



**The Massachusetts Appliance Turn-in
Program – Secondary Market and
Appliance Disposal Report**

FINAL

6/15/2011

Submitted to:

**National Grid, NSTAR Electric, Cape Light Compact, Western
Massachusetts Electric Company**

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MA Appliance Turn-in Program—Secondary Appliance and Disposal Market

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1 Executive Summary

This report is a component of the evaluation of the Massachusetts Appliance Turn-in Program (the “Program”) for 2009 and 2010, sponsored by NSTAR Electric, National Grid, Cape Light Compact, and Western Massachusetts Electric Company (“WMECo”) (the “Sponsors”). This report summarizes the results of an exploration of the secondary appliance market and the disposal and recycling market for refrigerators and freezers to gain a better understanding of how used appliances are bought, sold, and disposed of in Massachusetts. Research activities consisted of in-depth interviews with market actors, mystery shopping with used appliance dealers, and a review of Craigslist’s role in the Massachusetts appliance market.

Background

The Program collects and recycles working secondary refrigerators and stand-alone freezers from residential customers in Massachusetts. The Program’s primary goal is to achieve energy savings by removing secondary appliances from use. In addition, the Program recycles the appliances and processes environmentally harmful materials, including chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) found in refrigerant and foam insulation, according to strict environmental standards. JACO Environmental implements all aspects of the Program, including marketing, data tracking, appliance collection, disposal of hazardous materials, and recycling of nonhazardous materials.

Outside of the Program, Massachusetts residents have a variety of options for disposing of unwanted appliances. Municipalities offer appliance disposal programs, charities and used appliance dealers find new users for functioning units, and hauling and recycling companies seek out appliances to resell or sell as scrap. Alternatively, consumers might keep units in use or in storage, or sell them on Craigslist.com (“Craigslist”), a popular website for posting free, local classified ads. This report thus discusses the various pathways of an appliance being discarded outside of the Program, how market actors obtain these used appliances, how likely they are to end up back in use in Massachusetts, and how they are recycled, if at all.

Findings

The Recycling and Disposal Market

The evaluation team explored typical pathways that consumers use to dispose of a refrigerator or freezer. Below are key findings from interviews with market actors involved in the recycling and disposal market.

Quantities of Used Units Collected by Market Actors

- Massachusetts regulations prohibit improper disposal of Freon-containing appliances, so most municipalities provide residents with disposal services or advice for disposal if no municipality service is offered. Municipalities with disposal services provided rough

estimates¹ for the number of units removed that NMR calculates would be the equivalent of up to 2% of the households in those areas using a municipal service each year to dispose of refrigerators and freezers, including primary and secondary units and working and non-working units.

- Quantities obtained by haulers and recyclers vary depending on the size and type of company. Small junk haulers might only pick up a few units a year, but one large hauler working with major retailers obtains up to 25,000 units annually, commanding much of the market. Retailers and their haulers likely collect the majority of units removed from service each year in Massachusetts.

How Market Actors Obtain Used Appliances, and Fees for Collecting Them

Municipalities

- Most municipalities offer appliance disposal services, but some towns do not, making disposal more difficult. Some municipalities require residents to remove the unit's doors or visit the town hall to buy a recycling sticker. Many will not pick up units, and those that do only pick them up curbside.
- Fees for municipal appliance removal services vary from no charge to about \$30.² Transfer station drop-off is usually cheaper than curbside pickup. Cities are more likely to offer curbside pickup, while smaller towns are more likely to require transfer station drop-off.

Haulers and Recyclers

- Junk haulers are paid to remove rubbish, including appliances, from customers' homes.
- Haulers, recyclers, and scrap dealers obtain units from end users, appliance dealers, contractors, other haulers, gas and electric companies, and municipalities.
- Metal shredders receive few units from end users – most come from haulers and scrap dealers, and some from retailers and municipalities.
- These companies typically charge less than \$25 for appliance disposal, but some charge up to \$100 for a pickup. Some companies that process scrap metal charge fees for Freon removal, but these are offset by the scrap value of "light iron," for which residents can net about \$10.

¹ Readers should be aware that these are rough estimates. Most municipalities interviewed did not differentiate between refrigerators and freezers and other white goods that were disposed of through their municipal service and the estimates varied widely, with a range of less than 1% to 5% of households disposing of units each year. Most municipalities interviewed estimated their programs annually processed hundreds of units, despite their different population sizes. The city of Boston collected 2,500 in the past year, which translates to about one percent of households annually disposing of units.

² Among interviewed municipalities, and based on a brief review of municipal websites of other towns and cities in Massachusetts.

Dealers

- New appliance dealers offer appliance removal services to their customers, for free or a small charge if the customer purchases a new appliance. Major retailers reported that 30% to 50% of their customers use these services.³ (One also reported that 5% of customers got rid of two units at the same time.)
- For a fee, some new dealers remove appliances without requiring the purchase of a replacement. One major retailer reported it charges \$99 for this service in Massachusetts; another is testing a similar program in other states. One also hauls away display units from other dealers and recycles them, uses them for parts, or sells them to haulers for resale. These non-traditional haul-away services may be profitable for retailers – they charge for the service, sell the units for resale or scrap, more fully utilize delivery trucks, and increase their image as a player in the recycling market.
- Used dealers told mystery shoppers they obtain used units mainly from consumers and retailers, but in in-depth interviews, used dealers reported that only 10% to 25% of their inventory comes from consumers, and these percentages have declined in the last few years.
- Used dealers report that over the past few years, they purchased an increasing percentage of units from the haulers that major retailers use to perform customer haul-aways.
- While new appliance retailers seem to provide haul away as a convenience to customers, used dealers see this transaction as an opportunity to make money and build inventory.

Discarded Appliances Being Returned to Use, Rather Than Demanufactured

The U.S. Department of Energy estimates that 44% of discarded refrigerators and freezers end up back on the grid.⁴ Most of the respondents return much lower percentages of used units to use. This indicates that many used appliances are likely sold privately and donated to charities. Based on this research, we estimate that municipalities, haulers, recyclers, and new dealers return no more than 25% of the units they collect to the grid. However, in-depth interviews, market actors consistently reported they thought that this happened at much lower levels in Massachusetts.

Municipalities

- Units collected by municipal programs do not appear to be returning to use, but some municipalities encourage residents to donate working units to charities.⁵
- Municipalities identified liability concerns as a strong disincentive to putting units back into use and emphasized that units they collect are often damaged and not worth reusing.

³ One small new appliance retailer rarely hauled away appliances anymore (only 50 to 100 a year), because it encouraged customers to use the Program instead.

⁴ U.S. Department of Energy. “Refrigerator Market Profile 2009.” Updated 2009. http://www.energystar.gov/ia/partners/manuf_res/downloads/Refrigerator_Market_Profile_2009.pdf (accessed Jan. 4, 2011).

⁵ One municipal respondent also reported that charities in major cities aggressively seek functioning appliances.

Haulers and Recyclers

- Haulers and recyclers reported that they returned few units to use in Massachusetts. Large haulers reported less than 2% returned to use in Massachusetts. The largest hauler interviewed (25,000 units processed annually) estimated 1% of its collected units end up back in use in Massachusetts, and that 5% to 7% was a typical rate of return to the grid among similar large haulers.
- Junk haulers reported that 25% of units they picked up were working units they could resell or donate to charities. The evaluation team found that 11% of units on Craigslist were posted by dealers – based on interviews, it seems plausible that some of these small haulers are selling units on Craigslist.
- Metal shredders and scrap dealers reported that 100% of the appliances they obtained are demanufactured.⁶

Dealers

- New appliance retailers estimated 25% or less of their haul-aways return to use. Used dealers screen units to avoid taking units they cannot sell, and estimated they resell 80% of collected units and scrap the 20% that their service departments cannot repair.
- When new retailers collect haul-aways, all determinations about whether or not units end up back in use are made by the haulers and recyclers that purchase them, unless retailers require demanufacture (participants in the Environmental Protection Agency’s (EPA) Responsible Appliance Disposal (RAD) program, for example, require demanufacture).

Freon Processing

Most of the interviewed market actors properly evacuate Freon, but individuals, scavengers, and small companies with little regulatory oversight can easily find scrap dealers to purchase improperly purged white goods.

Municipalities

- Municipalities reported properly evacuating Freon (they usually hire licensed contractors), and that they rarely receive units with illegally cut refrigerant lines.

Haulers and Recyclers

- Haulers and recyclers reported a wide range of protocols for dealing with Freon, from implicitly encouraging customers to illegally cut refrigerant lines,⁷ to rigorous evacuation methods in keeping with EPA regulations.
- Scrap dealers usually accept units with cut refrigerant lines because they cannot prove they were cut illegally or cannot tell if the person dropping off the appliance was the one who cut them. Only one hauler/scrap dealer reported it turned away units whose owners could not

⁶ Some scrap dealers did have differing opinions on how common it was for other scrap dealers to return units to use; some thought that other scrap dealers resold units, even though the interviewed respondents did not.

⁷ One junk hauler reported implicitly instructing customers to illegally cut Freon lines because the company was not licensed to purge them.

prove they had legally purged them. Most haulers and recyclers reported that they received few units that they thought were illegally purged.

Dealers

- New appliance dealers reported following EPA guidelines, and major retailers specifically described stringent procedures for auditing their evacuation contractors.
- Used dealers reported that they remove Freon themselves. They may be doing so properly, but those interviewed did not seem as concerned about projecting an image of strictly following EPA regulations as the major retailers were.⁸

Metal Disposal and the Scrap Metal Market

Metals from white goods taken out of service appear to find their way to metal shredders where they will be repurposed, rather than ending up in landfills. The Steel Recycling Institute estimates 90% of steel in appliances is recycled.⁹ The waste ban on Freon-containing goods in Massachusetts makes it illegal to put refrigerators and freezers directly into landfills, and these units are valued by haulers, recyclers, and scavengers because the metal can be sold for scrap; the recycling market for other components such as plastic, glass, and foam insulation is not as robust and these components are typically land filled or sold as landfill cover.

- Municipalities often sell collected white goods to haulers and scrap dealers as light iron and use this income to offset the costs of their collection programs.
- Haulers and recyclers reported that units not being resold for use are not land filled, but sold into domestic and international scrap markets, resulting in the eventual recycling of their metal components.
- Dealers reported selling units to haulers, recyclers, and junk dealers, who often reimburse dealers for the value of the scrap metal in the appliances.

Foam Insulation, Glass, Rubber & Plastics Disposal

- Of non-Program market actors, only metal shredders break down appliances enough to separate out the foam, glass, rubber, and plastics.
- These materials are usually land filled, not recycled. Metal shredders reported that non-metals, including foam insulation, are ground up and sold as landfill cover, allowing CFCs and HCFCs in the foam to escape into the environment.
- One shredder said the technology exists to recycle these materials, as is done in Europe, but EPA regulations make such recycling cost prohibitive for recyclers.

⁸ One used dealer said the main reason most used refrigerators did not work was due to a lack of Freon, the – perhaps incorrect – implication being that cutting the lines would not be environmentally problematic. A hauler speculated that refrigerant lines were occasionally improperly cut in this way because people thought that the Freon previously already had leaked out of the system because the units would not get cold. This assumption results in the release of refrigerant into the atmosphere, but not due to criminal intent.

⁹ Steel Recycling Institute. Press release: “2008 Overall Steel Recycling Rate Hits All-Time High.” Dec. 10, 2009. <http://www.recycle-steel.org/PDFs/SteelRecyclingRatesRelease.pdf> (accessed Jan. 12, 2011).

EPA's Responsible Appliance Disposal (RAD) Program

- While the EPA's RAD Program sets environmentally sound standards for demanufacturing appliances, it is a voluntary program for participating electric companies and retailers. Participating retailers can—and do—demanufacture some refrigerators and freezers according to RAD protocols, and resell others. Best Buy and Sears are the only Massachusetts retailers participating in the RAD program.

Scavengers

- Municipalities, scrap dealers, and retailers reported that scavengers are an increasing source of competition for used appliances, particularly when scrap metal prices rise. Scavengers have little oversight and do not always properly dispose of Freon, but scrap dealers cannot always prove that the scavengers themselves illegally cut refrigerant lines.
- The units scavengers find set out for curbside pickup are often old or damaged with little value on the secondary market, indicating that scavengers are sending units to demanufacture by selling them as metal scrap, even if they are not properly disposing of Freon or recycling the other components.

The Residential Used Appliance Market

Craigslist has become an important marketplace for individuals who want to buy used refrigerators and freezers. Sellers can easily post free ads that reach a wide audience, the ads contain as much description and as many photos as a seller wishes, and the inventory of units is extensive. Used appliance dealers in comparison, reported low inventory, low sales, and expressed concern about falling profits. The following are topical key findings related to the used appliance market in Massachusetts.

