duke Energy. Nonetheless they are briefly documented here to demonstrate Duke Energy's compliance with its voluntary participation in the U.S. Environmental Protection Agency's (EPA) Responsible Appliance Disposal (RAD) program.

Once units have been checked into the warehouse, the dismantling process begins. Doors are disconnected; hardware and glassware is removed; refrigerants are collected; oils are drained; sheet metal is peeled off; and insulating foam is stripped and bagged. In all, JACO's recycling process recovers up to 95% of all refrigerator components for reuse, and it ensures that 100% of hazardous components—including the refrigerants, PCBs, mercury, and other toxic elements—are properly broken down and disposed of. Most of the remaining 5% of elements are also put to good use. For instance, while the fiberglass insulation inside the doors can't be recycled, it is shredded and used as fluff material to provide an air gap between landfill layers to create avenues for methane to escape.

All of JACO's processes are conducted to meet or exceed state and federal laws, as well as the more stringent RAD program guidelines. Furthermore, the program is designed so that while the recycling effort is conducted under the auspices of Duke Energy, the utility never comes into legal possession of the units. The units—and more importantly their hazardous elements—remain in JACO's custody from the time the customer signs the release until the constituent components have been broken down, sold, or dispersed to their upstream or downstream destinations. JACO uses revenues received from these sales to reduce program costs for Duke Energy.

When all steps in the dismantling process have been completed, the warehouse technician confirms that the unit has been recycled on a pocket PC. This signals JACO and Duke Energy that all requirements have been met and the incentive check can be processed for the unit associated with that specific ATO number.

Incentive Payments

The financial incentive levels for the program are currently set at $30 per unit for customers in Ohio and Kentucky. JACO is contractually required to send payments to customers within four to six weeks. This is the timeframe mentioned in program's promotional materials, but, in practice, most checks are mailed within two to four weeks. JACO handles payment processing and includes incentive documentation in its monthly billing to Duke Energy, whose product manager reviews the monthly data, reconciles any discrepancies with JACO, and approves the invoice.

No challenges or issues were reported with incentive processing or accounting. However, all parties that we talked to indicated that the incentive amount may need to be raised in order to help the program meet its collection goals. At $30 per unit, Duke Energy's incentive amount is at the low end of the "typical" financial range; the higher end being $50 per unit.

TecMarket Works considers introducing the program with a $30 incentive level to be a fiscally prudent step because it captures "the low hanging fruit" of willing customers and establishes a baseline for customer response levels. Moreover, as the correlation between response rates and marketing effectiveness is clarified, it becomes possible to identify market barriers to participation. However, the lower incentive amount also limits the number of people willing to part with their working refrigerators and freezers.

According to those we interviewed, the two most prevalent barriers to increasing customer participation appear to be financial. The first involves the cost of a customer's time. If a prospective customer is earning $10 per hour and the program requires them to miss four hours of work in order to be home to recycle the unit, then a $30 incentive will not cover the cost of their time. Thus even if they want to recycle the unit, it may not make financial sense to do so.

The second barrier involves a psychological hurdle arising because some prospective customers cannot or do not distinguish between replacement costs and operating costs. Even if they can afford to stay home to recycle the unit, they may be more likely to hold onto it because they reason that it costs them less to keep it than to buy a replacement should they decide they want one; this despite the fact that the program marketing copy tells them that getting rid of the unit could save them up to $150 per year.

For both barriers, the larger the financial incentive, the more enticing the offer will be.

Another advantage of increasing the incentive is the potential reduction of freeridership, since the larger payments shift the ratio away from those who would have recycled their units anyway toward those customers now participating because they will receive the compensation.

As Duke Energy and JACO are aware, successful program participation levels are reached when three factors come into alignment: appropriate customers, effective marketing, and a desirable offer being made (consisting of the incentive amount and other attributes, such as timing, free collection, etc.). As discussed in the earlier sections above, the program management team is currently targeting those customer segments most likely to be interested in recycling their appliances, and the team has implemented a coordinated, multi-pronged marketing effort that is demonstrably generating customer awareness. While these two factors can and should be enhanced, increased program enrollments will also depend upon the amount of the financial incentive. Therefore, as the team considers how to best achieve its annual harvest goals, they may do well to consider the relative cost effectiveness of increasing the marketing spend per unit in order to reach more customers and improve awareness versus increasing the incentive paid per unit to make the offer more attractive to people who are aware of the program.

To assess the effectiveness of increased incentive levels, Duke Energy conducted a controlled test of 240,000 North Carolina and South Carolina customers, who were to be sorted into three groups of 80,000 customers each. The first group received a $50 incentive. The second group received a $40 incentive; while the third group continued to receive the offer for a $30 incentive and thus serve as the control. All other aspects of the program remained consistent for all three groups. The program test applied to all collections for the month of September 2013. Analysis of the results demonstrated that compared to the $30 incentive control group which had 377 participants, the $40 incentive group drew an additional 612 participants with an associated 162% lift in response. The $50 incentive group performed even stronger with 867 more participants than the control group and an associated 230% lift compared to response rates in the control group. Such results demonstrate that with all other aspects of the program remaining consistent, higher incentive levels can lead to greater participation rates and therefore increased energy savings associated with the additional units collected. With this in mind, TecMarket Works encourages Duke Energy to consider the applicability of these results in its Ohio and Kentucky service territories and to take steps to adjust incentive levels there if deemed cost-effective and appropriate. In these decisions, JACO's experience with similar utility programs may provide guidance as well.

Quality Assurance

As discussed previously in this evaluation, the call center representatives and collection crews are subject to random and scheduled reviews for quality assurance. JACO managers provide similar inspections at their recycling facilities to ensure protocols are followed, to assess tracking of captured materials, and to confirm metrics for compliance with all regulations.

Because Duke Energy places considerable stock in the importance of customer experience, JACO collection crews provide each home they visit with a mail-in, 10-question survey to ascertain customer satisfaction. While response rates are low, feedback is positive. According to customer satisfaction figures collected by Duke Energy, 88% of customers rate their overall program satisfaction as equal to or greater than 8 on a scale of 1 to 10. Likewise, the program enjoys a net promoter score of 91 out of 100, with 93% of participants rating the program as 9 or 10, meaning that they would recommend it to their friends and family. Net promoter scores above 50 are considered strong.

When the program was first starting, Duke Energy also conducted a call-back survey with the first 10 percent of customers to join the program. After these customers finished the program, JACO made outbound phone calls to ask them to provide feedback about what was working well and what needed improvement. A similar call-back process remains available if the mail-in surveys or other quality assurance measures reveal a volume of complaints or otherwise draw scrutiny.

Data Tracking and Reporting

As noted in the section titled *Marketing* above, the team uses unique URLs and "how heard questions" to track marketing effectiveness. These metrics are then compared with the numbers of appointments and units collected to provide an overall picture of the program's effectiveness.

Equally important to Duke Energy is the customer's participation in the program. To manage this, JACO tracks all interactions from the date customers first make contact to the day their unit is collected to the day they cash their incentive payment.

Appliance tracking is similarly robust. Once an appointment is scheduled, JACO consistently tracks all activities based upon the associated unique ATO number, so it can report on the unit's status from before it comes into the company's possession until it has been fully dismantled into its constituent parts.

For reporting purposes, JACO's call handling metrics, scheduled appointments, cancellations, and collections are all automatically uploaded to an internet accessible database that can be accessed by Duke Energy managers at any time. This customer experience dashboard provides a multitude of ways for viewing data and reporting metrics, ranging from call handling times and available dates for appointments to reasons for cancellations and uncashed incentive payments.

No problems with data tracking or reporting were identified. However, Duke Energy and JACO indicated their respective IT departments had experienced challenges in aligning their computer systems to ensure fully functional data transfer and displays. Such challenges are to be expected during program start up, and while they caused some delays, they did not result in concerns regarding data integrity.

At the time of this report, the IT teams were focused on improving the reporting system to resolve an issue that was causing cancellation metrics to appear worse than they actually were. Under the original system, each new customer appointment resulted in a unique ATO number. While appropriate for tracking the appliance, this meant that if a customer called to reschedule, then a new ATO would be issued, which in turn made reschedules appear as cancellations if tracked by the ATO number. A system correction was underway at the time of our interviews.

Management Coordination and Communication

Each week the Duke Energy product manager, JACO's program manager, and RSE's account manager meet to discuss marketing performance, operations, strategy, and tactical changes. Specialists and other parties from each firm participate as appropriate. All parties consider their business relationships to be strong and positive with effective communication and a shared sense of teamwork toward a common set of goals.

Duke Energy expressed appreciation for the turnkey nature of JACO's programs. The product manager characterized JACO as "highly knowledgeable, open, fair, professional, and easy to work with." Furthermore, he indicated that JACO was meeting its service level agreements, despite appliance collection levels being lower than targeted.

For its part, JACO and its subcontractors described their Duke Energy counterparts as "able to see the big picture and handle details," "willing to try out and fund promising ideas" and even "they're my golden client." Of Duke Energy's product manager in particular they stated, "He's so dedicated that he even works on resolving issues when he's on his day off."

Program Changes Interviewees Would Like to See

We asked those we interviewed to suggest the changes that they would like to see made to the program. While managers are generally satisfied with the program, they are continually looking for opportunities for improvement. Their suggestions are noted below.

Based upon their experiences with many utilities around the nation, all parties that we spoke with from JACO and RSE expressed that incentive levels will need to be increased in order to meet projected goals. Duke Energy representatives also felt this would probably be necessary, but waited on the outcome of the incentive level testing in the Carolina System prior to making that determination.