Current Inventory

- Used dealers reported low inventory, only 4.3 units in stock on average. Only three out of 34 dealers had 15 or more used refrigerators in stock.
- Freezers are a small percentage of the used market. Only 17% of Craigslist ads were for stand-alone freezers.
- The Craigslist market is strong, particularly in eastern Massachusetts. 218 unique ads were posted in Massachusetts in one week; 75% were in eastern counties: Middlesex, Essex, Norfolk, Plymouth, and Suffolk. Interviewers spoke with 30 Craigslist sellers three weeks from the date they posted their ad—17 had sold their appliances, and most of the remaining 13 planned to repost them on Craigslist. Only one recycled their appliance and no others mentioned the possibility of doing so.
- Nearly nine out of ten ads on Craigslist (89%) were posted by individuals and 11% were posted by dealers. Craigslist also appears to have enabled a new breed of used appliance dealer that can forego a brick and mortar store front.
- Mystery shopped dealers quoted an average unit cost of \$280. The average price on Craigslist was \$519, though 63% were \$300 or lower. The highest price quoted by a dealer

was \$700, while 10% of Craigslist ads were greater than \$1,000. Craigslist seems to be a common choice for individuals disposing of high-dollar appliances.

- Ads on Craigslist typically indicated that sellers do not deliver the appliances for sale.

Sales Trends Experienced by Used Dealers

- Based on this research, we estimate that no more than 25% of appliances picked up by haulers and new appliance dealers are sold as used appliances by used dealers.
- In in-depth interviews, used dealers reported low annual unit sales, in the low hundreds.
- Used dealers reported that only 5% to 20% of their sales were purchased as secondary units.
- Used dealers seemed pessimistic about future sales and profitability, and reported it had become increasingly difficult in the past few years to obtain used appliances to sell. This was attributed to the poor economy, high scrap metal prices which encourage scrap dealers and scavengers to sell appliances into the scrap metal market, and appliance recycling programs.
- The number of identified used dealers in Massachusetts is relatively small. Some used appliance dealers reported to mystery shoppers that they discontinued selling used refrigerators and freezers because of low availability from centralized suppliers.

Ages of Units and Age Limits

- In in-depth interviews, dealers reported selling units that were typically 5 to 10 years old. The average age of units posted on Craigslist was 4.2 years.
- In in-depth interviews, used dealers reported they had no age limits on the units they sell, as long as they did not look very old. Only two out of 34 used dealers contacted by mystery shoppers mentioned that they had age limits on the units they sell – 9.5 years old, on average.

Buyers of Used Refrigerators and Freezers

- Used dealers reported that their main clients are landlords, tenants, and low-income customers, and they rarely inquire about energy efficiency.¹⁰
- Used dealers speculated that if they did not exist, buyers looking for primary units would be forced to consider more expensive new units (a concern for low-income customers), while those looking for secondary units may not purchase them. However, based on the results of mystery shopping and review of units for sale on Craigslist, it seems clear that buyers may turn to Craigslist as a major source of used appliances.

Awareness of the Program and Its Effects on the Secondary Market

- Program awareness among respondents was low, particularly among municipalities and haulers and recyclers. Retailers were the most knowledgeable about the Program, on average.
- Most haulers and recyclers speculated the Program would have minimal, if any, impact on their businesses, but that it would have a strong effect on the secondary appliance market because the Program was more attractive than the fee-based options available to consumers.

¹⁰ This may reflect the fact that many of these customers are landlords who may not pay electric bills, or because low-income buyers are more concerned about initial price, not operating costs.

- Used dealers expressed that the Program might be negatively affecting their businesses by removing inventory from the market. One dealer thought low-income customers were negatively impacted by the removal of inexpensive units from the used market.

Collaboration with Sponsors

- Respondents of all types were eager to participate in the Program, by promoting it to their customers or assisting with program implementation.
- New appliance retailers reported they worked with electric companies in other states by promoting secondary appliance turn-in programs and assisting program implementers with haul-aways. One reported that retail partnerships could boost Program participation 5% to 7%.

Conclusions and Recommendations

The findings summarized above suggest that the Program offers an attractive financial incentive to customers with secondary appliances. The Program is also far more convenient than most traditional options for disposing of a secondary appliance in Massachusetts. Craigslist, however, does appear to be a significant competitor for used appliances, but mostly for newer, more efficient refrigerators. Retailers that sell used appliances have few models available at any given time and those dealers also are interested in only newer units or new-looking units.

The following are recommendations resulting from the review of the disposal and used appliance markets.

Increase Program marketing efforts to residents. Municipal programs seem to be quite successful—up to 2% of households may remove units through these programs, but many municipalities were unclear about the percentage of collected units are refrigerators and freezers versus all appliances. However, most municipal programs are fee-based and burdensome, requiring door removal, moving an appliance to the curb, etc. In addition, hauling companies typically charge for appliance removal, and those that pay based on scrap value pay less than the Program. These barriers may encourage some consumers to keep their secondary appliances, and marketing the Program to residents faced with these barriers might allow the Sponsors to collect additional units that would not otherwise be removed from the grid.

Market the Program to those less likely to use Craigslist, including the elderly and customers in central and western Massachusetts. The elderly use Craigslist less than younger customers, and the Craigslist market appears significantly less active in central and western parts of the state. Without Craigslist as a practical option for getting rid of their secondary appliances, customers may keep them in use, particularly if their municipal programs are burdensome.

Consider increasing marketing efforts outside of urban areas and targeting residents of towns without municipal recycling programs. Residents in less densely populated areas may be more likely to have secondary appliances than their counterparts in cities. Also, some towns do not

have municipal appliance recycling programs at all, making the Program particularly attractive to these residents.

Sponsors should consider reaching out to Craigslist sellers. Units offered on Craigslist are likely to be working units. The average listing price on Craigslist was \$230 more than the Program’s incentive. However, 10% of units were \$50 or less, and 23% percent were \$100 or less, and six postings offered their refrigerator for free. Although those with high-value refrigerators may not be dissuaded from selling them on Craigslist, sellers with low-priced units may prefer the ease and environmental benefits of the Program.

Consider partnering with municipalities to promote the Program, and discourage charitable donation of working units. Sponsors could consider allowing residents to recycle their appliance, and donate the \$50 incentive to a charity of their choice, rather than donating the inefficient appliance. This would prevent customers from thinking that the Sponsors are trying to reduce charitable donations. JACO could potentially pick up the units from the municipalities to facilitate the effort.

Consider partnering with major retailers to market and implement the Program. Major retailers could promote the Program in their stores to customers who may be making a decision to keep or discard of an existing unit. Using retailers would necessitate a shift in targeted appliances for the Program—the Program would be more likely to pick up primary refrigerators and nearly dead units.

- Major retailers already work with electric companies, JACO, and ARCA in other states to implement similar programs – one reported a 5% to 7% increase in program participation due to the retail partnership.
- With less than half of major retailers’ customers using their haul-away services, it seems likely that significant numbers of appliances are remaining in use as secondary units.
- Retailers’ sales staff can screen for functioning secondary appliance ownership before discussing the Program, so as to discourage misrepresentation of primary units as secondary units. This is a particularly important part of discouraging free-ridership, and it may be happening in some cases – one appliance retailer reported that it encourages customers to use the Program to haul-away units being replaced with new units.
- Major retailers pick up many of the used appliances being discarded in Massachusetts through their haul-away programs. Retailers usually sell these appliances to haulers and recyclers who then sell the appliances into the used appliance market or the scrap metal market. If the Sponsors partner with major retailers, they could require that all units picked up by the retailer are fully demanufactured, rather than being resold by haulers.
- Retailers may be willing to partner with the Sponsors as some retailers already offer hauling services to customers who do not otherwise purchase new appliances and to other dealers. This may be profitable for retailers – they charge for the service, sell the units for scrap, more fully utilize delivery trucks already driving through neighborhoods, and increase their “green” reputation.

Sponsors may also have several opportunities to claim non-energy environmental benefits from the Program.

- *Reduction of ozone layer damage and decreased greenhouse gases through proper destruction of foam insulation.* The foam in refrigerators often contains CFCs and HCFCs, potent greenhouse gases that contribute to climate change and damage the ozone layer. These can be released into the environment if the foam is not properly destroyed, typically through high temperature incineration. Electric companies participating in the EPA’s RAD program report capturing 1.0 lb. of harmful chemicals from each properly recycled refrigerator or freezer – more than twice as much as is captured from the refrigerant.¹¹ Respondents also indicated that this foam is not properly destroyed outside of programs like that of the Sponsors. The Program provides a clear environmental benefit here not being otherwise offered in the market.
- *Reduction of ozone layer damage and decreased greenhouse gases through proper recycling of refrigerants.* Refrigerants, like foam, contain CFCs and HCFCs. According to the program records collected by JACO, Sponsors successfully captured nine ounces of refrigerant per refrigerator or freezer. Because the Program picks up used units from inside customers’ homes, the Sponsors minimize the ability of scavengers with no regulatory oversight to poach units off curbs before municipal programs can pick them up, thereby ensuring proper refrigerant recycling.
- *Recycling of non-hazardous materials.* Respondents, including metal shredders – the companies directly involved in dismantling appliances and other metal goods into their respective materials – consistently reported that non-metal, non-hazardous materials in demanufactured appliances end up in landfills, rather than being recycled. The Sponsors can quantify the amount of such materials recycled to calculate amounts of materials diverted from landfills and corresponding CO2 reductions from reduced demand for virgin materials.
- *Fuel savings from retail partnerships.* Sponsors could partner with major retailers not just to increase participation rates, but also to save fuel. One retailer suggested that the Sponsors allow retailers to provide haul-away services under the Program, rather than using only JACO for this purpose, because then JACO could “*come to me and pick them up at one place instead of having to drive to the same 50 places I already drove by.*” This trip consolidation would result in decreased fossil fuel consumption.

¹¹ U.S. Environmental Protection Agency. “Responsible Appliance Disposal Program 2009 Annual Report.” August 2010. http://www.epa.gov/ozone/partnerships/rad/downloads/RAD_2009_Annual_Report.pdf (accessed Jan. 9, 2010).

2 Sample and Methodology

In order to explore the secondary refrigerator and freezer market and how they are disposed of and recycled in Massachusetts, the evaluation team employed in-depth telephone interviews with market actors, including representatives of municipalities with appliance recycling programs, companies that provide hauling and recycling services, and new and used appliance dealers. The team also conducted mystery shopping telephone calls with used appliance dealers to gain a better understanding of their inventory and sales, and the team conducted a review of refrigerators and freezers for sale on Craigslist, to identify Craigslist's role in the used appliance market. These efforts were supplemented with secondary research where appropriate.

2.1 Municipalities

NMR conducted six in-depth interviews with representatives of a sample of Massachusetts municipalities with refrigerator and freezer disposal programs in November and December of 2010. The average interview length was 15 minutes. The interviews explored the services offered by the municipalities, how the programs are structured, and what happens to collected appliances, including whether they are reused or recycled.

Interviews were obtained from employees of small towns, suburbs, and large cities. Municipalities from across the state, from each Sponsor's service territory, and from various counties were interviewed, as shown in Table 2-1. Respondents typically included the heads of public works departments, municipal recycling program managers, and managers and superintendents of municipal transfer stations.

Table 2-1: Municipality Sample

| Municipality | Households ¹² | County | Electric Provider Territory |
|--------------|--------------------------|------------|-----------------------------|
| Boston | 237,397 | Suffolk | NSTAR |
| Worcester | 68,249 | Worcester | National Grid |
| Cambridge | 47,100 | Middlesex | NSTAR |
| Needham | 10,424 | Norfolk | NSTAR |
| Greenfield | 5,772 | Franklin | WMECo |
| Orleans | 3,205 | Barnstable | Cape Light Compact |

2.2 Haulers and Recyclers

NMR conducted interviews with nine haulers and recyclers of appliances in November and December of 2010. The average interview length was 15 to 20 minutes. Preliminary research revealed a variety of overlapping niches in the hauling and recycling market, including junk haulers who clear out cluttered homes (e.g. 1-800-GOT-JUNK), haulers and recyclers that

¹² U.S. Census Bureau 2005-2009 American Community Survey 5-Year Estimates. <http://www.census.gov/acs/www/> (accessed Jan 4, 2010).

manage residential, municipal, or commercial waste programs (e.g. Waste Management), scrap dealers that provide hauling services, and large metal processing facilities that shred and separate goods into their respective materials in preparation for mills, all collectively referred to as “haulers and recyclers” in this report. Interviews were conducted with each of these business types.

NMR created this sample by reviewing Massachusetts Department of Environmental Protection (DEP) directories of companies licensed to dispose of Freon-containing white goods. Online research was performed to identify the nature of these companies and their service territories. In addition to the DEP’s directories, interviewers culled online directories to identify other junk haulers, scrap dealers, recyclers, and metal processors. As interviews were completed, adjustments were made to the companies being targeted to obtain a sample that fully covered the range of company types and the Sponsors’ service territories. The majority of companies identified in Table 2-2 have facilities or headquarters in National Grid territory, but interviewers confirmed prior to and during interviews that these companies served multiple Sponsor territories.

Table 2-2: Hauler/Recycler Sample

| Type of Company | County | Electric Provider Territory |
|--------------------------|-------------|---|
| Junk Hauler | Middlesex | National Grid (covers larger territory) |
| Junk Hauler | Worcester | National Grid (covers larger territory) |
| Hauler/Recycler | Cambridge | NSTAR (covers larger territory) |
| Hauler/Recycler | Worcester | National Grid (covers larger territory) |
| Hauler/Recycler | Worcester | National Grid (covers larger territory) |
| Hauler/Scrap dealer | New Bedford | NSTAR (covers larger territory) |
| Hauler/Scrap dealer | Springfield | WMECo (covers larger territory) |
| Metals recycler/shredder | Greenfield | WMECo (covers larger territory) |
| Metals recycler/shredder | Everett | National Grid (covers larger territory) |

2.3 Appliance Retailers

2.3.1 In-depth Retailer Interviews Sample and Methodology

In-depth telephone interviews were conducted with six Massachusetts appliance dealers in November and December of 2010, including three new appliance dealers, two used appliance dealers, and one that sold both new and used appliances.

Large national retailers play a significant role in the appliance market, and the evaluation team targeted two such retailers with locations across the state. The team performed online research to identify key corporate personnel and contacted them via emails and telephone calls. These representatives provided the team with contact information for the corporate personnel best suited to discuss appliance sales and haul away programs. These two interviews averaged approximately one hour in length.

For the remaining four dealer interviews, the team targeted small, independent, or regional appliance dealers. Cadmus generated the sample from InfoUSA directories, identified the Sponsors’ territories in which each dealer operated, and confirmed via phone calls to these retailers that they sold new, used, or both new and used appliances. From this sample, NMR called randomly selected retailers from each service territory, and asked to speak with the manager most familiar with the store’s sales and haul away services. These remaining four interviews averaged just over 15 minutes in length.

Table 2-3 describes the type and location of the retailers that completed interviews with evaluation staff.

Table 2-3: New and Used Appliance Retailer Sample

| Type of Company | New or Used Dealer | County ¹³ | Electric Provider Territory |
|-----------------------------------|--------------------|----------------------|---|
| Major nationwide appliance dealer | New | multiple | Cape Light Compact, National Grid, NSTAR, WMECo |
| Major nationwide appliance dealer | New | multiple | Cape Light Compact, National Grid, NSTAR, WMECo |
| Local/regional dealer | New | Barnstable | Cape Light Compact |
| Local/regional dealer | New & Used | Berkshire | WMECo |
| Local/regional dealer | Used | Essex | National Grid |
| Local/regional dealer | Used | Bristol | National Grid |

2.3.2 Mystery Shopping Sample and Methodology

Cadmus acquired a directory from a business information vendor, InfoUSA, that identified over 500 appliance dealers in Massachusetts based on their Standard Industrial Classification (SIC) codes. The team cleaned this data to remove duplicates and major new appliance retailers such as Sears, Home Depot, and Lowes. The team originally planned to contact 50 used appliance dealers from this list, allocated across Sponsors proportional to the number of residential customers served by each Sponsor. Once calling began, however, it became apparent that despite their SIC codes, many stores on the InfoUSA list did not sell used refrigerators or freezers. Some were appliance repair shops, some sold used appliances but not refrigerators or freezers, and others did not sell used appliances.

The team altered its strategy and called every store in the sample to eliminate those that did not sell used refrigerators and freezers. Table 2-4 shows a breakdown of the final call status for all of the stores on the InfoUSA list. Of 241 potential used appliances dealers, 135 (56%) were inappropriate for the study, and 72 (30%) could not be reached. Among the 72 that could not be reached, 44 had SIC codes identifying them as new appliance retailers rather than used appliance dealers. We expect that the majority of these 44 would not have sold used appliances. Interviews were completed with 34 stores that sell used refrigerators and freezers.

¹³ Counties are provided rather than specific cities, so as to protect the anonymity of the respondents.

Cadmus interviewers posed as customers shopping for used appliances and called these dealers, asking about:

- the source of their used appliances;
- available inventory and typical sales prices;
- requirements for determining whether or not a used appliance is saleable;
- the quality of used appliances in the secondary market; and,
- what is done with a unit when it is decided the unit is not worth fixing.

Table 2-4: Status of Call List from InfoUSA

| No. of Businesses | Status |
|-------------------|--|
| 511 | Original list from InfoUSA |
| 344 | Businesses within Sponsors’ territory |
| 241 | Potential used appliance dealers ¹ |
| 34 | Completed interviews |
| 122 | Do not sell used appliances |
| 11 | Sell used appliances but not refrigerators |
| 2 | Do not sell used refrigerators to residential market |
| 72 | Could not reach ² |

¹The potential sellers list excluded large chain retailers of new appliances only.

²Businesses were called up to three times at different times of the day and on different days of the week. Messages were also left.

Table 2-5 shows the allocation of mystery shopping interviews across Sponsor service territories.

Table 2-5: Completed Mystery Shopping Calls by Sponsor Territory

| Sponsor | No. of Completed Calls |
|--------------------|------------------------|
| National Grid | 11 |
| NSTAR | 7 |
| WMECo | 7 |
| Cape Light Compact | 1 |
| Total | 34 |

2.3.3 Craigslist Sample and Methodology

Cadmus reviewed all Massachusetts¹⁴ ads for full-sized¹⁵ refrigerators or freezers posted on Craigslist over a one week period, from October 29th through November 5th. The team reviewed these ads to identify the location, asking price, age, condition, and features of units being sold. The team also identified duplicate postings, and units being sold by dealers versus residential end-users. Dealers could be identified based on whether or not they mentioned the name of their business or in-store pickup in the ad, the frequency of their postings, and the abundance of stock.

¹⁴ Craigslist allows users to post ads in any of five geographic areas in Massachusetts: Boston, Cape Cod/Islands, South Coast, Western Massachusetts, and Worcester/Central Massachusetts. Further location detail is inconsistent because sellers can provide as much or as little location information as they wish.

¹⁵ Small, or “dorm-sized” refrigerators were not included because they are not the focus of the Program.

Dealer names in Craigslist ads were cross-checked against the InfoUSA directory to identify overlap between Craigslist and traditional brick and mortar dealers.

The team identified 242 ads for full-sized refrigerators and freezers posted on Craigslist during the one week review period, 218 (90%) of which were unique, non-duplicate ads.

In addition, after waiting three weeks from the date of an ad's posting, the team called the seller to inquire about the outcome of the ad placement. Of the 218 unique postings, 83 provided a phone number. Of those 83 ads, 30 resulted in a conversation about the appliance for sale. Five sellers refused to participate in the survey, and 41 did not answer their phone when called at least twice on different days and at different times.

3 The Recycling/Disposal Market for Used Appliances

Outside of the Program, Massachusetts residents face a variety of options for disposing of unwanted appliances. Some of these options result in an appliance being returned to use, while others result in an appliance being removed from the grid. This section of the report explores the typical pathways that result in the removal of appliances from the grid by summarizing the results of interviews with key players in the recycling and disposal market for used appliances, including municipalities with recycling programs and haulers and recyclers that handle used appliances (including junk haulers, solid waste haulers and recyclers, scrap dealers, and metal shredders). New and used appliance dealers were also interviewed to better understand how likely the used appliances that they collect and sell end up back in use in Massachusetts, and how they are disposed of, if at all.

3.1 Quantities of Discarded Appliances Removed from Service

Market actors involved in the appliance recycling and disposal market, include municipalities with recycling programs, haulers and recyclers, and appliance dealers.

Using a variety of sources, we estimate the number of units that potentially would be considered for disposal in Massachusetts and the means for disposal. We caution, however, that these are rough estimates—the study was designed as an exploration of the likely flows of products through the secondary and recycling/disposal market; the sample was not designed with the rigor to definitively describe the precise quantities of units that market actors transfer to the secondary market or remove from the grid. As Table 3-1 shows, we estimate that there are about one million secondary refrigerators and stand-alone freezers in Sponsor households. In 2010, the Program removed about 1% of those units. We also estimate the number of new refrigerators purchased in the past year because for almost every new refrigerator purchased, an existing unit may be transferred to use as a secondary unit. We thus estimate there are approximately 1.3 million units in Sponsor service areas that could potentially be removed from use.

Estimates of the flows of units from homes from all sources except for the Program include primary, secondary, working, and non-working units, which make direct comparisons to Program activity difficult. The major source of units being removed from service comes from retailers and the haulers contracted to remove units for them, or about 7% of all potential units. Municipal programs are estimated to be responsible for the removal of about 4% of all potential units, or from about 2% of households. The Program is the third largest source of removals. In total, we estimate that about 10% of secondary refrigerators and freezers and newly displaced refrigerators due to new purchases in Sponsor service areas were removed from service in 2010. Caveats for our estimates are included as notes in the table below.

Table 3-1: Rough Estimates of Ultimate Unit Status in Sponsor Area

| Number of residential customers | Estimates | Source | Notes |
|---|------------------|------------------------|--|
| National Grid | 1,200,000 | Sponsor website | |
| NSTAR | 987,000 | Sponsor website | |
| Cape Light Compact | 200,000 | Sponsor website | All customers |
| WMECo | 200,000 | Sponsor website | All customers |
| TOTAL Sponsor Households | 2,587,000 | | Rough estimates (may include some C/I customers) |
| Secondary refrigerators in use (Sponsor territory) | 517,400 | 2005 RECS | Assumed same usage rates across New England |
| Stand-alone freezers in use (Sponsor territory) | 564,436 | 2005 RECS | Assumed same usage rates across New England |
| MA Program eligible units | 1,081,836 | | Secondary, working units only |
| New refrigerator purchases per year (Sponsor territory) | 235,182 | 2005 RECS | New purchases represent potential transfers to secondary status. Calculation includes half of primary refrigerators less than 2 years old |
| Total potential removals in MA Sponsor territory | 1,317,018 | | Sum of secondary units in use and new refrigerator purchases in 2010 |
| Units removed from service | | | |
| Annual units removed by municipal programs | 51,740 | NMR depth interviews | Assume 2% of households per year. Includes primary, secondary, working and nonworking units |
| Annual units removed by/on behalf of retailers | 94,073 | NMR depth interviews | Assume 100% of retailers offer removal and 40% of customers use retail service for disposal. Mostly former primary units, but these become secondary units if kept. Includes working and nonworking units. |
| Number of units collected by haulers/recyclers directly from households | 3,000 | NMR depth interviews | Assume 30 units per hauler/recycler and assume 100 haulers/recyclers total (very rough estimate). Includes primary, secondary, working and nonworking units |
| Number of units removed through Program | 10,570 | Program records 2010 | |
| Units kept on grid | | | |
| Annual units sold on Craigslist | 2,150 | Cadmus secret shopping | Assume 57% units sold (17/30) every 3 weeks (52/3=17.3 cycles per year), with 218 total units available per cycle |
| Number of used units sold through used dealers | 24,268 | NMR depth interviews | Assume 25% of units collected by haulers/retailers return to grid |
| TOTAL Units Removed from service | 135,115 | | All types units, adjusted by those put back on grid thru used dealer sales |

3.1.1 Municipalities

Massachusetts regulations (310 CMR 19.017) prohibit improper disposal of Freon-containing appliances, so most municipalities provide residents with disposal services or advice for disposal if no municipality service is offered. Municipalities with disposal services provided rough estimates for the number of units removed that NMR calculates would be the equivalent of up to

2%¹⁶ of the households in those areas using a municipal service each year to dispose of refrigerators and freezers, including primary and secondary units and working and non-working units.

Five out of six municipal representatives, despite their different population sizes, estimated their programs annually processed “hundreds” of refrigerators and freezers, as seen in Table 3-2. All six municipalities reported steady appliance disposal rates, and they thought the Program was not affecting their programs’ collection rates because awareness of the Program was low.

Boston reported significantly higher quantities than the other municipalities, having collected 2,500 refrigerators and freezers in 2010, up from 2,300 in 2009, which translates to about one percent of households annually disposing of units in 2010. Greenfield estimated it processed 500 refrigerators and freezers in 2010. The Cambridge representative reported that the city annually collected between 800 and 1500 white goods of all varieties.¹⁷ The Worcester representative estimated its processed units were in the “hundreds.”¹⁸ Needham processed 492 white goods in 2010, and estimated 300 of those were refrigerators, freezers, and air conditioners.¹⁹ Orleans reported processing 400 white goods in the past year, the majority of which were Freon-containing units (including air conditioners).

Table 3-2: Quantities of Units Obtained by Municipal Programs

| Municipality | Households ²⁰ | County | Units Processed Annually | % of Households Discarding White Goods | % of Households Discarding R&F |
|--------------|--------------------------|------------|---|--|--------------------------------|
| Boston | 237,397 | Suffolk | 2,500 refrigerators and freezers | -- | 1% |
| Worcester | 68,249 | Worcester | “hundreds” of refrigerators and freezers ¹ | -- | <1%-1% |
| Cambridge | 47,100 | Middlesex | 1,150 white goods ² | 2% | <1%-1% |
| Needham | 10,424 | Norfolk | 492 white goods | 5% | 1%-2% |
| Greenfield | 5,772 | Franklin | 500 refrigerators and freezers | -- | 9% |
| Orleans | 3,205 | Barnstable | 400 white goods | 12% | 2%-5% |

¹ Respondent’s best estimate. Calculations based on a range, from 200 to 900 units; percentages are calculated across this range.

² Average of range provided by respondent.

¹⁶ Readers should be aware that these are rough estimates. Most municipalities interviewed did not differentiate between refrigerators and freezers and other white goods that were disposed of through their municipal service and the estimates varied widely, with a typical range of less than 1% to 5% of households disposing of units each year.

¹⁷ The Cambridge representative did not have access to data that would have provided exact refrigerator and freezer disposal quantities.

¹⁸ The Worcester respondent said it would be difficult to obtain exact counts because of how their program was administered – the units picked up curb-side were handled entirely through their recycling hauler, and the city had no role in the appointment or pickup process.