While no challenges or issues with refrigerator collection were reported, two people suggested that customer expectations may be better managed by adding language about collection trucks being limited by accessibility of their properties.

Although no problems with data tracking or reporting were identified, a methodological approach was causing cancellation metrics to appear worse than they actually were because customers who cancelled their initial appointment were assigned a new ATO number when they rescheduled, thus making the numbers appear to be referring to different customers rather than the same person. A correction was underway at the time of our interviews.

Evaluation and Recommendations

Evaluation

Overall Duke Energy's Appliance Recycling Program is a well-conceived and well-managed energy efficiency program. Its marketing implementation successfully combines Duke Energy customer communications with paid advertising and creative public relations events that are effectively generating customer awareness and sign-ups for the program. Aside from a temporary, minor slip in call center answering times, phone-based customer support and scheduling are operating smoothly. Likewise, unit collections and dismantling operations are also functioning well with no reported issues. Moreover, the program managers and implementation teams communicate regularly and collaborate effectively as they work toward shared goals.

Yet despite this laudable performance, the program lags in its projected pick up rates, bringing in 2,608 units in Ohio and 578 units in Kentucky, for a total of 3,186 units so far throughout the combined service territories toward a combined goal of 5,984 units by the end of 2013. This represents 53% of combined goals.

A portion of this may be ascribed to higher than desired cancellation rates of 19.3% in Ohio and 18.8% in Kentucky since each appointment cancellation diminishes the program's marketing and scheduling effectiveness. But this can account for a few hundred collections at most, and thus does not appear to be a primary driver.

A successful program operates optimally when it targets the most appropriate customers with a carefully designed marketing message and a compelling offer. Since the program's targeting and marketing efforts are operating well, the most apparent area for change seems to be the financial incentive offered for each unit collected. At $30 per unit, the offer does not appear be high enough to compel customers to relinquish their still-working refrigerators and freezers. Therefore, the program may need to consider raising the incentive level.

TecMarket Works commends Duke Energy's on its testing of different incentive levels with its Carolina System customers in September of 2013 that demonstrated that incentives of $40 and $50 result in greater participation rates. We encourage the utility and JACO to carefully consider the results of those tests and their applicability in its Ohio and Indiana service territories in order to weigh the merits of increasing the incentive level versus investing additional program dollars in improved targeting and increased marketing spend per unit.

These steps and the suggestions noted below may help to increase program collections. However, we also ask Duke Energy to reconsider its original harvest projections in light of the program's performance during the initial months of operation. It may be that current performance appears to be underperforming because the initial goals were overly optimistic or because they were based on outdated study projections by the time of the launch of the program.

With these thoughts in mind we offer the following recommendations for improvement.

Recommendations

- It seems logically sound that cancellation rates will diminish with a greater number of appointment time slots and with shorter time intervals between customer calls and pick up dates. However, that will remain an indirect effect until more customers begin making appointments. Therefore, Duke Energy and JACO should also take multiple actions to increase program enrollments and direct steps to reduce cancellations wherever possible.
- Raising incentive amounts from $30 to $40 or $50 per unit will likely increase participation and help the program to reach its targeted goals. This should be studied and compared with the effectiveness of increasing marketing spend per unit to make a wider audience aware of the program and its benefits.
- Because landlords represent the largest group of appliance purchasers, consider developing an aspect of the program that targets property management companies to encourage their participation either with collections of individual refrigerators that

require replacement or via large scale replacements at one time. Such a move could increase the energy savings of the program, while providing landlords with cash offsets to replace inefficient refrigerators, making their rental units more attractive to tenants.

- To better reach its goals the program team may also explore expanding the regulatory filing to extend eligibility beyond residential customers to other types of buildings, including schools, offices, and industrial locations. Such an expansion would of course need to comply with cost-effectiveness tests and regulatory filing requirements.
- Duke Energy may be able to generate leads for the program by adding a question about secondary refrigerators and freezers to future customer surveys, such as the Home Energy House Call survey.
- Consider taking advantage of Duke Energy's internal customer satisfaction and net promoter scores to develop an initiative that encourages program participants to refer their families and friends.
- Arranging joint promotions with municipal and private recycling firms to promote environmentally appropriate recycling may be a way to increase awareness at fairly low cost.
- Stay abreast of market factors that may affect the program, including new and used appliance dealer practices, supply and demand for used units, price of materials recovered, changing appliance efficiency standards, Energy Star program changes, technology improvements, and environmental regulations.

Appliance Dealer Interview Results

This section presents the results from interviews with new and used appliance dealers in Ohio and Kentucky. These instruments can be found in *Appendix C: Used Appliance Dealer Survey Instrument* and *Appendix D: New Appliance Dealer Survey Instrument.*

Survey Overview

By removing 3,186 refrigerators and freezers from the market in Ohio and Kentucky during the first ten months since program inception, Duke Energy's Appliance Recycling Program is unquestionably reducing the number of used units that are connected to its power grid. However, the program represents only one of a number of factors that are affecting the number of used units for sale in the marketplace. To better understand the market in which the program is operating, TecMarket Works sought to interview dealers of new and used refrigerators and freezers about the state of the market, the ARP program, and its effect on their businesses. The objective was to contact as wide a survey sample population as possible, including: national or regional retail chains, companies with multiple locations, small dealers operating from storefronts and repair shops, and charitable groups that sell donated items.

Between July 31 and August 22, 2013, TecMarket Works completed telephone interviews with 56 owners or representatives from new and used appliance dealers selling to customers within Duke Energy's service territories in North Carolina, South Carolina, Kentucky, Ohio, and Indiana. Of those, 24 operated in Ohio and Kentucky. Conversations ranged from less than five minutes to more than 30 minutes. Interview guides are shown in *Appendix C: Used Appliance Dealer Survey Instrument* and *Appendix D: New Appliance Dealer Survey Instrument.*

The sample list for the survey was collected via a geographic-area-specific internet search using Google, Craigslist, Yelp, YellowPages.com, CitySearch.com and other web resources. Using readily identifiable contact information provided on the internet, we contacted approximately 10-15 new and used dealers operating in each of Duke Energy's service territories. We also contacted representatives from national and regional firms operating in multiple states, such as Home Depot, Lowes, Sears, Best Buy, Menards, and HH Gregg.

On the whole, the appliance dealers that we spoke were reluctant to provide numbers regarding their businesses, although they were more forthcoming regarding operations and their perceptions of the supply and demand for used appliances. As a result, the survey sample obtained did not lend itself to reliable quantitative analysis. The interviews do, however, provide an insightful qualitative look at the state of the market from their perspective. Overall remarks from these interviews are combined below to render a big picture view, while state-specific comments are provided to increase understanding about each individual territory. Nonetheless, it is important for the reader to note the relatively small sample sizes for this portion of the study.

How National Market Actors Effect Local Used Refrigerator Markets

Across the United States, the majority of *new* refrigerators are sold via national department stores like Sears, home improvement centers such as Home Depot and Lowes, and mass

merchants like Best Buy and Costco. A smaller percentage are sold by regional companies like Menards and HH Gregg or by independent retailers who often operate a single location.[7]

Our market research revealed no national firms that are selling *used* refrigerators in retail stores. While these high volume national retailers do not directly sell used appliances, they nonetheless influence the market for used refrigerators and freezers because their delivery drivers (employees or subcontractors) frequently collect used units from customers at the time they drop off new units. In previous years, a sizeable number of these used units were collected and resold at wholesale prices to local used appliance dealers. This practice provided a steady supply to local dealers in order meet market demands for less expensive units.

In recent years the supply of used units for resale in local markets has diminished as the largest market actors have adopted new policies. Some national firms, including Sears, Best Buy, and Home Depot, have joined the U.S. Environmental Protection Agency's Responsible Appliance Disposal (RAD) program, and thus follow specific guidelines for the dismantling and recycling of all units they collect. Another national firm, Lowes, has taken a more measured approach, recycling some units, donating some units to charity groups for individual resale, and bundling others for resale to U.S. wholesalers or in foreign markets. Collectively these individual corporate actions have cut the number of used units available for resale in local markets by between 50 to 85 percent, according to estimates among the smaller dealers that we spoke with.

Duke Energy's collection of more than 3,000 units has been a contributing factor to this decline. However, several appliance dealers we spoke with indicated that they had noticed a reduction in supply prior to 2009. This decline was accelerated in 2010 by the federally funded Cash for Clunkers appliance rebate program. Since that time, virtually all parties we spoke with agreed that supplies of used refrigerators and freezers have continually diminished.

How Local Dealers Obtain Used Appliances for Resale

As ready supplies of secondhand refrigerators and freezers have dwindled, used appliance dealers have adopted different business strategies for obtaining and reselling units:

- **Continue to buy used units from retailers who'll sell them, and then mark up the units for resale.** This option appeared to be available via Menards chain stores and individual new appliance stores that also sell used units directly to retail customers.
- **Buy from wholesalers.** Lowes and HH Gregg continue to sell the used units that they collect when they drop off new units at customers' homes. But these are only sold to a select few wholesalers. Those wholesalers in turn sell to smaller dealers. Dealers in Indiana, Kentucky, and Ohio spoke of one such wholesaler near Indianapolis who opens its doors twice per month to dealers from many states, who drive large trucks to its warehouse and literally race down the aisles when the doors open, marking units they want. "I went one time," complained a small dealer from Ohio, "but I was by myself and

[7] US Department of Energy, New Opportunities Multiply Savings: Energy Star Refrigerator Market Profile, Washington, DC: US Department of Energy, December 2009., source: http://apps1.eere.energy.gov/states/pdfs/ref_market_profile.pdf

I was competing against teams of a half a dozen guys from the same store. I managed to mark just a few units while they grabbed the rest."

- **Buy from appliance auctions.** These events are held on a periodic basis and offer dealers the opportunity to inspect and bid on a wide array of units, specifically selecting what they want, such as a stainless steel French door unit, or an Amana side-by-side with water dispenser. Some auctions provide a seven day warranty on their units to give dealers time to inspect them thoroughly upon returning to their places of business. However, with fewer used units available in general, auctions are becoming somewhat less common.
- **Buy by the truckload**. Many used appliance dealers reported receiving sales calls from "guys out of state" offering to sell them a "grab bag truckload" of working and nonworking units. A dealer in North Carolina described the arrangement: "In the last three loads I paid $9,500, $10,800, and $12,000 per truckload. A few in each load worked. About two thirds were repairable in the first and only about half in the other loads. The rest I use for parts or sell for scrap metal." While another dealer complained, "Their prices keep going up and my profits are going down as they try to pass off more of their junk on unsuspecting dealers." Reliable quality or not, this option is only available to businesses with sufficient capital and the resources to purchase and repair nonworking units.
- **Obtain more used units from individuals.** This was the most common strategy used among dealers we spoke with. It had three variations: charging people to pick up units, accepting or collecting units at no charge, and paying people for their working or nonworking units. Increasingly, people are recognizing the value of their used appliances and are charging accordingly. Craigslist.org was the most frequently cited source of individual transactions.
- **Shift revenue streams to focus less on sales of used units and more on repair services.** This was another common strategy, particularly among those dealers who indicated that their supplies of used units had been reduced by 80 percent or more. However, this option was not without its challenges since the price of used parts has also risen as fewer used units from which to draw upon have been available.
- **Switch to sales of new units.** A number of dealers indicated that they sold both new and used units. For them, shifting sales attention was fairly straightforward. However, this option appeared to be unattractive or unviable to the majority of dealers who only sold used units.
- **Buy from other used appliance dealers that are going out of business.** One business's demise is another's opportunity. More than one dealer we spoke with said he looked for others dealers who wanted to liquidate their stocks.

How Dealer Business Models Influence Perceived Effect of the Program

The choice of business model seemed to affect the level of impact that the changing market is having upon their businesses, and hence the perceived effect of Duke Energy's program as well. Those dealers who have supply contracts with Lowes or HH Gregg, with wholesalers who buy from these larger chains, and those dealers who have sufficient capital to buy in large quantities,

generally continue to do well. While dealers who depend upon single purchases from individuals find fewer and fewer units available and thus consider Duke Energy's program to be having more of an effect on their business. Yet even among those dealers who buy predominantly from individuals, the impacts attributed to the program appear to vary based upon whether the dealers sell older, inexpensive units or more costly units that are only a few years old. The higher the prices these dealers pay for the units and sell them for, the less effect Duke Energy's ARP appears to have on their businesses. Conversely, smaller businesses are being adversely affected by a variety of market factors, of which the Duke Energy program is one. These businesses find themselves facing a need for additional capital, a change in business model, or the prospect of going out of business. However, because customer demand for less-expensive used units remains high, the net effect appears to be that as the market continues to shift, fewer companies will be selling used units in the future.

State Specific Dealer Comments

Among the 24 appliance dealers that we spoke with in Ohio and Kentucky, 75% of them sold only used units. Among those that sold new units, the percentage of new unit sales to used unit sales varied from 2% new (the occasional new scratch and dent that was obtained inexpensively) to 100% new units (no used appliance sales at all).

Effect on Dealer Businesses

Among the appliance dealers, 94% said were aware of the Duke Energy program. Their opinions about the program ranged from those who felt positively about its environmental effects to those who saw it as detrimental to their businesses. Their verbatim comments are shown below.

- *It's a good program from an environmental stand point.*
- *It's good to recycle so it sounds positive.*
- *It's good for people buying new.*
- *Sounds fine.*
- *It's fine. (2)*
- *I'm neutral.*
- *No opinion.*
- *It's a stupid program. Refrigerator efficiency has more to do with seals than with motors. older units are pretty efficient.*
- *It might be good for environment but it's bad for businesses and people who can't buy new.*
- *It sounds like cash for clunkers.*
- *It's hurt us big time.*
- *It hurts us.*
- *They're screwing us.*

When it came to the program's impact on their businesses dealer opinions were likewise split between those whose felt that the program had little influence on their businesses to those who felt acute shortages of used units available for their resale. Among the respondents majority felt the Duke Energy program was having a modest or significantly negative effect on their

businesses, while a somewhat smaller group felt the program's effect was negligible. One retailer felt it helped their new unit sales. Their verbatim responses include:

- *They're eating our lunch.*
- *Yes, a big effect.*
- *Yes it's definitely impacting us.*
- *Fewer used units are available to us.*
- *Anything that takes things out of the market hurts us.*
- *Some maybe.*
- *Maybe a modest negative effect.*
- *It might have a small effect.*
- *It would have a negative impact in theory, but not in practice.*
- *Not much effect. Other factors are more influential. Mostly it's an issue with the big suppliers changing their policies. Now if you'd have a contract with a store like HH Gregg or Lowes you can't get any units, but that's not because of Duke.*
- *No effect.*
- *None I can see.*
- *No effect on my business.*
- *No. The incentive is too low to influence our customers.*
- *It's a small positive for new sales.*

These responses ran in close parallel with their observations about ARP's impact on the supply of used units. Those dealers who purchased from individuals noticed a scarcity of available units, while those who obtained theirs from other sources were less affected. Their comments included:

- *We only have a fraction of units that we used to get.*
- *There are fewer out there and more dealers are looking for them.*
- *You just can't get used units anymore."*
- *They're taking units we could be selling off the market.*
- *We just can't get used units anymore.*
- *There are fewer units all the time.*
- *There are probably fewer used units, but mostly our sister store deals with that. They prefer newer ones that people are not likely to get rid of anyway.*
- *It cuts down on number of units we can buy, but there are other factors too, like fewer big retailers getting rid of used units. Plus credit financing makes it possible for people to buy new ones. They can afford a monthly payment, but not a one-time big price. So that has cut sales too.*
- *Maybe there are less for businesses who buy from individuals.*
- *We don't sell used, but maybe.*
- *Perhaps, but not much.*
- *No our supply is steady. I can get what I want. People call me 5-7 times a day wanting to sell (all types of) appliances. Plus I can buy on Craigslist. Plus I can buy from wholesalers.*
- *We have a contract with 15 Lowes stores so we get all the used appliances we need.*

Dealers of new appliances agreed the program was having little influence on new unit sales.

The used dealers we spoke with felt demand for used refrigerators and freezers remains steady or is rising. They were slightly less agreed when asked if they had enough units to meet demand. Those who sold only used appliances wanted more, while those who also sold new units felt that supply and demand were about balanced. Their verbatim replies are shown below.

- *I get 15-20 phone calls for refrigerators alone every day. Counting people who come into the store and those looking for standalone freezers, I could probably sell 35-40 units per day if I had them.*
- *Demand is high.*
- *Demand might be up slightly, but that is probably due to the economy and not to the program.*
- *Demand is steady and we could probably sell more if we had them.*
- *Demand is steady. (4)*
- *Demand is the same.*
- *Poor people still need refrigerators. That's not going to change.*
- *They're making used units more expensive for me, which means I need to raise prices for my customers.*

Appliance Dealer Business Practices

Among the appliance dealers who sell used units, just one accepted only working units. The others accept units in a variety of conditions, ranging from needing minor hardware fixes to more involved electrical and mechanical repairs. As may be expected in any business, the dealers must weigh the unit's purchase price and eventual sales price against the cost of used replacement parts and the amount of labor involved. While that arithmetic varies, virtually all dealers agreed that it was not economical to repair failed compressors or leaking refrigerant systems. Actual comments about the condition of units that they'll accept are shown below.

- *We buy working units mostly. If the repair is minor we might see it as good investment.*
- *We buy working units and resell on Craigslist only. We don't have a storefront to keep overhead low.*
- *We buy working and non-working units, but we prefer working ones.*
- *We buy them, fix them, and sell them.*
- *We buy working and non-working units and fix them as necessary.*
- *We like them working, but mostly buy nonworking units and fix them up for resale.*
- *We buy working and nonworking units and fix whatever we need to.*
- *We buy used units, working or not, fix what we need to and resell them.*
- *We sell units that are 10 years and newer. Prefer white working top mount units, but we take and fix all types.*
- *We buy, fix, sell what we can get.*

While the actual repairs on any given unit naturally depend upon its condition, the steps that dealers take to prepare used units for sale are fairly consistent: They assess the working and

ascetic condition of the unit, make necessary mechanical repairs, clean, disinfect, and occasionally kill any insects that might be in, on, or under the unit.

As business people, the dealers expressed consistent confidence that if they placed a unit on the sales floor then they could sell it. The primary reason for not selling units had to do with the cost of repairs prior to placing it up for sale. If the units could not be sold, dealers opted for one of three paths. The first is to save the unit for spare parts. Selection of this option tended to depend upon the dealer business model and upon the amount of warehouse space available for storing nonworking units. The second option is to sell the non-functioning unit for scrap metal. Dealers reported that nonworking units typically brought them $10-15 dollars at current prices. The third option is to give the nonworking unit away, typically to scrap collectors willing to pick up the unit. Only one used appliance dealer we spoke with indicated that he recycled non-working units.