¹⁹ Transfer stations and other municipal facilities that process white goods often seem to count refrigerators, freezers, and air conditioners as the same type of white good, because all three must be properly purged of Freon.

²⁰ U.S. Census Bureau 2005-2009 American Community Survey 5-Year Estimates. <http://www.census.gov/acs/www/> (accessed Jan 4, 2010).

Recognizing that respondents did not have access to precise data, smaller towns appear to be recycling white goods, including refrigerators and freezers, at fairly high rates. This may reflect higher ownership rates of secondary appliances in areas where residents are more likely to live in single family homes with garages or basements with room for secondary appliances. One urban municipality's respondent reported that the Sponsors could not expect high participation rates in big cities where residents tend to live in smaller homes, because "*Who has two refrigerators when they have a 600 square foot apartment?*" This respondent also thought the Program should be opened up to residents disposing of primary refrigerators, not just secondary units.

3.1.2 Haulers and Recyclers

The quantities of units obtained by haulers and recyclers vary depending on the size and type of company, from less than 100 to thousands. Haulers that have contracts with retailers appear to collect many of the used appliances in Massachusetts, thereby influencing the secondary and recycling markets.

Junk haulers reported picking up relatively few units. One estimated picking up 20 refrigerators and four freezers a year, and the other estimated 40 to 50 units a year, 80% of which were refrigerators.

One large hauler interviewed purchases units from major retailers after they are hauled away from the homes of the retailers' customers; this hauler collects thousands of units from customers in Massachusetts each year and 25,000 from throughout New England, commanding much of the market. In contrast, a hauler with commercial clients reported picking up only 200 to 600 units annually. A different hauler with municipal contracts reported processing only 20 refrigerators and 10 freezers a year, and that it used to collect many more, but speculated that these numbers had decreased due to increased competition from appliance retailers' free haul away services.

Scrap dealers estimated they processed between hundreds and thousands of appliances a year. One metal shredder could not determine how many appliances it processed because they had already been crushed into "light iron" by the time the shredder obtained them. The other large metal shredding facility estimated it processed thousands of refrigerators and freezers each year.

3.1.3 Dealers

The two large chains (both new appliance retailers) sell like-new customer returns at a discount, but do not sell used units. While they do not sell used units, they are involved in the recycling market through the haul-away services they offer customers,²¹ because many of the units they collect are demanufactured, rather than resold. As discussed in more detail in section 3.2.3, one major retailer reported that 30% of customers have an old unit hauled away, and another major retailer estimated 50% of its customers do the same.

²¹ One new retailer noted that haul-away quantities are directly tied to sales, and as this company opened more stores, sales and thus haul-aways had increased.

One small new appliance dealer reported that on rare occasions they might allow a customer to return a unit after a few months, and the store would sell it on consignment. They hauled-away up 50 to 100 used units in a given year, all of which were sent to the scrap or recycling market. Used dealers reported that about 20% of the used appliances they collected were unrepairable, and ended up being recycled or sent to the scrap market.

3.2 How Market Actors Obtain Used Refrigerators and Freezers, and Fees for Collecting Them

Municipalities with recycling programs, haulers and recyclers, and appliance dealers, collect appliances from a wide variety of sources. Some of these market actors charge fees to customers who want to dispose of appliances, while others accept them free of charge, or even pay for them, based on their scrap value.

3.2.1 Municipalities

Most municipalities offer appliance disposal services, but some towns do not, making disposal more difficult. As seen in Table 3-3, fees for municipal appliance removal services vary from no charge to about \$30.²² Transfer station drop-off is usually cheaper than curbside pickup.

Cities are more likely to offer curbside pickup, while smaller towns are more likely to require transfer station drop-off. Boston and Cambridge (the first and fourth most populated cities in Massachusetts) were the only municipalities interviewed that only accept refrigerators and freezers via curbside pickup. The other four allow residents to drop units off at municipal transfer stations. Worcester and Greenfield offer residents either option, with an additional fee for curbside pickup. All four municipalities with pickup service require advance notice from residents before putting the unit on the curb.

In some cases, Massachusetts towns do not accept white goods even at their transfer stations. For example, the town of Dalton (Berkshire County) on its website refers residents to a local auto wrecking yard, adding a layer of difficulty to the removal of the appliance.²³

²² Among interviewed municipalities, and based on a brief review of municipal websites of other towns and cities in Massachusetts.

²³ http://www.dalton-ma.gov/index.asp?Type=B_LIST&SEC={DBF5C107-23AC-46BD-9AED-7F563098E6A4}

Table 3-3: Municipal Collection Services

| Municipality | Services Available to Residents | Cost for Curb-Side Pickup | Cost for Drop-off | Pickup Frequency | Population ²⁴ |
|--------------|---------------------------------|---------------------------|-------------------|------------------|--------------------------|
| Boston | Curb-side pickup | Free | -- | Weekly | 645,169 |
| Cambridge | Curb-side pickup | \$25 ²⁵ | -- | Weekly | 108,771 |
| Worcester | Pickup and drop-off | \$27.50 | \$12 | By appointment | 182,882 |
| Greenfield | Pickup and drop-off | \$27 | \$15 | Bi-weekly | 17,844 |
| Needham | Drop-off | -- | \$15 | -- | 29,021 |
| Orleans | Drop-off | -- | \$20 | -- | 6,254 |

Of the four municipalities that offer pickup service, Cambridge and Greenfield reported using municipal employees for curb-side pickup, while Boston and Worcester reported using contractors who take ownership of units they pick up. Boston's recycling and trash contractors handle appliance pickup, and the process is scheduled through the city, either online or on the phone. In Worcester, residents call and pay the recycling hauler directly for pickup service; the city negotiated preferable rates with its hauler, should residents choose to use that provider.

The Program is more convenient than municipal options. The four interviewed municipalities with pickup service reported they would never enter a resident's home to pick up an appliance. Cambridge requires residents to remove the doors and purchase a sticker at their public works department to affix to the unit prior to pickup. Needham requires door removal prior to drop-off at its transfer station. Residents of small towns without municipal programs have even fewer options for disposing of a secondary appliance. These are barriers that may encourage consumers to keep their secondary appliances, because keeping them is easier than disposing of them.

²⁴ U.S. Census Bureau 2009 Population Estimates.

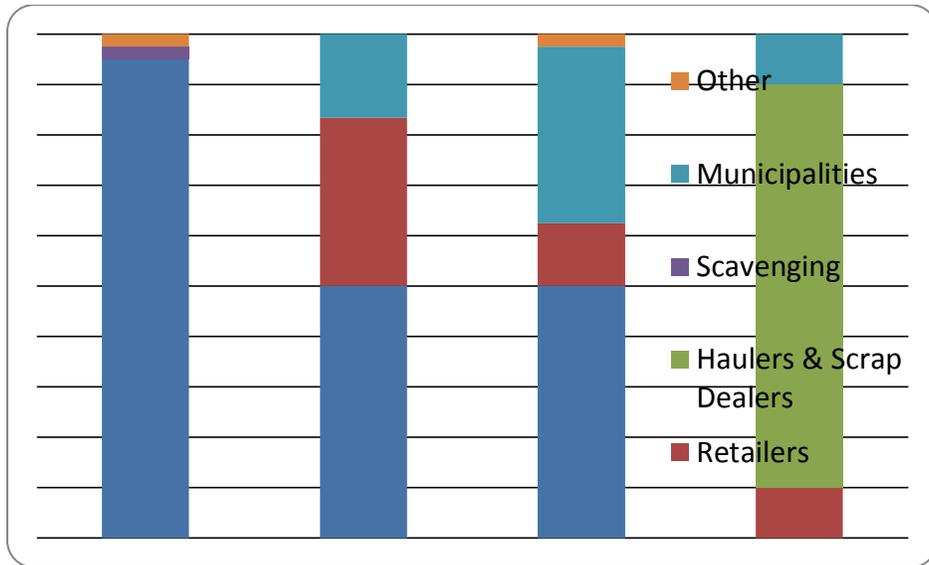
http://factfinder.census.gov/home/en/official_estimates_2009.html (accessed Jan 4, 2010).

²⁵ This is discounted to \$20 for seniors.

3.2.2 Haulers and Recyclers

Haulers and recyclers in Massachusetts obtain used appliances from different sources depending on their business model, as seen in Figure 3-1. Junk haulers are paid to remove rubbish, including appliances, from customers’ homes. Haulers, recyclers, and scrap dealers obtain units from end users (residential or commercial), appliance dealers, contractors, other haulers, gas and electric companies, and municipalities. Metal shredders receive few units from end users – most come from haulers and scrap dealers, and some from retailers and municipalities.

Figure 3-1: Hauler and Recyclers’ Sources for Used Appliances in MA



As seen in Table 3-4, these companies typically charge less than \$25 for appliance disposal, but some charge up to \$100 for a pickup. Some companies that process scrap metal charge fees for Freon removal, but these are offset by the scrap value of “light iron,” for which residents can net about \$10.

Table 3-4: Hauler and Recycler Collection Services

| Type of Company | Services Available to Residents | Cost for Pickup | Cost for Drop-off (if any) | Pickup Caveats |
|-----------------|---------------------------------|---------------------------------|---|---|
| Junk Hauler | In-home pickup | Cleanout charge + \$15-\$25 fee | -- | Depends on difficulty of removal |
| Junk Hauler | In-home pickup | \$75-\$100 | -- | Refers to municipal hauler if only one unit |
| Hauler/Recycler | Pickup and drop-off | \$0-\$100 | -- | Depends on municipal contracts |
| Hauler/Recycler | Pickup and drop-off | Scrap value after \$5-\$20 fee | Scrap value after \$5-\$20 fee | Depends on presence of Freon |
| Hauler/Recycler | Commercial pickup & drop-off | Scrap value ²⁶ | Scrap value ²⁷ | Commercial only – no residents |
| Scrap dealer | Curbside pickup & drop-off | Scrap value after \$15-\$25 fee | Scrap value after \$8 fee | Depends on number of nearby pickups |
| Scrap dealer | Curbside pickup & drop-off | \$100 | Scrap value | Depends on distance from scrap yard |
| Metal shredder | Drop-off | -- | Scrap value after unknown fee ²⁸ | -- |
| Metal shredder | Drop-off | -- | Scrap value ²⁹ | -- |

3.2.2.1 Junk Haulers

The two junk haulers reported obtaining used appliances mainly from residential customers, usually as part of a larger cleanout, and they did not reimburse customers for the appliances’ scrap value. Curb-side scavenging was done “*very rarely*” by one of the junk haulers. One charged a surcharge of up to \$25 for appliances with Freon.³⁰ The other reported that it would charge up to \$100³¹ to pick up a single appliance, but this rarely happened because customers discarding only a single appliance were referred to the municipal solid waste hauler, who charges much less for refrigerator pickups. If part of a larger cleanout, this junk hauler does not charge extra for an appliance with Freon because it still would fetch scrap value, and “*I’m not trying to make money on both ends.*”

²⁶ Not available to individuals, just retailers and their haulers with contracts with this recycler.

²⁷ Not available to individuals, just retailers and their haulers with contracts with this recycler.

²⁸ Respondent declined to provide this fee.

²⁹ Not available to residents, just haulers and similar companies.

³⁰ While this respondent charged customers for units with Freon, the hauler did not pay Freon disposal costs, as it dropped off refrigerators and freezers at a fee-free recycling facility.

³¹ One reason this respondent did not apply a surcharge to Freon-containing appliances is that this respondent would not accept units with Freon left inside them, and indirectly encouraged customers to cut the Freon lines themselves, as discussed in Section 3.5.

3.2.2.2 Haulers and Recycling Companies

A large hauler reported that all of the used appliances it processes in Massachusetts (25,000 annually, from sources throughout New England) are purchased from retailers or their contracted haulers. This hauler purchases the haul-aways picked up by major appliance retailers in Massachusetts, paying them a “*fairly modest rebate per appliance,*” based on the units’ scrap value. “*We either get [refrigerators and freezers] from their stores or their centralized distribution center. For example, [one major retailer] will load up their delivery vehicles in the morning with the new appliances, they’ll make their deliveries, pull out the haul-aways, put them on their truck, bring them back to [their] facility and then they’re loaded onto our trailers and processed.*” One of the major retailers interviewed confirmed that it sells units to this hauler, indicating that the hauler appears to have a significant effect on whether or not the appliances end up back on the grid. As discussed in section 3.4.2, most of these units end up demanufactured or sold to out of state dealers.

A large hauler with residential customers and municipal contracts reported obtaining few units from these sources (only 30 per year). Fees depend on the hauler’s contract with the resident’s municipality, but would be up to \$100 in the absence of a municipal contract.³²

Another hauler reported obtaining 200 to 600 used units in Massachusetts, from institutional (80%) or commercial (20%) end-users. Its customers were reimbursed for scrap value, and charged \$20 per unit if Freon was intact, or \$5 to \$10 if already purged.

3.2.2.3 Scrap Haulers and Dealers

Scrap haulers and dealers reported obtaining appliances from residential, municipal, commercial, and industrial clients. They also provide pickup or dumpster service for large customers (landfills, municipalities, etc.), and allow drop-offs at the scrap yard.