Among the new appliance dealers we spoke with all offered to collect old refrigerators and freezers when dropping off new appliances at customer homes. When asked what they did with the units that they'd collected, four resold the working used units, two dealers sold the units for scrap metal, and five said the units were dismantled and recycled.

Evaluation and Recommendations

Evaluation

While new and used appliance dealers were reluctant to discuss the quantitative aspects of their businesses, they did offer well-informed insights into the state of the market for used refrigerators and freezers and varied opinions on the affect that the Duke Energy program was having on their businesses.

Drawing upon their collective feedback and supplemental research, TecMarket Works concludes that market volume for used refrigerators has been declining for a number of years due to a number of factors including the practices of national retailers, federal programs, and scrap metal prices. Having collected 3,186 used units in Ohio and Kentucky since starting in 2012, the Duke Energy program is helping to accelerate changes set in place by these other market forces.

Taken together, these myriad factors have served to greatly cut supplies of used refrigerators and freezers to the point that prices for used units and replacement parts are rising and customers who desire to purchase used units are being turned away. Despite this, the program appears to be having little or no noticeable effect on new unit sales.

With this in mind we suggest the following ideas to help increase program enrollments.

Recommendations

- Duke Energy may be able to increase its collections by exploring a retailer-utility partnership for recycling refrigerators and freezers at the time of new unit delivery, such as its new relationship with participating Sears stores in the greater Indianapolis area that launched in the fourth quarter of 2013. If the effort is successful there, it may be advantageous to implement a similar arrangement in Duke Energy's Ohio and Kentucky

territories. Details of such a partnership would necessarily need to address the potential for reducing Duke Energy's net to gross ratio through the collection of non-working unit.

In theory, the potential for such an arrangement exists among all new appliance dealers who collect older units, with the greatest opportunity lying in those companies that sell the largest number of units. Retailers who are already participating in the EPA's RAD program, such as Home Depot, and Best Buy may be ready partners for joint promotions and coordinated collections. While midsize companies that collect older units as a service to their customers may also represent possible partners. The program may be a more challenging "sell" at firms, such as Lowes, Menards, HH Gregg and others, which generate revenue from the used units that they collect.

- Duke Energy may also be able to increase its collection numbers by new appliance dealers with point-of-sale promotion materials to encourage them to mention the program to customers shopping for new units.
- Also consider accepting units from and paying incentives to used appliance dealers who are willing to recycle working units via the program instead of reselling them.
- The market for used appliances is influenced by a wide number of factors and continues to change with time. Thus it may be helpful to plan a follow up study of the marketplace within a few years in order to understand and appreciate how those changes are influencing customer expectations, willingness to participate, and satisfaction with the program.

Participant Survey Results

This survey focused on customers who, according to program tracking records, recycled a refrigerator and/or freezer through the Appliance Recycling program. Surveys with a total of 161 participants who recycled 94 refrigerators and 81 freezers (including fourteen participants who recycled multiple units) were completed via telephone by TecMarket Works' staff. The distribution of units recycled by survey respondents for each state and overall is shown in Table 19.

Table 19. Units Recycled by Surveyed Customers

Units	Ohio (N=131)	Kentucky (N=30)	All survey respondents (N=161)
Recycled one refrigerator	48.9%	53.3%	49.7%
Recycled one freezer	41.2%	43.3%	41.6%
Recycled two refrigerators	1.5%	0.0%	1.2%
Recycled two freezers	1.5%	0.0%	1.2%
Recycled one refrigerator and one freezer	6.9%	3.3%	6.2%

Characteristics of Recycled Units: Refrigerators

Customers who recycled refrigerators were asked whether the unit(s) they recycled through the program were their primary (main) or secondary (spare) units. Nearly three-quarters of the refrigerators recycled by these customers were secondary or spare refrigerators, as seen in Table 20: out of 94 refrigerators recycled by survey respondents, 26 (27.7% of 94) were main units and 68 (72.3% of 94) were secondary units. There is no equivalent question about freezers, since all freezers are considered secondary units to the household refrigerator (i.e., almost every home has a refrigerator, and some have a stand-alone freezer in addition to the refrigerator, but it is assumed that no one has a freezer without a refrigerator).

Table 20. Use of Refrigerators Recycled by the Program

Units	All respondents who recycled refrigerators (N=92)		Number of units recycled	
	N	%	Main	Secondary
Main refrigerator (kitchen)	25	27.2%	25	0
Spare/secondary refrigerator (not in kitchen)	65	70.7%	0	65
Recycled primary and secondary refrigerator	1	1.1%	1	1
Recycled two secondary refrigerators	1	1.1%	0	2
		Totals:	26	68

As seen in Table 21, just over half (52.9% or 36 out of 68) of the secondary refrigerators recycled by survey respondents were kept in the basement, while another 38.2% (26 out of 68) were kept in garages. However Kentucky customers are much more likely to keep their spare units in the basement (80.0% or 8 out of 10) compared to Ohio customers (48.3% or 28 out of 58; this difference is significant at $p>.05$ using student's t-test).

Table 21. Location of Secondary Refrigerators

Location	Ohio secondary refrigerators (N=58)	Kentucky secondary refrigerators (N=10)	All recycled secondary refrigerators (N=68)
Basement	48.3%	80.0%	52.9%
Garage	41.4%	20.0%	38.2%
Laundry room	3.4%	0.0%	2.9%
Kitchen	1.7%	0.0%	1.5%
"In our son's downstairs kitchen"	1.7%	0.0%	1.5%
"In our combined basement/garage area"	1.7%	0.0%	1.5%
"Side room"	1.7%	0.0%	1.5%

As Table 22 indicates, most secondary refrigerators are kept in rooms that are heated in the winter (63.2% or 43 out of 68) and cooled in the summer (61.8% or 42 out of 68). Assuming that all main refrigerators are kept in areas of the house that are heated and cooled[8] (in or by the kitchen), overall about three-quarters of the refrigerators recycled by surveyed customers were kept in rooms that are heated (73.4% or 69 out of 94) and cooled (72.3% or 68 out of 94).

Table 22. Refrigerators Kept in Rooms that Have Heating and Cooling

	Main refrigerators (N=26)	Secondary refrigerators (N=68)	Total (N=94)
Stored in a room that is heated in the winter	100.0%	63.2%	73.4%
Stored in a room that is cooled in the summer	100.0%	61.8%	72.3%

Although survey respondents did not know the ages of about one recycled refrigerator in six (16.0% or 15 out of 94), nearly half (45.7% or 43 out of 94) were 20 years old or older. Only ten refrigerators (10.6% of 94) were less than 10 years old.

Recycled refrigerators that were used as spare or secondary units tend to be significantly older: the mean age of recycled secondary units is 29.1 years, while the mean age of recycled primary units is 15.3 years (this difference is significant at $p<.05$ using ANOVA). None of the primary units recycled were older than 35 years, compared to 30.9% (21 out of 68) of the secondary units (this difference is significant at $p<.05$ using student's t-test). The average age of all refrigerators recycled (main and secondary together) is 25.1 years and the median age is 20 years.

[8] There was only one surveyed customer (0.6% or 1 out of 161) who does not have a cooling system for their home, and this Kentucky customer recycled a freezer. All surveyed respondents have heating systems for their homes.

Table 23. Age of Recycled Refrigerators

Age of recycled refrigerator	Main refrigerators (N=26)	Secondary refrigerators (N=68)	Total (N=94)
Less than 10 years old	15.4%	8.8%	10.6%
10 years to 14 years old	26.9%	10.3%	14.9%
15 years to 19 years old	19.2%	10.3%	12.8%
20 years to 24 years old	19.2%	13.2%	14.9%
25 years to 34 years old	7.7%	8.8%	8.5%
35 years or older	0.0%	30.9%	22.3%
Don't know	11.5%	17.6%	16.0%

Secondary refrigerators recycled through this program have been used as secondary units for an average of 14.0 years, and the median length of time is twelve years.[9] There are also three recycled spare refrigerators (4.4% of 68) which were not being used; these units were acquired along with the purchase of a home. The distribution of time being used as a spare refrigerator is shown in Table 24.

Table 24. Length of Time that Secondary Refrigerators have been Used as Spares

Length of time	All recycled secondary refrigerators (N=68)
Less than a year	5.9%
1 year up to 3 years	7.4%
3 years up to 6 years	10.3%
6 years up to 10 years	13.2%
10 years up to 15 years	16.2%
15 years up to 25 years	30.9%
25 years or more	11.8%
Was not using unit (came with home)	4.4%
Don't know	0.0%

Table 25 shows that most (73.5% or 50 out of 68) secondary refrigerators were plugged in and running all of the time. Assuming that all main refrigerators are also plugged in and running all of the time, overall 80.9% (76 out of 94) of refrigerators recycled by surveyed customers were plugged in and running all of the time. Eight recycled refrigerators (8.5% of 94) were not plugged in and running before they were recycled.

[9] When computing the mean and median length of time that units have been used as spares, three units which were described as having been used for "zero" years were not included, since these customers described these spare units as having been acquired through the purchase of a home (the unit came with the home and was not used by the new occupants).

Table 25. Refrigerator Usage

Refrigerator usage	Main refrigerators (N=26)	Secondary refrigerators (N=68)	Total (N=94)
Plugged in and running all the time	100.0%	73.5%	80.9%
For special occasions only	0.0%	7.4%	5.3%
During certain months of the year only	0.0%	7.4%	5.3%
Not plugged in and running	0.0%	11.8%	8.5%

The five customers who said they used their spare refrigerators "for special occasions only" estimated that their units were plugged in and running for an average of about four months during the past year. Among the five customers who said they used their spare refrigerator "during certain months of the year only", units were plugged in and running an average of about three months during the past year. Seven of the ten respondents (70.0%) who had their spare units running for only part of the year report that they run their spare units mainly during "a mix if both summer and other times of the year".

Table 26 indicates that a majority of 57.4% (54 out of 94) of refrigerators recycled by surveyed program participants were in good working order. Approximately a third of recycled units were working but in need of minor repairs (31.9% or 30 out of 94) and the remaining tenth were working but with significant performance problems (10.6% or 10 out of 94). None of the refrigerators recycled by surveyed participants were described as not being in working order, which is a requirement for participation in the program (units are supposed to be functional in order to qualify).

Even though they tend to be newer than secondary units (see Table 23), recycled refrigerators that were used as "main" kitchen units were significantly more likely to have significant performance issues (26.9% or 7 out of 26) compared to units that were used as secondary or spare refrigerators (4.4% or 3 out of 68; this difference is significant at $p<.05$ using student's t-test). While most of the recycled secondary units were in good condition (63.2% or 43 out of 68), fewer than half of main refrigerators were in good condition (42.3% or 11 out of 26; this difference is significant at $p<.05$ using student's t-test).

Table 26. Condition of Recycled Refrigerators

Condition of recycled refrigerator	Main refrigerators (N=26)	Secondary refrigerators (N=68)	Total (N=94)
Worked and was in good physical condition	42.3%	63.2%	57.4%
Worked but needed minor repairs	30.8%	32.4%	31.9%
Worked but had significant performance problems	26.9%	4.4%	10.6%
It did not work	0.0%	0.0%	0.0%
Don't know	0.0%	0.0%	0.0%

Characteristics of Recycled Units: Freezers

Most freezers recycled by surveyed customers were kept in the basement (60.5% or 49 out of 81), with the garage being the next-most common location (33.3% or 27 out of 81), as seen in Table 27.

Table 27. Location of Recycled Freezers

Location	All recycled freezers (N=81)
Basement	60.5%
Garage	33.3%
Laundry room	2.5%
Dining room	1.2%
Utility room	1.2%
"In our mud room / breezeway"	1.2%

Table 28 indicates that a majority of recycled freezers were kept in rooms that were heated in the winter (60.5% or 49 out of 81) and cooled in the summer (56.8% or 46 out of 81).

Table 28. Freezers Kept in Rooms that have Heating and Cooling

	All recycled freezers (N=81)
Stored in a room that is heated in the winter	60.5%
Stored in a room that is cooled in the summer	56.8%

About two-thirds of the freezers recycled by survey respondents (64.2% or 52 out of 81) were 20 years old or older. Only one respondent (1.2% of 81) recycled a freezer that was less than 10 years old, as seen in Table 29. The average age of freezers recycled by surveyed program participants is 26.4 years and the median age is 22 years.

Table 29. Age of Recycled Freezers

Age of recycled freezer	All recycled freezers (N=81)
Less than 10 years old	1.2%
10 to 14 years old	13.6%
15 to 19 years old	13.6%
20 to 24 years old	22.2%
25 to 34 years old	14.8%
35 years or older	27.2%
Don't know	7.4%

As seen in Table 30, the majority of freezers recycled by survey respondents were plugged in and running all of the time (69.1% or 56 out of 81), though 22.2% (18 out of 81) were not plugged in and running at all.

Table 30. Freezer Usage

Freezer Usage	All recycled freezers (N=81)
Plugged in and running all the time	69.1%
For special occasions only	2.5%
During certain months of the year only	3.7%
Not plugged in and running	22.2%
Plugged in and running all the time until a month or two ago when we unplugged it	2.5%
Don't know	0.0%

Among the five surveyed customers who used their freezer "certain months of the year" or "for special occasions only", the average amount of usage for the recycled unit was 6 months out of the past 12 months. Two of these five customers ran their freezer mainly during non-summer months, two ran their freezers sporadically throughout the entire year, and one did not answer the question.

The majority of freezers recycled by surveyed program participants are described as being in good physical condition (76.5% or 62 out of 81), as seen in Table 31. Only six freezers (7.4% of 81) were described as having significant performance problems, while one freezer (1.2% of 81) was non-functional.

Table 31. Condition of Recycled Freezers

Condition of recycled freezer	All recycled freezers (N=81)
Worked and was in good physical condition	76.5%
Worked but needed minor repairs	14.8%
Worked but had significant performance problems	7.4%
It did not work	1.2%
Don't know	0.0%

Program Awareness and Reasons for Participation

All of the customers responding to the survey (100% of 166) recall participating in the Appliance Recycling program.

A plurality of nearly half of customers surveyed (46.0% or 74 out of 161) first became aware of the Appliance Recycling program through an insert with their monthly bill. Advertising (28.0% or 45 out of 161) and word-of-mouth from family, friends, neighbors and coworkers (17.4% or 28 out of 161) were also mentioned by significant numbers of participants.

There are two significant differences in Table 32: Customers who recycled one refrigerator were more likely to have heard of the program from friends, family and neighbors (26.3% or 21 out of 80) compared to those who recycled one freezer (7.5% or 5 out of 67), and customers who recycled one freezer were more likely to mention an email from Duke Energy (6.0% or 4 out of

67) than those who recycled a refrigerator (0.0% of 80; both of these differences are significant at $p<.05$ using student's t-test).

Table 32. Source of Awareness of the Appliance Recycling Program

Source of Awareness	Recycled one refrigerator (N=80)	Recycled one freezer (N=67)	Recycled multiple units (N=14)	Total (N=161)
Insert with monthly bill	48.8%	44.8%	35.7%	46.0%
Advertisement on radio, TV or newspaper (listed below)	25.0%	31.3%	28.6%	28.0%
From a friend, family, neighbor, coworker	26.3%	7.5%	14.3%	17.4%
Saw info at Duke Energy website	3.8%	7.5%	14.3%	6.2%
Email from Duke Energy	0.0%	6.0%	0.0%	2.5%
From another energy program (listed below)	0.0%	3.0%	0.0%	1.2%
From appliance dealer or retailer (listed below)	1.3%	0.0%	0.0%	0.6%
Some other way (listed below)	2.5%	1.5%	7.1%	2.5%
Don't know / not specified	2.5%	7.5%	7.1%	5.0%

Percentages may total to more than 100% because participants could give multiple responses.

Forty-five survey participants (28.0% of 161) mentioned advertising as the source of their awareness of the recycling program. These 45 responses are categorized and listed below; the most frequent response mentioned by a third of these participants is *The Cincinnati Enquirer* newspaper.

Newspapers (N=21 or 46.7% of 45)

- *Cincinnati Enquirer* (N=15)
- *Unspecified newspaper* (N=5)
- *Hamilton Journal newspaper*

Television (N=17 or 37.8% of 45)

- *Unspecified television* (N=10)
- *Channel 12* (N=2)
- *Channel 9* (N=2)
- *Channel 9 or channel 12*
- *Channel 19 news*
- *"On the news."*

Radio (N=11 or 24.4% of 45)

- *Unspecified radio* (N=8)
- *700 WLW* (N=2)
- *WARM 98*

Other (N=1 or 2.2% of 45)

- *"Online newsletter from WCPO radio."*

Note: the list above totals to more than 45 responses because respondents could name multiple sources of awareness.

Two survey participants (1.2% of 161) named other energy programs as their source of awareness. These responses are listed below.

- *Home Energy House Call.*
- *An intern from the Department of Environmental Services.*

One survey participants (0.6% of 161) mentioned an appliance dealer or retailer. This response is listed below.

- *Sears.*

Four survey participants (2.5% of 161) named "other" sources of awareness. These four responses are listed below.

- *A news article in the newspaper.*
- *A repair person working on my dryer told me about it.*
- *I called Duke Energy to obtain more information about the program.*
- *Recommendation from a lady who works for my auto mechanic.*

Customers' Reasons for Recycling Refrigerators

Figure 9 shows the reasons surveyed customers who participated in the Appliance Recycling program give for disposing of their refrigerators. Nearly half (overall 47.8% or 44 out of 92) of participants mentioned that the unit they recycled was a spare that was not used much or at all, and for a plurality of 38.0% (35 out of 92) or respondents this was the main reason the recycled their refrigerators. Two more reasons were given by more than 25% of customers who recycled refrigerators: the unit was not working properly (overall 27.2% or 25 out of 92), and wanting to save energy (31.5% or 29 out of 92). Although only three customers (3.3% of 92) mentioned saving money on utility bills as their main reason for participating, thirteen more customers (14.1% of 92) mentioned saving money as a secondary reason for participating.