The larger scrap dealer reported that half of its 1,000 to 2,000 annual units come from dumpsters provided to six Massachusetts municipalities or their haulers, and the other half come from individual drop-offs. The other scrap dealer reported it obtains units (hundreds annually) from a wider variety of sources, including: drop-offs from individuals, haulers, scavengers, and landfill operators (50% of the scrap yard’s appliances), retailers and their haulers discarding customer haul-aways (25%), the commercial sector (contractors doing apartment building cleanouts, businesses, distributors, etc.) (5%), and gas/electric companies³³ and six Massachusetts municipalities provided the remaining 20%.

One scrap dealer charges up to \$25 per appliance pickup, or less if it could consolidate pickups, while the second scrap dealer charges customers up to \$100 for a pickup, depending on distance from the scrap yard. Both credited customers for scrap value, after Freon removal fees.

³² This respondent noted that they used to collect many more units, but speculated that these numbers had decreased due to increased competition from appliance retailers’ free haul away services.

³³ This hauler reported receiving refrigerators and freezers from the replacement programs administered by Massachusetts electric and gas companies.

3.2.2.4 Metal Shredders

Large scale metal recycling facilities reported that most of their appliances came from haulers and scrap dealers. One reported it received appliances solely from large recycling and dismantling facilities. The other shredder reported that 60% came from scavengers or haulers associated with scrap dealers or retailers, 20% came from municipalities disposing of collected goods, and 20% came from onsite drop-offs by consumers, contractors, and retailers.

3.2.3 Dealers

As summarized in Table 3-5, new appliance dealers reported that they obtain used appliances (which may be destined for the resale or recycling markets) almost exclusively from consumers through their haul-away programs, while used appliance dealers reported they purchase most from haulers, not consumers.

Table 3-5: Where Appliance Dealers Obtain Used Appliances, based on In-Depth Interviews

| Type of Company | New or Used Dealer | Direct from Consumers | Scavenging | Purchase from Haulers | Purchase from Dealers | Total |
|-----------------------------------|--------------------|------------------------|------------|-----------------------|-----------------------|-------|
| Major nationwide appliance dealer | New | 100% | -- | -- | -- | 100% |
| Major nationwide appliance dealer | New | Majority ³⁴ | -- | -- | Remainder | 100% |
| Local/regional dealer | New | 100% | -- | -- | -- | 100% |
| Local/regional dealer | New & Used | 100% | -- | -- | -- | 100% |
| Local/regional dealer | Used | 25% | 0 | 75 | -- | 100% |
| Local/regional dealer | Used | 8% ³⁵ | 8 | 85 | -- | 100% |

As summarized in Table 3-6, of the 34 mystery-shopped used appliance dealers, 26 said they obtain units from individuals, and 10 said from dealers.³⁶ Only one reported that it obtains appliances from the dump.

Table 3-6: How Used Appliance Dealers Obtain Inventory, Based on Mystery Shopping

| Sources of Used Appliances | Number of Dealers |
|----------------------------|-------------------|
| <i>Sample size</i> | 34 |
| Direct from consumers | 26 |
| Purchase from dealers | 10 |
| Scavenging | 1 |

³⁴ Respondent declined to provide exact percentages of goods coming from each source, other than to indicate that most of the units come directly from consumers.

³⁵ Respondent said 85% came from haulers, and the remainder came from the other two sources.

³⁶ Respondents may have mentioned more than one source.

Table 3-7 summarizes haul-away and drop-off services offered by the appliance dealers from the in-depth interviews, the fees they charge, and the rates at which customers utilize them. Even though new dealers tend to charge little, if anything, for haul-away, most new and used dealers reported less than half of their customers have used appliances removed, indicating significant numbers are likely remaining in use as secondary units or being sold or donated to charities.

Table 3-7: Appliance Dealers’ Haul-Away and Drop-Off Services, based on In-Depth Interviews

| Type of Company | New or Used Dealer | Services Offered to Customers | Haul-Away with Purchase | Customers Who Use Haul-Away Service | Fee for Drop-off |
|-----------------------------------|--------------------|-------------------------------|-------------------------------------|-------------------------------------|------------------|
| Major nationwide appliance dealer | New | Haul-away | \$0 with new purchase, \$99 without | 50% ³⁷ | -- |
| Major nationwide appliance dealer | New | Haul-away | \$10* | 30% | -- |
| Local/regional dealer | New | Haul-away | Free* | 50-100 per year | -- |
| Local/regional dealer | New & Used | Haul-away | Varies | 90% | -- |

As summarized in Table 3-6, used appliance dealers told mystery shoppers that they obtain used appliances mainly from consumers and from retailers (only one mentioned scavenging). In in-depth interviews, however, used dealers reported that little of their inventory came from consumers, one reporting 25%, and the other less than 10%. Used dealers report that over the past few years, they purchased an increasing percentage of units from the haulers that major retailers use to perform customer haul-aways, and less from the appliances’ original owners.

One used dealer reported that 75% of its inventory came from three or four haulers. Half of its inventory came from apartment building cleanouts, where haulers would collect units and sell them to dealers. This retailer used to get units from a major retailer and from an out of state hauler, but those relationships have ended due to a lack of hauler supply of units.

The other used dealer reported that 85% of its inventory came from two haulers, a small one with contracts with local retailers, and a large, out of state hauler that has “*contracts with all the big stores like Lowes, and Sears, and Home Depot, ... and they get them by the trailer loads and they bring them down to their facility where they sort them ... for scrap or things that look halfway decent and people like me go down into that warehouse building and we pick and choose.*” One used dealer reported that the haulers of major appliance retailers with desirable haul-aways often drop by used appliance stores to sell or drop off used refrigerators.

³⁷ This is the percentage of customers taking advantage of haul away across all appliances, not just refrigerators and freezers, but the respondent thought the figure was representative of refrigerators and freezers.

The two used dealers reported they rarely scavenged for units. One reported less than 10% of its inventory came from scavenging; the other thought the percentage was too low to count (Table 3-5). One used dealer noted that curbside scavenging used to be easy years ago, *“but now it seems like it's very rare to see anything of any value on the curb. ... I don't know [if] the recycling program that I've heard of might have something to do with it, and the fact that there are a lot of scrap people out there now who go out and make regular rounds.”*

Both used dealers described how it was becoming increasingly difficult to obtain used appliances to sell, due to the poor economy, aggressive scrap dealers responding to high metal prices, and the appliance recycling programs:

“I have to go out and buy them, basically, especially in today's economy. People are hanging onto stuff as long as they can. It's not out on the side of the road like it used to be. ... I used to get more when the economy was better. ... Before [2009] we used to get a lot of phone calls from people [with units to get rid of].”

Also, the used appliance market has *“definitely changed in the last year or so. We used to get a lot more from people who were just looking to get rid of their refrigerators ... but we've seen that dry up pretty significantly in the past year or so. I'm not sure [why]. I've heard some of the scrap metal people that we occasionally use have talked about how they aren't seeing them as much either and I guess there was some sort of recycling program that they were talking about that might have impacted that.”*

New appliance retailers seem to provide haul-away as a convenience to customers, but used dealers see this transaction as an opportunity to make money and build inventory. Both used dealers reported that they decide whether to pay for, charge for, or accept a customer's appliance for free on a case by case basis, and it is generally negotiable. Both used dealers reported past frustrations with customers trying to convince them to pay for units that the dealers deemed worthless. One reported trying to ascertain if the unit was sellable by talking to its owner, *“but some people lie to you anyway. So we just tell them, if it is junk, ... you will pay us \$20 a piece,”* but they might pay the customer if the unit was in good shape. The other used dealer reported that they stopped performing pickups from customers altogether because *“eight out of ten times ... people call us to come pick something up that they tell us is going to be great, ... we go out there and spend [our] time and money ... and they're not worth the time.”*

3.3 Use of Haulers

Haulers frequently take ownership of the units they pick up on behalf of retailers, rather than just providing a transport service. As a result, haulers determine whether used appliances are kept in use or demanufactured.

3.3.1 Municipalities

Of the four municipalities that offer pickup service, Cambridge and Greenfield reported using municipal employees for curbside pickup, while Boston and Worcester reported using independent contractors who take ownership of units they pick up. Boston uses its regular recycling and trash contractors to pick up appliances, and the process is scheduled through the

city, either online or on the phone. Worcester’s pickup service is run entirely by the city’s recycling hauler; residents call and pay the hauler directly. Worcester has negotiated preferable rates with its regular recycling hauler for residents who want to schedule a pickup.

3.3.2 Dealers

Large dealers often use contracted haulers to provide delivery and haul-away services for their customers and smaller dealers are more likely to use their own employees.

The two large, new appliance retailers both use contracted haulers. One interviewed major retailer also uses its own employees to collect haul-aways from residences and deliver them to the retailer’s facilities or storage warehouses. Haulers purchase these appliances based on their scrap or resale value. One retailer explained that it charges customers for haul-away to offset the cost of the “*storage, facilities, [and] transportation involved,*” because “*at the end of the day, it costs us money to deal with haul away.*”

3.4 Discarded Appliances Being Returned to Use

The U.S. Department of Energy estimates that 44% of discarded refrigerators and freezers end up back on the grid.³⁸ DOE estimates, unfortunately tend to be outdated and optimistic. Most of the respondents return much lower percentages of used units to use. This indicates that many used appliances are likely sold privately and donated to charities. Based on this research, we estimate that municipalities, haulers, recyclers, and new dealers return no more than 25% of the units they collect to the grid. However, in-depth interviews, market actors consistently reported they thought that this happened at much lower levels in Massachusetts.

3.4.1 Municipalities

Units collected by municipal programs in Massachusetts do not appear to be returning to use, but a small number of municipalities may encourage residents to consider donating working units to charity. Every municipality interviewed reported that they intended all the units they collect for demanufacture. Expressing a common theme, one said that “*Once it comes into the gate, that’s it. It’s going to a grave. It’s not cradle to cradle; it’s cradle to grave, here.*”

Two municipalities identified liability concerns as a strong disincentive to putting units back into use. Two also emphasized that appliances collected by municipalities are generally not worth reselling or donating. One thought that residents utilized municipal programs only after they had “*exhausted other avenues,*” such as trying to sell or donate their appliance, because “*by the time they contact us, they know they’re going to pay*” to dispose of it, and people prefer to “*get rid of things for free, rather than paying.*”

³⁸ U.S. Department of Energy. “Refrigerator Market Profile 2009.” Updated 2009. http://www.energystar.gov/ia/partners/manuf_res/downloads/Refrigerator_Market_Profile_2009.pdf (accessed Jan. 4, 2011).

Respondents emphasized that the main function of a municipal program is to dispose of waste, not maximize revenue, giving them little incentive to expose themselves to any potential risk or effort from reselling appliances. As one respondent noted, *“Our main function is we’re a transfer station. We need to collect and transfer the materials. We’re not in the business to make money.”*

Two cities reported that they sometimes refer residents with working units to charities when they call to inquire about appliance disposal. One respondent noted that local charities, particularly those in large cities, were *“pretty aggressive about getting things that are still useable.”*

3.4.2 Haulers and Recyclers

Haulers and recyclers reported that they returned few units to use in Massachusetts, as seen in Table 3-8. Large haulers reported less than 2% returned to use in Massachusetts. The largest hauler interviewed (25,000 units processed annually) estimated 1% of its collected units end up back in use in Massachusetts, and that 5% to 7% was a typical rate of return to the grid among similar large haulers.

Table 3-8: Hauler and Recycler Estimates of Collected Appliances Returning to Use

| Type of Company | Destined for Scrap/Recycling | Sells for Reuse? | Donates to Charities? | Estimate of % Returning to Grid |
|-----------------|------------------------------|--------------------|-----------------------|---------------------------------|
| Junk Hauler | Yes | Plans to in future | -- | 0% ¹ |
| Junk Hauler | Yes | -- | Yes | 20-30% |
| Hauler/Recycler | Yes | -- | Yes | <2% |
| Hauler/Recycler | Yes | -- | -- | 0% |
| Hauler/Recycler | Yes | Yes | -- | 1% ² |
| Scrap dealer | Yes | -- | -- | 0% |
| Scrap dealer | Yes | -- | -- | 0% |
| Metal shredder | Yes | -- | -- | 0% |
| Metal shredder | Yes | -- | -- | 0% |

¹This respondent put none back on the grid currently, but hoped to in the future.

²This hauler reported few of its units end up back on the grid, though a used dealer reported that this hauler was one of the dealer’s main sources of inventory.

Junk haulers reported that, on average, 25% of units they picked up were working units they could resell or donate to charities (even if they did not currently do so), but they appear to make up a small percentage of the hauling market. The evaluation team found that 11% of units on Craigslist were posted by dealers – based on interviews, it seems plausible that some of these small haulers are selling units on Craigslist. One junk hauler reported it sent all appliances to scrap facilities, but wanted to obtain a storage facility where items could be stored and sold on Craigslist, because 25% of the units picked up were sellable. The other junk hauler reported donating all working units (20% to 30% of the collected appliances) to local charities and recycling the rest. This hauler would only donate working units that were not *“ancient”* because such units are *“very inefficient.”*

The three hauling/recycling companies reported that almost none of the units they collect return to use in Massachusetts. One hauler sold all units to scrap dealers (the doors and Freon had already been removed by that point). Another sent all units identified as working by their former owners to charities – 50% were sent to scrap yards, 50% were sent to charities, but only 2% of those ended up at charities in Massachusetts. The third, a large hauler that annually collects 25,000 units from major retailers throughout New England, screens units for resale but estimated only 3% end up back in use, and only 1% end up in use in Massachusetts; most are sold to dealers abroad (mainly Latin America), because they did not “*want to pollute the regional market for our retailers.*” This hauler estimated that similar companies typically return 5-7% back to use on the grid. Perhaps contradicting this hauler’s report, a used appliance dealer identified this hauler as one of its main inventory sources, and that the hauler owned a warehouse full of units available for resale.