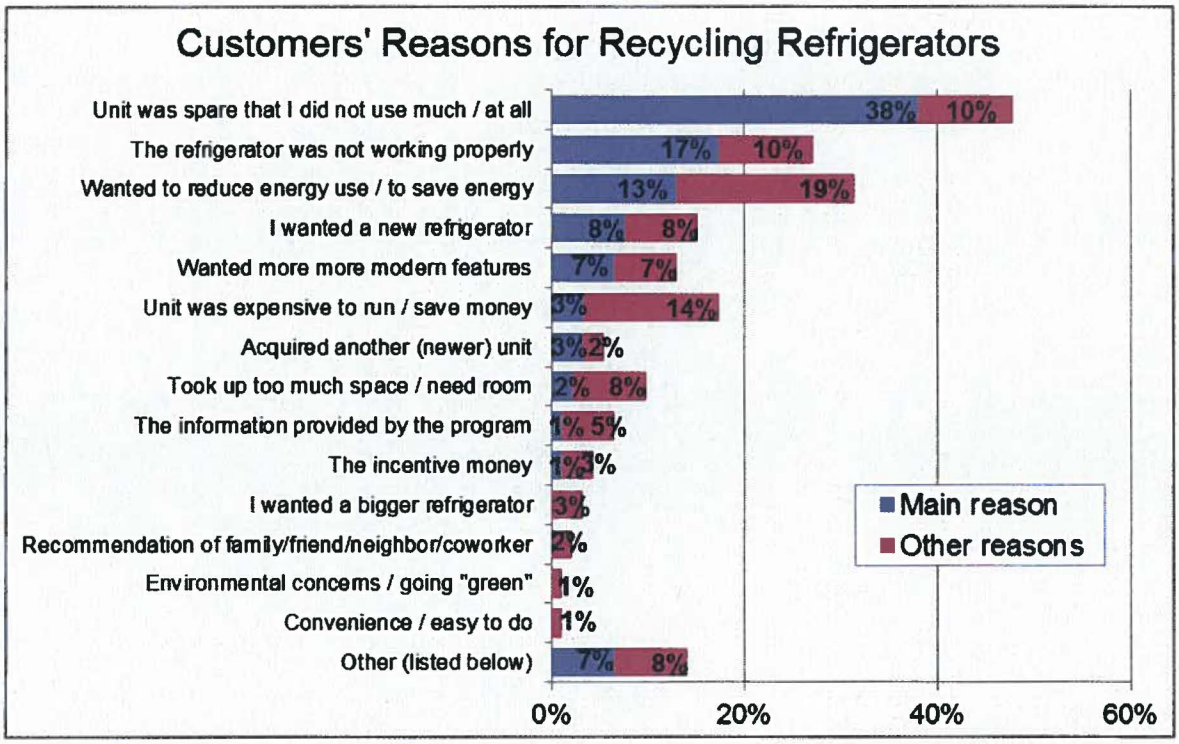

Figure 9. Customers' Reasons for Recycling Refrigerators (N=92 participants who recycled refrigerators)

Thirteen survey participants who recycled refrigerators named "other" reasons for participating in the program. These responses are listed below.

Main reasons (N=6)

- *Cosmetic.*
- *I didn't want to clean the dirty refrigerator.*
- *It was too big.*
- *We wanted to upgrade to a freezer. The refrigerator part was no longer needed.*
- *Our neighbor gave us a used replacement refrigerator.*
- *We moved.*

Other reasons (N=7)

- *The convenience of not having to drain the Freon myself.*
- *I wanted to replace it with a freezer.*
- *The refrigerator was white in color, and I wanted stainless steel.*
- *I wanted to downsize our refrigerators.*
- *My beer fridge looked bad, appearance-wise.*
- *Our contractor recommended it.*
- *Recommendation from a lady who works for my auto mechanic.*

Customers' Reasons for Recycling Freezers

Figure 10 shows the reasons for disposing of freezers given by surveyed customers in the recycling program who recycled freezers. Two-thirds (68.4% or 54 out of 79) mentioned that the recycled freezer was a spare unit that was not used much or at all, and more than a half (55.7% or 44 out of 79) said this was the main reason. The only other specific reason given by more than 20% of survey participants who recycled freezers is to save energy (overall 38.0% or 30 out of 79). Another 17.7% (14 out of 79) mentioned saving money on utility bills, and 12.7% (10 out of 79) mentioned that their freezers were not working properly.

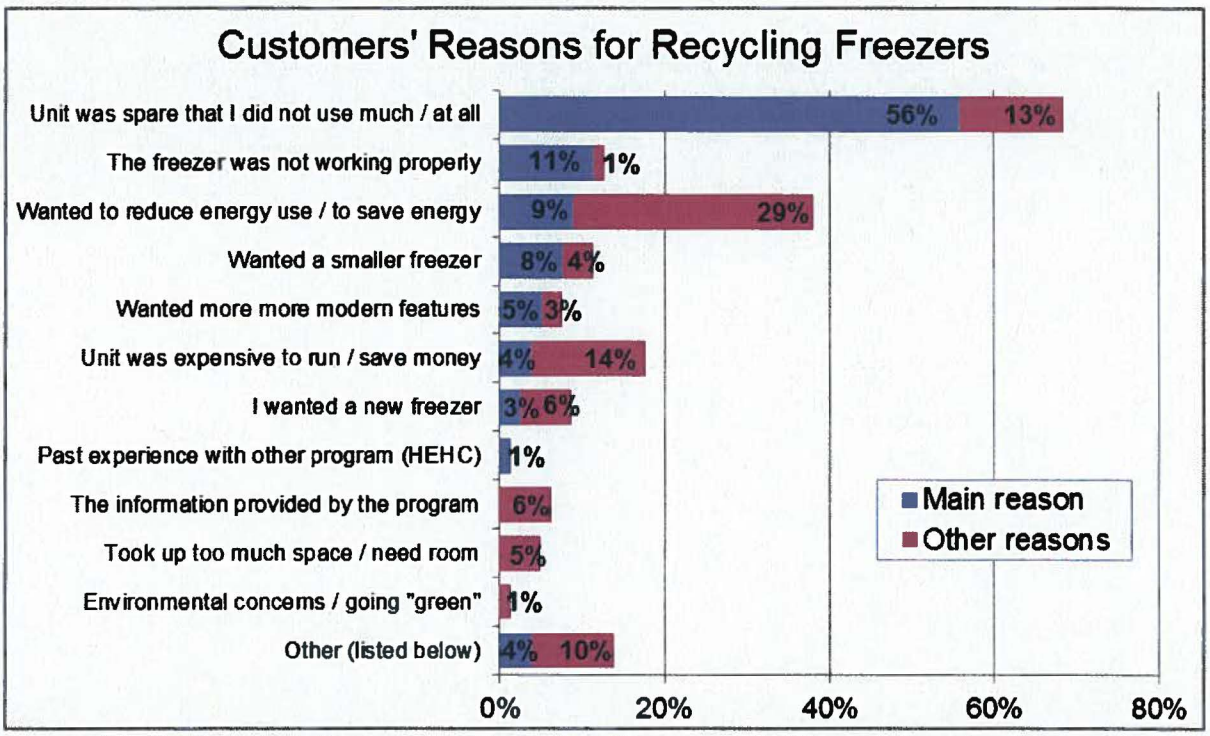

Figure 10. Customers' Reasons for Recycling Freezers (N=79 participants who recycled freezers)

Eleven survey participants who recycled freezers named "other" reasons for participating in the program. These responses are listed below.

Main reasons (N=3)

- *My wife wanted it gone due to a rust spot in the inside bottom of the freezer.*
- *We were moving and didn't have room for it at the new house.*
- *We are downsizing.*

Other reasons (N=8)

- *The freezer was manual defrost, which was inconvenient.*
- *That big freezer was a bother to clean, it did not have a self-defrost.*
- *It was is the garage and getting out there to get stuff was inconvenient.*
- *It was in garage so it was always running in summer.*
- *We wanted to try to win the contest for oldest appliance.*

- *We are downsizing.*
- *I thought the freezer was a fire hazard.*
- *I was worried that I was going to fall in and freeze to death.*

Customers' Reasons for Recycling Appliances through the Duke Energy Program

Table 33 shows the main reasons given by customers for recycling their units through the Duke Energy Appliance Recycling program rather than disposing of the units some other way. A plurality of 39.8% (64 out of 161) cited the convenience of home pick-up, and nearly a quarter (23.6% or 38 out of 161) mentioned the cash incentive. Another 10.6% (17 out of 161) said they did not know of any other way to dispose of their old units.

Customers who recycled one refrigerator were significantly more likely to mention the cash incentive as the main reason they recycled through the Duke Energy program (33.8% or 27 out of 80, higher than the other two groups at $p<.05$ using student's t-test), and customers who recycled one freezer were more likely to mention the convenience of home pick-up (46.3% or 31 out of 67) and environmentally-friendly disposal (11.9% or 8 out of 67; both significantly higher than refrigerator recyclers at $p<.10$ or better using student's t-test). Customers who recycled multiple units were more likely to mention that they did not know of any other option (28.6% or 4 out of 14, higher than the other two groups at $p<.05$ using student's t-test).