The two scrap dealers reported that all the appliances they obtain are sold into the scrap market, and never sorted for reuse. Like the municipal respondents, one scrap dealer thought liability concerns about selling faulty units were too great, and that their value as used units was comparable to their value as scrap.

Metal shredders reported that they process all appliances they receive, and sort none for resale.

3.4.3 Dealers

As seen in Table 3-9, new appliance retailers estimated 25% or less of their haul-aways return to use. Used dealers screen units to avoid taking units they cannot sell, and estimated they resell 80% of collected units and scrap the 20% that their service departments cannot repair.

Table 3-9: Dealer Estimates of Collected Used Appliances Returning to Use

| Type of Company | New or Used Dealer | Estimate of % Returning to Grid |
|-----------------------------------|--------------------|---------------------------------|
| Major nationwide appliance dealer | New | Small percentage |
| Major nationwide appliance dealer | New | <25% ¹ |
| Local/regional dealer | New | 0% |
| Local/regional dealer | New & Used | Majority |
| Local/regional dealer | Used | 80% |
| Local/regional dealer | Used | 75-80% |

¹ According to this retailer’s main hauler, this figure is actually closer to 1%.

When new retailers collect haul-aways, all determinations about whether or not units end up back in use are made by the haulers and recyclers that purchase them, unless retailers require demanufacture (participants in the Environmental Protection Agency’s (EPA) Responsible Appliance Disposal (RAD) program, for example, require demanufacture).

One major new retailer thought only a very small percentage of its haul-aways ended up back in use, and the other major retailer thought no more than 25% of the units it collected ended up

back on the grid in Massachusetts, and expected the figure was actually lower.³⁹ Interestingly, the recycler that purchased most of this retailer's haul-aways was also interviewed, and that recycler reported that only 3% of these units would end up back in use at all, and only 1% would end up back in use in Massachusetts – most would be sold to dealers in Latin America.

The small new appliance retailer reported that it recycles all of the units it hauls away from customers. The dealer that sold new and used units reported that it repairs and resells broken units, unless the compressor is broken. Unsellable units would be “*junked*” and sold to a scrap dealer. This dealer reported that most used units received as haul-aways are broken, and customers would be “*silly*” to get rid of functioning units.

The two used dealers reported in in-depth interviews that 80% of the units they obtain are functioning or repairable, all of which end up back on the grid after they refurbish them. Used dealers reported to mystery shoppers that they refurbish used appliances before selling them (only one out of 34 mystery shopping respondents did not refurbish units). Refurbishing could entail cleaning or retouching, or repair or replacement of components, including relays, fans, thermostats, and switches, and some mystery shopping respondents even reported entirely rebuilding many of their refrigerators prior to selling them. Used dealers commonly have skilled service departments, allowing them to return a high percentage of units to use - twenty seven of the 34 mystery shopper respondents reported that they repair refrigerators prior to selling them.

In in-depth interviews, used dealers reported that the 20% of units that could not be repaired and sold were typically stripped for parts or valuable metals, and then sold or given to scrap dealers.

The used appliance dealers contacted by mystery shoppers reported a variety of destinations for unsellable units, all of which likely involved some degree of demanufacture. Twelve used dealers said that they send the unit to the dump; eight said that they recycle the unit; five said that they sell them for scrap metal, and one reporting giving them away. However, as discussed in section 3.6.2, regarding metal disposal and the scrap market, it seems clear that even in situations where the dealers reported these units go to the dump, they very likely end up in the hands of haulers who sell them into the scrap market.

3.5 Freon Processing

The Clean Air Act of 1990 and related EPA regulations⁴⁰ prohibit the intentional release of certain refrigerants into the atmosphere, and provide guidelines for proper evacuation and recycling of these refrigerants, because the CFCs and HCFCs they contain are harmful to the ozone layer and they are potent greenhouse gases. While the Program properly disposes of Freon in the appliances it collects, not all market actors do. Individuals sometimes cut refrigerant-

³⁹ This respondent also reported that these figures would be even lower in states where the retailer worked with various electric companies on programs that required disposal of picked up units, rather than allowing them to return to the grid, which is currently the case for this retailer in Massachusetts.

⁴⁰ U.S. E.P.A. “Complying with the Section 608 Refrigerant Recycling Rule.” 2010. <http://www.epa.gov/ozone/title6/608/608fact.html> (accessed Jan. 4, 2011).

containing lines in order to rip out copper components from the appliances, or to avoid having to pay to have Freon evacuation fees that are charged by municipalities, haulers, and recyclers. Most of the interviewed market actors properly evacuate Freon, but individuals, scavengers, and small companies with little regulatory oversight can easily find scrap dealers to purchase improperly purged white goods.

3.5.1 Municipalities

Municipalities reported properly evacuating Freon (they usually hire licensed contractors), and that they rarely receive units with illegally cut refrigerant lines.

In all cases, the municipalities reported that their contracts required that Freon-containing units were evacuated by licensed technicians. Four of the six municipalities reported that they hire contractors to purge Freon at the municipalities' facilities, and several use the same contractor. The other two municipalities reported that Freon was removed by their haulers or scrap dealers.⁴¹

Only one municipal respondent reported that a small number of people bring units to the transfer station after having illegally cut Freon lines. The respondent thought this was done to obtain copper or to avoid the fee charged for dropping off appliances containing Freon. The respondent described how such customers “*blatantly lie to you*” about letting Freon escape into the atmosphere, but fortunately these occurrences were “*few and far between.*” (Because it uses a Freon removal contractor, the municipality actually avoids evacuation fees if the lines have been illegally cut before the unit is brought to the transfer station.)

One municipality noted that residents often put unpurged units on the curb to be taken away with the trash, but the local compliance officer provides instructions on proper refrigerator recycling.

⁴¹ Only one respondent expressed interest in having the municipality evacuate Freon without the use of a contractor, but the expensive evacuation equipment and “*union issues*” made it cheaper to have a contractor do it.

3.5.2 Haulers and Recyclers

Haulers and recyclers reported a wide range of protocols for dealing with Freon, from implicitly encouraging customers to illegally cut refrigerant lines,⁴² to rigorous evacuation methods in keeping with EPA regulations, as seen in Table 3-10.

Table 3-10: Hauler and Recycler Freon Practices

| Type of Company | Accept Units with Freon Intact? | Freon Rules | Method of Freon Removal |
|-----------------|---------------------------------|-------------------------------------|---|
| Junk Hauler | No | Accepts purged units only | Illegally by customers |
| Hauler/Recycler | No | Accepts purged units only | Legally or illegally by customers |
| Scrap dealer | No | Accepts purged units only | Legally or illegally by customers |
| Metal shredder | No | Accepts purged units only | Legally or illegally by customers |
| Junk Hauler | Yes | N/A – only receives intact units | Off-site by third party contractor |
| Hauler/Recycler | Yes | N/A – only receives intact units | Onsite (company is licensed) |
| Hauler/Recycler | Yes | Accepts all units | Onsite (company is licensed), and legally or illegally by customers |
| Scrap dealer | Yes | Will not accept illegally cut lines | Onsite by third party contractor, and legally by customers |
| Metal shredder | Yes | Accepts all units | Onsite (company is licensed), and legally or illegally by customers |

Scrap dealers usually accept units with cut refrigerant lines because they cannot prove they were cut illegally or cannot tell if the person dropping off the appliance was the one who cut them. Only one respondent among the haulers and recyclers reported turning away units whose owners could not prove they had legally purged them. Most haulers and recyclers reported that they received few units that they thought were illegally purged.

The two junk haulers do not remove Freon. One gave units to a licensed recycling company, but the other demonstrated a serious environmental concern, particularly among smaller operations and scavengers with no regulatory oversight:

“I [tell] the customers that they have to remove [the refrigerant]. [Scrap yards] won’t accept it without [the lines] being cut. I won’t cut it because it’s illegal. I don’t ask how the customer actually gets it out of there, but I know the machines that take them out are quite costly, so I can’t do it on my end. So I just let the customer know that it has to be drained. I don’t want to know how they do it. I just can’t take it unless it’s drained. ... I know what everybody does. Everybody basically cuts them with a pair of pivot snips and lets it bleed out. But ... I don’t have the machine ... and I can’t get the company shut down, so I leave that on the customer’s end. [It’s] a bit of a don’t ask, don’t tell policy all around. They just have to be snipped so I can scrap them for the metal cash.”

Scavengers and haulers can easily find scrap yards that will buy appliances with illegally cut lines. Only one respondent, a scrap yard, does not accept units with improperly cut Freon lines (“I can’t sell that. It’s against the law, so we wouldn’t even consider it. We turn them away”). The

⁴² One junk hauler reported implicitly instructing customers to illegally cut Freon lines because the company was not licensed to purge them.

other scrap yard does not accept units with Freon intact. This respondent preferred working with “commercial companies” that bring in properly evacuated units, but if it was done illegally, the scrap dealer could not “*prove where or when that happened as long as it didn’t happen here. ... And if we don’t take it somebody else will.*”

Two of the three solid waste hauling/recycling companies were licensed Freon evacuators, and dealt with Freon according to EPA regulations. One reported it followed strict guidelines to ensure its academic and institutional clients were not affiliated with illegal activity, and while most units it received were properly evacuated and tagged, it still could not always verify that the units it received had been purged properly, and the other noted that it never receives units with Freon already purged, and always does the purging itself. The third was not a licensed evacuator, and referred customers to Freon removal technicians, but presumably customers do not have to follow their recommendations.

Of the two metal shredding facilities, one reported that all the appliances they receive have already been purged of Freon. The other receives white goods with and without Freon, and always charged for drop-offs in case they had to evacuate any Freon themselves (their licensed technicians sell the Freon to a Freon recovery company). This respondent estimated that only 2% of their intake had improperly cut lines.

Refrigerant lines seem to be cut illegally so as to avoid paying for Freon evacuation at scrap yards, or they are cut in the process of trying to cut out copper components from these appliances. Scavengers without regulatory oversight likely are a major source of improper Freon disposal, because even if they cut the lines themselves, they can find scrap yards that will still purchase the appliances.

3.5.3 Dealers

New appliance dealers with larger market shares seemed more concerned with proper Freon evacuation than smaller used appliance dealers.

New appliance dealers reported following EPA guidelines for Freon disposal, and major retailers specifically described stringent procedures for auditing their evacuation contractors. The two large new appliance dealers described stringent standards – vendors must track every unit until it is demanufactured, and vendors are audited by the retailers to ensure compliance. One retailer noted, “*We’re not required to do that. We do that because we want to make sure that they’re doing the right things. And truly, because it reflects on us. I don’t want to be on TV with Geraldo.*” The third new appliance retailer reported that the Freon was removed “*in accordance with law*” by their hauler, and a dealer of new and used appliances declined to describe how they dealt with Freon.

Used dealers reported that they remove Freon themselves. They may be doing so properly, but those interviewed did not seem as concerned about projecting an image of strictly following EPA regulations as the major retailers were. One said they used vacuum pumps and tanks to recover Freon so they could reuse it. This respondent reported receiving some units with the refrigerant

lines already cut, which is “*not great*” for the environment, but thought there was “*not much you can do about that.*” The other used dealer reported that its staff did not have a standardized process for Freon removal, but its scrap dealer would not accept units that were not already purged. This respondent said most of the units they received were already “*pretty much dead*” and the main reason refrigerators did not work was due to a lack of Freon, the (perhaps incorrect⁴³) implication being that cutting the lines would thus be less environmentally problematic.

3.6 Metal Disposal and the Scrap Metal Market

Metals from white goods taken out of service appear to find their way to metal shredders where they will be repurposed, rather than ending up in landfills. The Steel Recycling Institute estimates 90% of steel in appliances is recycled.⁴⁴ The waste ban on Freon-containing goods in Massachusetts makes it illegal to put refrigerators and freezers directly into landfills, and these units are valued by haulers, recyclers, and scavengers because the metal can be sold for scrap. Most respondents sell white goods as “light iron,” an unrefined scrap metal product that contains different types of metals and non-metal materials.

3.6.1 Municipalities

Municipalities often sell collected white goods to haulers and scrap dealers as light iron and use this income to offset the costs of their collection programs. Four municipalities reported being paid for the scrap value of their collected units. Of the remaining two municipalities, one pays haulers to remove appliances and receives no reimbursement for their scrap value,⁴⁵ and the other gives the units to scrap dealers, without compensation or charge.⁴⁶

All four municipal respondents that get paid for the scrap value of their appliances reported that the scrap market was volatile, and that prices were currently high (between \$150 and \$200 per metric ton of light iron at the time of the interviews). None of the municipalities altered their programs due to rising or falling scrap prices, though one did note that when prices were low it would sell metal to local rather than larger regional metal processing facilities, due to the expense of transport to larger facilities. Another respondent expressed a common theme among the municipalities, that “*in our mind, [the payment for scrap metal is] almost just like a little bonus. The goal is to get rid of them, and the fact that we get paid a little for it is helpful, but it’s*

⁴³ A hauler speculated that refrigerant lines were occasionally improperly cut because people thought that the Freon previously already had leaked out of the system because the units would not get cold. This assumption results in the release of the refrigerant into the atmosphere, but not due to criminal intent.