Table 33. Main Reasons for Recycling Through the Duke Energy Program

Reason	Recycled one refrigerator (N=80)	Recycled one freezer (N=67)	Recycled multiple units (N=14)	Total (N=161)
The convenience of the home pick-up	33.8%	46.3%	42.9%	39.8%
The cash incentive	33.8%	14.9%	7.1%	23.6%
Did not know of any other way / no other option	8.8%	9.0%	28.6%	10.6%
Appliance was disposed of in a way that was good for the environment	3.8%	11.9%	7.1%	7.5%
Pick-up was free	3.8%	6.0%	7.1%	5.0%
Information from ad or web site convinced me	3.8%	1.5%	7.1%	3.1%
Information from mailings convinced me	2.5%	3.0%	0.0%	2.5%
Experience with Duke Energy: familiar, reliable, trustworthy	3.8%	1.5%	0.0%	2.5%
Recommended by friend/family/neighbor/coworker	3.8%	1.5%	0.0%	2.5%
Recommended by dealer/retailer/contractor	0.0%	1.5%	0.0%	0.6%
Timing / speed of pick-up	0.0%	1.5%	0.0%	0.6%
Other (listed after Figure 11)	2.5%	1.5%	0.0%	1.9%
Don't know	0.0%	0.0%	0.0%	0.0%

Additional reasons (not including the "main reason") customers recycled their units through the Duke Energy program are shown in Table 34. The cash incentive (overall 28.6% or 46 out of 161), the convenience of home pick-up (25.5% or 41 out of 161), and disposing of the appliance in an environmentally-friendly way (19.3% or 31 out of 161) were the most-mentioned secondary reasons for participating in the program.

Table 34. Additional Reasons for Recycling through the Duke Energy Program (Not Including Main Reason)

Reason	Recycled one refrigerator (N=80)	Recycled one freezer (N=67)	Recycled multiple units (N=14)	Total (N=161)
The cash incentive	21.3%	35.8%	35.7%	28.6%
The convenience of the home pick-up	23.8%	26.9%	28.6%	25.5%
Appliance was disposed of in a way that was good for the environment	23.8%	16.4%	7.1%	19.3%
Did not know of any other way / no other option	3.8%	9.0%	7.1%	6.2%
Recommended by friend/family/neighbor/coworker	3.8%	3.0%	0.0%	3.1%
Experience with Duke Energy: familiar, reliable, trustworthy	1.3%	1.5%	0.0%	1.2%
Recommended by dealer/retailer/contractor	1.3%	0.0%	7.1%	1.2%
Timing / speed of pick-up	1.3%	0.0%	0.0%	0.6%
Other (listed after Figure 11)	1.3%	3.0%	7.1%	2.5%

Percentages may total to more than 100% because participants could give multiple responses.

Figure 11 shows the combined main and secondary reasons why surveyed customers recycled their units through the Duke Energy program. Overall, about two-thirds of customers (65.2% or 105 out of 161) mentioned the convenience of home pick-up as a reason they participated in the Duke Energy program, and more than half (52.2% or 84 out of 161) mentioned the cash incentive. Another 26.7% (43 out of 161) mentioned environmentally-friendly disposal, and 16.8% (27 out of 161) said they did not know any other way to dispose of old units.

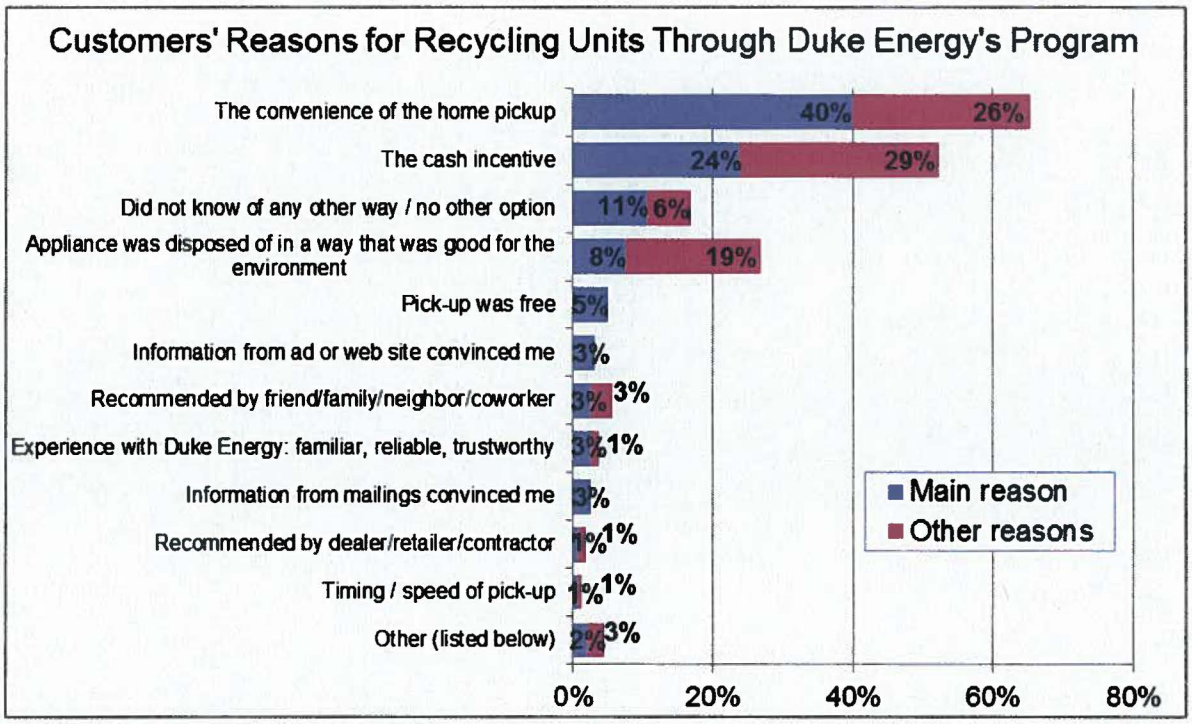

Figure 11. Customers' Reasons for Recycling Units through the Duke Energy Program (N=161 all survey participants)

Seven survey participants gave "other" reasons for recycling their units through the Duke Energy program. These responses are listed below.

Main reasons (N=3)

- *I posted it on Craigslist, but only got one call and the offer less than Duke's offer.*
- *I thought it was good that they would find out how much energy the appliance was using when they had the device on it.*
- *I thought Duke had a use for the freezer.*

Other reasons (N=4)

- *I wanted to save energy.*
- *Other companies offering appliance pick up would have made me drain the Freon beforehand.*
- *It's a new service. I wanted to try it and see how it worked.*
- *The contribution of the $30 incentive to a good cause.* [This customer donated their incentive money to the Helping Hands Assistance program.]

Customers were also asked if the incentive payment and the information provided explaining the program had any influence on their decision to participate. As seen in Figure 12, both the incentive (74.5% or 120 out of 161) and the information (70.2% or 113 out of 161) were an influence for most customers. Customers who recycled a refrigerator were more likely to say they were influenced by the incentive (78.8% or 63 out of 80) than the information (65.0% or 52 out of 80; this difference is significant at $p<.10$ using student's t-test), but there were no

significant differences between these influence ratings for those who recycled a freezer, multiple units or for all surveyed participants together.

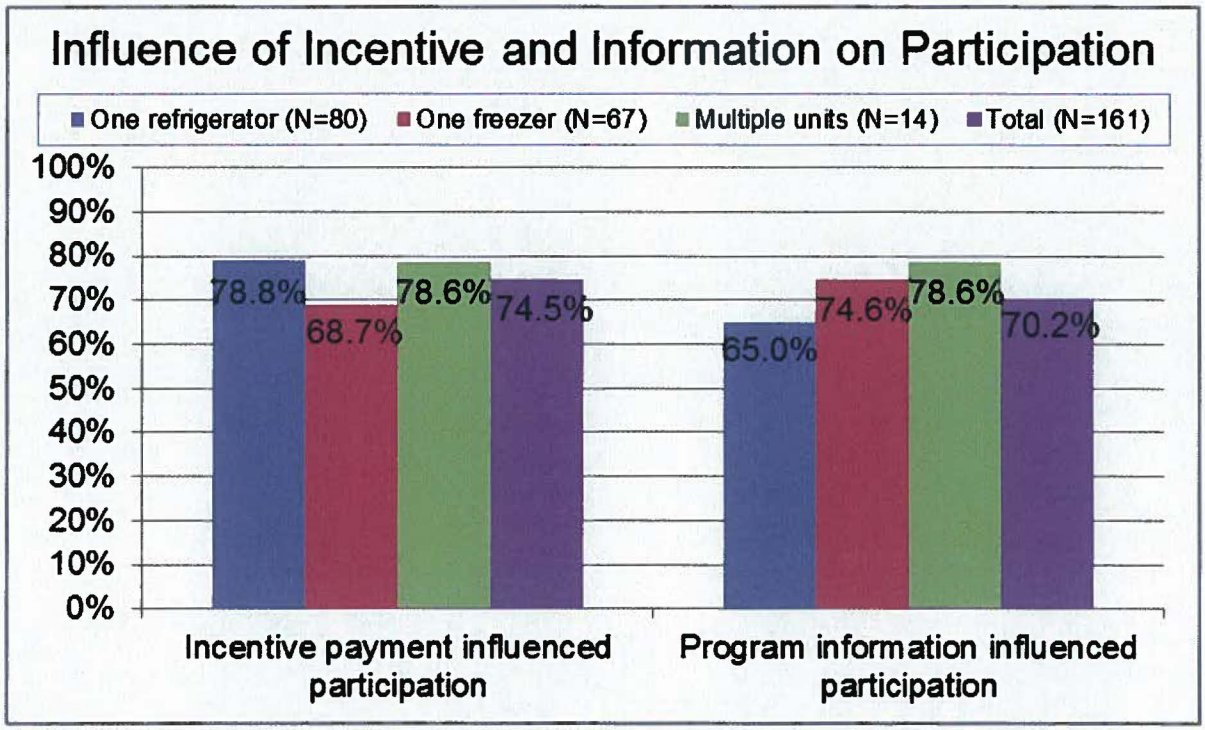

Figure 12. Influence of Incentive Payment and Program Information on Participation

Participation in the Program

About two-thirds of surveyed participants signed up for the program by telephone (64.6% or 104 out of 161) and 21.1% (34 out of 161) signed up online, while another 12.4% (20 out of 161) were signed up by someone else in their household. There are no statistically significant differences between customers who recycled different units.