⁴⁴ Steel Recycling Institute. Press release: “2008 Overall Steel Recycling Rate Hits All-Time High.” Dec. 10, 2009. <http://www.recycle-steel.org/PDFs/SteelRecyclingRatesRelease.pdf> (accessed Jan. 12, 2011).

⁴⁵ This respondent noted that the municipality paid its haulers a flat fee for appliance removal, regardless of how many units were collected, providing some stability to the municipality’s budget.

⁴⁶ This municipal respondent seemed surprised by the idea that municipalities might ever be paid for the scrap metal value, because the respondent thought the appliances were not valuable to scrap dealers until they spend time and money on evacuating Freon from the units before it can be sold as scrap metal.

*not really the determining factor.*⁴⁷ Similarly, another town respondent noted that payment based on scrap value was helpful because municipal programs can be expensive, and “*between personnel and postage, your \$15 [fee] is way out the window.*”

3.6.2 Haulers and Recyclers

Haulers and recyclers reported that units not being resold for use are not land filled, but sold into domestic and international scrap markets, resulting in the eventual recycling of their metal components.

Junk haulers do not appear to dismantle appliances. If not destined for resale or charitable donation, units are commonly sold as scrap or dropped off at transfer stations. One junk hauler reported giving appliances to a recycling company licensed to evacuate Freon.⁴⁸ The other sells units to a scrap yard.

Three haulers reported selling appliances to scrap facilities, and only one, a large recycler with contracts with major retailers, reported that it separates out aluminum, copper, and compressors. One recycler noted that it does not hold materials to “play” the metals market, though doing so is common among similar companies.

The two scrap dealers reported that they crush, cube, or bale appliances (with other similar metals) after processing Freon, and sell them to larger metal shredders.

The two metal shredders interviewed use large machines to rip apart metal goods, and ferrous and nonferrous magnets and advanced sorting equipment (e.g. metal finders, x-ray technology, Eddy Current separators that separate a mixed bath of materials into layers of distinct materials, etc.) separate out various types of metals in light iron goods. These facilities shred metals into various sizes and sell them to domestic or foreign mills for recycling.

Haulers and recyclers noted that the scrap market is extremely volatile, and reported light iron prices between \$150 and \$200 per metric ton at the time of the interviews. Respondents noted that values were currently high, but many had seen much lower values, even to the point that metal collection was not profitable. Prices are higher for separated metals, but generally only metal shredders realize those prices. Metal processors send materials to domestic or international markets in accordance with demand, though none of the respondents reported they would stop metal collection in a slow market, though they might hold metals until prices rose.

3.6.3 Dealers

Dealers reported selling units to haulers, recyclers, and junk dealers, who often reimburse dealers for the value of the scrap metal in the appliances. One used dealer reported that only recently did scrap dealers start paying for the used appliances, due to high scrap metal prices.

⁴⁷ Another town similarly noted that it used to haul collected units to a scrap yard that would take the appliances without charging the town, and without paying the town any percentage of the scrap value, but it recently found out that there was a strong demand for scrap metal, and found a hauler that would pay for these materials.

⁴⁸ This recycler did not reimburse for scrap value, but it also did not charge the junk hauler for Freon removal.

In in-depth interviews, five of the six dealers reported that other than sometimes removing refrigerant, they disposed of used white goods as whole units, and did not separate out different metals, though this is likely not the case with many used dealers trying to maximize profits on broken units.

Noting that *“I do anything to make money,”* one used dealer reported that it dismantled units as much as possible to sort out valuable metals, and some scrap dealers *“don’t want the plastic or Styrofoam”* in these units. This dealer noted that separating out metals can be time consuming, but it helps compensate for the higher prices used dealers increasingly pay for inventory.

The used appliance dealers contacted by mystery shoppers reported a variety of destinations for unsellable units, all of which likely involved metals being sold into the scrap market. Twelve used dealers said that they send them to the dump, eight said they recycle them, five said that they sell them for scrap metal, and one reporting giving them away. However, based on the active role that haulers, recyclers, and scavengers play in the scrap metal market, it seems unlikely that many of these units actually end up in landfills.

3.7 Foam Insulation, Glass, Rubber & Plastics Disposal

The non-metallic components of refrigerators and freezers in Massachusetts appear to be ending up in landfills, rather than recycled. Of non-Program market actors, only metal shredders break down appliances enough to separate out the foam, glass, rubber, and plastics.

Both interviewed shredders confirmed⁴⁹ that after separating out metal components, the non-metallic materials – including the foam insulation – are ground up and sent to landfills where they are used as landfill cover, allowing CFCs and HCFCs in the foam to escape into the environment. One shredder said the technology exists to recycle these materials, as is done in Europe, but EPA regulations make such recycling cost prohibitive for recyclers.

One new appliance retailer enthusiastically praised electric company programs that used JACO and ARCA to dispose of foam in an environmentally beneficial manner: *“What ... a retailer does not do ... is take the foam out of the sidewalls out the refrigerator unless there’s a plant in the area that provides that service, and JACO and ARCA are the only ones building those plants. And the only time they build those plants is when they’re working with you [the electric companies]. ... That’s the biggest benefit you bring to the environment, is that you can actually have the funding to be able to drive a program that can afford to take the foam out.”*

⁴⁹ Many of the other respondents speculated that these materials ended up in landfills, but most were not sure where these materials went or how they were processed. Only two respondents other than the metal shredders (a municipality and a new appliance retailer) confidently knew where these materials would end up.

3.8 EPA’s Responsible Appliance Disposal (RAD) Program

The RAD Program is a voluntary partnership program begun in 2006 wherein utilities, retailers, local governments, manufacturers, universities, and other organizations agree to ensure that:

- Refrigerant is recovered and reclaimed or destroyed
- Foam is recovered and destroyed, or the blowing agent is recovered and reclaimed
- Metals, plastic, and glass are recycled
- PCBs, mercury, and used oil are recovered and properly disposed.

While the EPA’s RAD Program sets environmentally sound standards for demanufacturing appliances, it is a voluntary program for participating electric companies and retailers. Participating retailers can—and do—demanufacture some refrigerators and freezers according to RAD protocols, and resell others. Best Buy and Sears are the only Massachusetts retailers participating in the RAD program.

3.9 Scavengers

Municipalities, scrap dealers, and retailers reported that scavengers are an increasing source of competition for used appliances, particularly when scrap metal prices rise. The New York Times also recently reported on the prevalence of urban scavenging operations picking up curbside appliances before they could be processed by New York City’s recycling program.⁵⁰ Scavengers have little oversight and do not always properly dispose of Freon, but scrap dealers cannot always prove that the scavengers themselves illegally cut refrigerant lines.

In in-depth interviews, scrap dealers and used appliance dealers noted that they found few appliances on residents’ curbs because scavengers pick them up first. The city of Cambridge respondent posited that scavengers might be affecting the quantity of units picked up by the city’s recycling program, and described how the city’s public works staff “*constantly tell people*” that they can have the appliance recycling fee refunded if a scavenger picks up the appliance before the city’s haulers arrive. A new appliance retailer similarly reported that “*some guy comes around with a pickup truck while you’re sleeping*” to scavenge appliances on curbs, which “*is really bad too, because that guy has nobody controlling him.*” They appear to have very little oversight, and are likely not properly disposing of Freon in all cases, but they are still able to sell appliances to scrap dealers that cannot prove that the scavengers themselves illegally cut the refrigerant lines.

⁵⁰ Rashbaum, William K. “Big Appliances Put Out as Trash Are Vanishing, Puzzling the City.” *New York Times*. Dec. 14, 2010. <http://www.nytimes.com/2010/12/15/nyregion/15fridge.html> (accessed 12/30/2010).

Based on municipalities' reports, the units scavengers find set out for curbside pickup are often old or damaged with little value on the secondary market, indicating that scavengers are sending units to demanufacture by selling them as metal scrap, even if they are not properly disposing of Freon or recycling the other components.

4 The Residential Used Appliance Market

Craigslist has become an important marketplace for individuals who want to buy used refrigerators and freezers. Sellers can easily post free ads that reach a wide audience, the ads contain as much description and as many photos as a seller wishes, and the inventory of units is extensive. Used appliance dealers in comparison, reported low inventory, low sales, and expressed concern about falling profits.

4.1 Current Inventory

Used appliance dealers reported low inventory of used refrigerators and freezers, while the Craigslist market appears to be thriving, particularly in eastern Massachusetts.

4.1.1 Used Dealers' Inventory

In keeping with the findings of the in-depth interviews previously discussed in section 3.1.3, where used dealers reported low annual sales (each store reported annual sales in the low hundreds), the 34 used appliance dealers contacted through mystery shopping reported low inventory of used appliances, with only 4.3 units in stock on average. Table 4-1 summarizes these low inventories—only three dealers had 15 or more used refrigerators in stock.

Table 4-1: Current Inventory of Mystery Shopped Dealers

| Number of Units in Stock | Number of Used Dealers |
|---------------------------------|-------------------------------|
| <i>Sample Size</i> | 34 |
| 0 | 8 |
| 1-3 | 14 |
| 4-7 | 9 |
| 15 or more | 3 |

4.1.2 Craigslist Inventory

242 refrigerator and freezers ads were posted on Craigslist in Massachusetts in the one week period reviewed by the evaluation team, and 218 (90%) were unique ads. Table 4-2 shows the number of postings on Craigslist by date. Of the 17 that were duplicate postings,⁵¹ 12 were posted by unique owners, and five were posted by the same dealer. Out of the 218 unique postings, 89% were posted by individuals and 11% were posted by dealers.⁵² Neither of the dealers who provided their company names in their Craigslist ads were on the InfoUSA list, indicating little overlap between “brick and mortar” dealers and Craigslist dealers. Craigslist appears to have enabled a new breed of used appliance dealer, those who utilize online advertising to sell units they keep in storage, rather than in a traditional retail store front.

Table 4-2: Number of Postings per Day on Craigslist in MA

| Date | No. of Postings | No. of Unique Postings | Unique Postings % |
|--------------|-----------------|------------------------|-------------------|
| 10/30/10 | 32 | 31 | 97% |
| 10/31/10 | 35 | 35 | 100% |
| 11/1/10 | 50 | 46 | 92% |
| 11/2/10 | 29 | 25 | 86% |
| 11/3/10 | 31 | 25 | 81% |
| 11/4/10 | 29 | 28 | 97% |
| 11/5/10 | 36 | 28 | 78% |
| Total | 242 | 218 | 90% |

As shown in Table 4-3, 50% of the ads on Craigslist were located in Middlesex and Essex counties, and 75% were in eastern counties: Middlesex, Essex, Norfolk, Plymouth, and Suffolk.⁵³ Very little of the Craigslist inventory was in central and western Massachusetts.

Table 4-3: Number of Unique Craigslist Postings by County

| County | No. of Postings |
|--------------|-----------------|
| Middlesex | 72 |
| Essex | 39 |
| Norfolk | 22 |
| Plymouth | 18 |
| Suffolk | 14 |
| Worcester | 12 |
| Bristol | 7 |
| Barnstable | 4 |
| Unknown | 29 |
| Total | 218 |

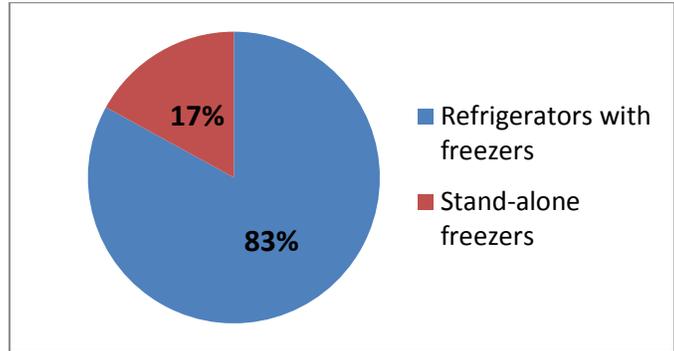
⁵¹ Some of these duplicate postings were posted multiple times.

⁵² Dealers could be identified based on whether or not they mentioned the name of their business or in-store pickup in the ad, the frequency of their postings, and the abundance of stock.

⁵³ Note that not all counties could be determined based upon limited information provided in the ad.

Of the 218 unique ads, only 17% were for stand-alone freezers (see Figure 4-1).

Figure 4-1: Relative Number of Refrigerator and Freezers Ads on Craigslist



As seen in Table 4-4, top-freezer units were the most common type of refrigerator for sale on Craigslist (48%), with side-by-side units close behind at 34%. French door refrigerators with a freezer drawer on the bottom are newer to the market and have less market share on Craigslist, making up only 10% of the refrigerator postings. The majority of freezers on Craigslist were upright, not chest freezers.

Table 4-4: Number of Unique Craigslist Postings by Type

| Type of Appliance | No. of Postings |
|----------------------------------|-----------------|
| Refrigerator with freezer | |
| Upright | 88 |
| Side-by-side | 62 |
| French door | 19 |
| No information | 13 |
| Freezer | |
| Upright | 26 |
| Chest | 10 |
| Total | 218 |

As seen in Table 4-5, of units posted on Craigslist, Kenmore units were most common (23%) followed by GE units (13%).