Table 35. Methods of Signing Up for the Program

Who signed up and how	Recycled one refrigerator (N=80)	Recycled one freezer (N=67)	Recycled multiple units (N=14)	Total (N=166)
Respondent signed up for program	**85.0%**	**88.1%**	**92.9%**	**87.0%**
Respondent signed up by telephone	63.8%	65.7%	64.3%	64.6%
Respondent signed up online	21.3%	19.4%	28.6%	21.1%
Respondent signed up but can't recall how	1.3%	3.0%	0.0%	1.9%
Someone else in the household signed up	**13.8%**	**11.9%**	**7.1%**	**12.4%**
Don't know	**1.3%**	**0.0%**	**0.0%**	**0.6%**

Percentages may total to more than 100% because participants could give multiple responses.

As seen in Table 36, only 7.7% (8 out of 104) of customers who signed up for the program by telephone had to call more than once to sign up.

Table 36. Signing Up for the Program by Telephone

Base: Respondents who signed up by telephone	Recycled one refrigerator (N=51)	Recycled one freezer (N=44)	Recycled multiple units (N=9)	Total (N=104)
Called one time	86.3%	93.2%	100.0%	90.4%
Called more than once	11.8%	4.5%	0.0%	7.7%
Don't know	2.0%	2.3%	0.0%	1.9%

The eight surveyed customers who had to call more than once to sign up for the program were asked why they had to make more than one call. These responses are listed below.

- *I needed to reschedule.* (N=2)
- *It was difficult to get through the first time, plus the representative did not properly enter our information, which meant we had to reschedule the pick-up.*
- *The date that I selected was not honored, so when I got the automated call, I had to reschedule. But, this was really not a problem because it was very easy to reschedule.*
- *I called back to verify the date and time of the pick-up.*
- *I called Duke and they gave me a number to call for the pick-up.*
- *The removal contractor needed to know the cubic footage of the appliance.*
- *The line was busy.*

Overall, 97.5% (157 out of 161) of surveyed customers were able to schedule a convenient pick-up time, as shown in Table 37. Only three respondents (1.9% of 161) were unable to schedule a convenient pick-up time.

Table 37. Scheduling a Convenient Pick-Up Time

	Recycled one refrigerator (N=80)	Recycled one freezer (N=67)	Recycled multiple units (N=14)	Total (N=161)
Able to schedule convenient pick-up time	96.3%	98.5%	100.0%	97.5%
Not able to schedule convenient pick-up time	2.5%	1.5%	0.0%	1.9%
Don't know	1.3%	0.0%	0.0%	0.6%

According to Table 38, only 10.6% (17 out of 161) of survey participants scheduled pick-up dates that were more than one month from the date they signed up for the program, while 8.1% (13 out of 161) were able to schedule a pick-up within a week of the date they signed up for the program. Most customers (68.9% or 111 out of 161) scheduled pick-ups for between one week and one month after the date they signed up, although about one in eight (12.4% or 20 out of 161) could not recall the length of time between sign-up and appliance pick-up.

Table 38. Length of Time between Scheduling Appointment and Pick-Up

Time between scheduling and unit pick-up	Recycled one refrigerator (N=80)	Recycled one freezer (N=67)	Recycled multiple units (N=14)	Total (N=161)
Less than 1 week	10.0%	4.5%	14.3%	8.1%
1 week up to 2 weeks	21.3%	29.9%	21.4%	24.8%
2 weeks up to 1 month	45.0%	40.3%	57.1%	44.1%
1 month up to 2 months	13.8%	9.0%	0.0%	10.6%
2 months or longer	0.0%	0.0%	0.0%	0.0%
Don't know	10.0%	16.4%	7.1%	12.4%

As seen in Table 39, none of the surveyed participants (0.0% of 161) said that they did not receive a confirmation call before pick-up, although 8.1% (13 out of 161) could not recall whether they received a confirmation call or not. The vast majority (91.9% or 148 out of 161) did recall receiving a confirmation call.

Table 39. Customers Receiving a Confirmation Call before Pick-Up

	Recycled one refrigerator (N=80)	Recycled one freezer (N=67)	Recycled multiple units (N=14)	Total (N=161)
Received confirmation call before pick-up	91.3%	94.0%	85.7%	91.9%
Did not receive confirmation call before pick-up	0.0%	0.0%	0.0%	0.0%
Don't know	8.8%	6.0%	14.3%	8.1%

Table 40 shows that 96.9% (156 out of 161) of surveyed customers say that the collection team arrived on time to pick up their units for recycling. Only three respondents (1.9% of 161) said that the collection team was not on time, while the other 1.2% (2 out of 161) of survey respondents could not recall.

Table 40. Timeliness of Collection Team's Arrival

	Recycled one refrigerator (N=80)	Recycled one freezer (N=67)	Recycled multiple units (N=14)	Total (N=161)
Collection team arrived on time	97.5%	95.5%	100.0%	96.9%
Collection team did not arrive on time	1.3%	3.0%	0.0%	1.9%
Don't know	1.3%	1.5%	0.0%	1.2%

Incentive Payments

Four out of five customers surveyed (81.4% or 131 out of 161) recalled correctly that the incentive for this program is $30 per unit recycled, as seen in Table 41. Six customers (3.7% of 161) could not recall the incentive amount, and only two customers (1.2% of 161) guessed an amount that was more than $10 away from the correct amount.

Table 41. Customers' Recall of Incentive Amount

Incentive per unit	Recycled one refrigerator (N=80)	Recycled one freezer (N=67)	Recycled multiple units (N=14)	Total (N=161)
$19 or less	0.0%	0.0%	0.0%	0.0%
$20 to $29	8.8%	9.0%	0.0%	8.1%
$30 (actual amount)	81.3%	79.1%	92.9%	81.4%
$31 to $39	5.0%	7.5%	0.0%	5.6%
$40 to $49	1.3%	0.0%	0.0%	0.6%
$50 to $59	0.0%	1.5%	0.0%	0.6%
$60 or more	0.0%	0.0%	0.0%	0.0%
Don't know	3.8%	3.0%	7.1%	3.7%

As shown in Table 42, only ten survey respondents (6.2% of 161) said that they donated their incentive to the Helping Hands Assistance program. The remaining vast majority of 93.8% (151 out of 161) took the incentive payment.

Table 42. Taking Payment or Donating the Program Incentive

	Recycled one refrigerator (N=80)	Recycled one freezer (N=67)	Recycled multiple units (N=14)	Total (N=161)
Took payment for incentive	93.8%	92.5%	100.0%	93.8%
Donated incentive to Helping Hands Assistance	6.3%	7.5%	0.0%	6.2%
Don't know	0.0%	0.0%	0.0%	0.0%

Table 43 indicates that only four surveyed customers (2.4% of 161) reported waiting 6 weeks or longer to receive their incentive payment, and none (0 of 161) report that they are still waiting for their payment to arrive. More than one respondent in ten (11.8% or 19 out of 161) was unable to answer this question; among respondents who were able to give a length of time, roughly equal numbers received their checks in under 3 weeks (41.0% or 66 out of 161) and in 3 to 6 weeks (38.5% or 62 out of 161). The median length of time waiting for an incentive payment check to arrive is 3 weeks.

Table 43. Length of Time to Receive Incentive Payment

Time from unit pick-up to receipt of incentive check	Recycled one refrigerator (N=80)	Recycled one freezer (N=67)	Recycled multiple units (N=14)	Total (N=161)
Less than 1 week	0.0%	4.5%	0.0%	1.9%
1 week up to 2 weeks	12.5%	16.4%	28.6%	15.5%
2 weeks up to 3 weeks	16.3%	28.4%	42.9%	23.6%
3 weeks up to 4 weeks	22.5%	17.9%	14.3%	19.9%
4 weeks up to 5 weeks	15.0%	13.4%	0.0%	13.0%
5 weeks up to 6 weeks	8.8%	1.5%	7.1%	5.6%
6 weeks up to 7 weeks	0.0%	3.0%	0.0%	1.2%
Longer than 7 weeks	2.5%	0.0%	0.0%	1.2%
Have not received payment yet	0.0%	0.0%	0.0%	0.0%
Donated incentive (no payment to receive)	6.3%	7.5%	0.0%	6.2%
Don't know	16.3%	7.5%	7.1%	11.8%

Replacing Recycled Units

TecMarket Works asked surveyed program participants if they have replaced the units they recycled, or if they are intending to replace the units in the next 12 months. As seen in Figure 13 , all but one of the main refrigerators which were recycled have already been replaced (96.2% or 25 out of 26), and the customer with the unit which has not been replaced intends to replace it (3.8% or 1 out of 26). Logically, recycled main refrigerators are always going to be replaced with another unit.

However, only 30.9% (21 out of 68) of secondary refrigerators have been replaced, and only 29.6% (24 out of 81) of recycled freezers have been replaced. Out of the total of 94 refrigerators recycled by program participants, 48.9% (46 out of 94) have already been replaced. There are also three customers who still plan to replace secondary refrigerators in the next 12 months (4.4% of 68), and five customers who plan to replace freezers in the next 12 months (6.2% of 81).