Table 4-5: Number of Craigslist Postings by Brand

| Brand | No. of Postings | Percent of Total |
|--------------------|-----------------|------------------|
| Kenmore | 50 | 23% |
| GE | 29 | 13% |
| Whirlpool | 24 | 11% |
| Frigidaire | 16 | 7% |
| Amana | 12 | 6% |
| KitchenAid | 12 | 6% |
| Maytag | 7 | 3% |
| Sub Zero | 5 | 2% |
| Other ² | 32 | 15% |
| Unreported | 31 | 14% |
| Total | 218 | 100% |

¹Unique postings only.

²There were less than five postings for each brand in this category.

Among ads that described the features of the units, the most commonly mentioned feature was a water and ice dispenser followed by stainless steel. One unit also boasted an LCD display. Among the appliances for which specific data were available, the average storage capacity was 21 cubic feet and the average age was 4.2 years.

The majority of ads on Craigslist (80%) stated that the advertised appliance worked well and did not have any problems.

4.2 Prices Charged for Used Appliances

The average price charged by used dealers is comparable to typical prices charged on Craigslist, but the upper range of prices on Craigslist is much higher than that reported by used dealers.

Mystery shopped dealers quoted an average refrigerator cost of \$280. The lowest price for a refrigerator reported by any of the dealers was \$175. The average lowest price quoted by dealers was just under \$200. The highest quoted price was \$700 (for stainless steel) with an average highest price of \$360.⁵⁴

Table 4-6 shows the distribution of prices for refrigerators and freezers on Craigslist. Among unique postings, 23% had an asking price of \$100 or less, 40% had a listed price between \$100 and \$300, 20% were between \$300 and \$600, and 15% were greater than \$600. The average price⁵⁵ was \$519, though 63% of units had an asking price of \$300 or lower. The highest price quoted by a dealer was \$700, while 10% of Craigslist ads were greater than \$1,000. Craigslist seems to be a common choice for individuals disposing of high-dollar appliances.

⁵⁴ The average lowest price and the average highest price was available for calculation since we asked each dealer to tell us their lowest selling price and their highest selling price in addition to the average cost of a unit.

⁵⁵ Not including advertisements with no asking price listed.

Table 4-6: Asking Prices on Craigslist⁵⁶

| Price Range | No. of Postings | Percent of Total |
|------------------------|-----------------|------------------|
| \$0-\$50 ⁵⁷ | 22 | 10% |
| \$51-\$100 | 29 | 13% |
| \$101-\$200 | 46 | 21% |
| \$201-\$300 | 41 | 19% |
| \$301-\$400 | 25 | 11% |
| \$401-\$600 | 19 | 9% |
| \$601-\$1,000 | 12 | 6% |
| \$1,001-\$2,000 | 8 | 4% |
| \$2,001 or more | 13 | 6% |
| Price not posted | 3 | 1% |
| Total | 218 | 100% |

4.3 Types of Units Sought Out by Used Dealers for Resale

In in-depth interviews, used dealers reported trying to obtain units that functioned and looked good—little else mattered. Inexpensive, basic, and aesthetically pleasing models sold well to their customers, and were thus highly desired by used dealers.

One used dealer sought out base model units without icemakers, because these sold quickly. These low end units were reportedly desired by landlords and other customers because they were inexpensive and more likely to be in good condition. High end units were used longer by their owners, thus arriving in worse condition. The other used dealer emphasized the need to obtain things that were “*as good looking as possible. ... The better it looks, the faster it sells.*” One used dealer also reported avoiding purchasing certain unreliable brands, or foreign models with less familiar brands. A retailer that sold new and used units thought that price was the most important factor for customers buying used appliances. A major new appliance retailer reported that its haulers tried to resell haul-aways that were less than five years old, ENERGY STAR, or stainless steel – typically units that were discarded due to home renovation, rather than malfunction.

⁵⁶ This is based on the 218 unique ads on craigslist. For duplicate postings, the first posting is recorded as the unique record and therefore the prices in this chart represent the price before it was dropped.

⁵⁷ There were six units posted as free and one post for \$1. (In some cases Craigslist posters puts up ads at \$1 with the intent of soliciting higher offers.) The next highest price was \$40.

4.4 Sales Trends Reported by Used Dealers

Based on research and interviews with market actors, we estimate that no more than 25% of appliances picked up by haulers and new appliance dealers are sold as used appliances by used dealers. Used dealers also reported that only 5% to 20% of their sales were purchased as secondary units.

During in-depth interviews, two used appliance dealers reported annual sales in the low hundreds. One reported selling 200 used refrigerators each year, but only two or three freezers because “*freezers are few and far between,*” difficult to obtain, and sell quickly. Neither respondent was optimistic about sales increasing in the future.

In in-depth interviews, used dealers seemed pessimistic about future sales and profitability, and reported it had become increasingly difficult in the past few years to obtain used appliances to sell. This was attributed to the poor economy, high scrap metal prices which encourage scrap dealers and scavengers to sell appliances into the scrap metal market, and appliance recycling programs.

One reported being unsure about how the used appliance market might change, but on several occasions mentioned the increasing difficulty of obtaining used units to sell. The other thought that “*realistically it might shrink,*” because retail prices of refrigerators are decreasing, lessening the price gap between new and used units. “*At this rate if we’re paying \$50 to \$75 per unit and then fixing them and reselling them, it becomes a much more difficult market for us to keep up with because then we have to raise the price that we’re charging the customer and it brings it closer to the price of a new refrigerator.*” The dealer described how this same phenomenon had rendered used air conditioners completely impossible to sell. A dealer of new and used units hypothesized that the used market could continue to grow if the economy continued to perform poorly.

When searching for used appliance dealers to mystery shop, the team found identified only a small number of used dealers in Massachusetts. The number of identified used dealers in Massachusetts is relatively small. Some used appliance dealers reported to mystery shoppers that they discontinued selling used refrigerators and freezers because of low availability from centralized suppliers.

4.5 Ages of Units and Age Limits

In in-depth interviews, used dealers reported that there were no set age limits among used appliance dealers, as long as the units did not look very old. These dealers sold units that were typically 5 to 10 years old, and none interviewed had age limits on units they were willing to sell, and one also reported that it would sell antique units to collectors. “*As long as it looks decent, even though it’s old, I’ll sell it cheap.*” Actual age was not of much importance, one dealer

reported in an in-depth interview: *“It’s just a matter of ... how old they appear to be, and how old the customer will perceive them to be.”*

Only two out of 34 used dealers contacted by mystery shoppers volunteered to mystery shoppers that they had age limits on the units they sell – 9.5 years old, on average. One such dealer told the mystery shopper that *“Any unit older than eight years we don’t fix because the lifespan of an appliance is only 12 to 14 years anyway.”* Another told a mystery shopper, *“If it’s 10 to 12 years old or not working at all, then it’s inefficient and not worth it.”*

The average age of units posted on Craigslist was 4.2 years.

4.6 Buyers of Used Refrigerators and Freezers

The two used dealers reported in in-depth interviews that their main clients were landlords and tenants (one estimated 75% to 80%) who had no interest in new appliances and just wanted inexpensive units that would only be used for a short period of time. Used dealers reported that landlords of inexpensive apartments do not want to spend money on nice appliances because they expect that renters will ruin them. The dealer that sold new and used units thought the main buyers were simply low-income people who could not afford new units.

4.7 Buyers’ Interest in Energy Efficiency

The three dealers that sold used units reported in in-depth interviews that their customers generally do not inquire about energy efficiency. One reported only five to ten percent asked about energy efficiency, and to these customers, the dealer provided an inaccurate assessment of the units’ efficiency, noting that *“as long as we know that ... the unit has possibly 134a [refrigerant] in it ... it’s going to be pretty much energy efficient.”* The other used dealer said *“you would think by this point in 2010 ... people would be a little more interested, but it’s a very rare customer who asks me if we have anything that’s ENERGY STAR or anything like that.”* This may reflect the fact that many of these customers are landlords who may not pay electric bills, or because low-income buyers are more concerned about initial price, not operating costs.

4.8 Used Units Purchased as Primary vs. Secondary Units

The three dealers that sold used refrigerators and freezers reported that most were purchased as primary units. One dealer estimated that 20% of its customers planned to use these appliances as secondary units, while the other two dealers thought only 5% were being sold as secondary units.

4.9 Buyer Behavior in Absence of Used Dealers

Used dealers speculated that if they did not exist, buyers looking for primary units would be forced to consider more expensive new units (a concern for low-income customers), while those looking for secondary units may not purchase them. However, based on the results of mystery

shopping and review of units for sale on Craigslist, it seems clear that buyers may turn to Craigslist as a major source of used appliances.

None of the used dealers mentioned Craigslist as a competitor for used appliance customers. One used dealer posited that customers would have no other option other than to buy new appliances if used dealerships did not operate, but noted that stores like Sears and Lowes now sell “scratch and dent” items on the retail sales floor at a discounted price. The other used dealer thought that without used appliance stores, most customers looking for a primary refrigerator would finance one at a big box store, resulting in a higher total price due to interest charges. This respondent thought customers looking for secondary units “*to keep the beer cold*” would not bother to purchase one if used dealers did not exist. A dealer of new and used units was concerned about what low income people would do without used appliance dealers, and noted that “*that’s one of the problems I have with the Program.*”

4.10 Delivery and Pickup of Units for Sale on Craigslist

Fifty-four unique postings specified the desired delivery method, and the majority (74%) of those ads specified that the unit needed to be picked up by the buyer and would not be delivered by the seller. This indicates that sellers are unable or unwilling to move the appliances themselves, which underscores the relative convenience of the Program, in that it removes appliances from customers’ homes, requiring almost no effort on the part of the customer. However, in light of the fact that sellers on Craigslist typically do not deliver their goods to buyers, individuals often post ads on Craigslist offering, for a fee, to pick up and deliver large goods being bought and sold by Craigslist users.

4.11 Warranties

Thirty out of 34 mystery shopped dealers offered warranties on their refrigerators. Most warranties were 30 or 90 days, though three dealers offered a six month warranty. Three respondents did not offer a warranty and one was not sure of the company’s policy. Of those who do offer a warranty, the average warranty period was 2.7 months.

While all dealers were asked by mystery shoppers approximately how long their refrigerators are expected to last, most were unable to give a definitive answer. Among those who did answer, the general response was a range of two to ten years.

Units purchased on Craigslist are typically purchased “as-is,” unless from a dealer that indicates otherwise.

4.12 Follow-up Calls with Craigslist Sellers—Successful and Unsuccessful Sales on Craigslist

After an ad had been posted on Craigslist for three weeks, the team called sellers who provided phone numbers in their ads (83 of the 218 unique postings), to ask whether or not they had sold

the advertised appliances. Interviewers spoke with 30 such Craigslist sellers. Of these 30 sellers, 17 had sold their appliances (five were freezers), while 13 had not yet sold their appliances (two were freezers), and most of those planned to repost them on Craigslist.

All of the sellers who had not sold their units after three weeks were individual owners. Of the 17 respondents who had sold their appliances, 12 were individual owners; the remaining five units were sold by the same dealer.

As shown in Table 4-7, of the 13 respondents who had not sold their appliance, one had their unit stolen, one donated it to the Salvation Army, and only one had recycled it. No others mentioned the possibility of recycling their appliance. The other 10 still possessed the appliances. Of those, eight planned to repost it on Craigslist, one planned to leave the unit behind when he moved, and one was unsure what to do with it. When asked whether or not they would lower the price on a future Craigslist posting, two said no, two said yes, and one said he would raise the price as that tactic has worked well in the past to drive sales.

Table 4-7: Craigslist Sellers Who Did Not Sell Their Unit

| Unique Ad | Do you still have it? | If yes, what will you do with it? | If repost, will you lower the price? |
|-----------|-----------------------|-----------------------------------|--------------------------------------|
| 1 | No, it was stolen | n/a | n/a |
| 2 | No, recycled it | n/a | n/a |
| 3 | No, donated it | n/a | n/a |
| 4 | Yes | Leave behind | n/a |
| 5 | Yes | Don't know | Don't know |
| 6 | Yes | Repost | Don't know |
| 7 | Yes | Repost | Don't know |
| 8 | Yes | Repost | Don't know |
| 9 | Yes | Repost | No |
| 10 | Yes | Repost | No |
| 11 | Yes | Repost | Yes |
| 12 | Yes | Repost | Yes |
| 13 | Yes | Repost | Will raise price |

Among the 17 who sold their refrigerator or freezer (Table 4-8), two declined to answer questions beyond whether or not it was sold. Out of the 15 applicable calls, 12 said they did not have to lower their price to sell the unit and three said they did. Of the three respondents who lowered their asking price, two posted their ad only once but sold it for \$150 less than asking price, and one posted their ad four times and only lowered the price by \$50 before it sold.⁵⁸

Table 4-8: Craigslist Sellers Who Did Sell Their Unit

| Unique Ad | Did you have to lower the price of your unit? | How many times did you repost your ad? | By how much did you lower the final price? |
|-----------|---|--|--|
| 1 | NA | NA | NA |
| 2 | NA | NA | NA |
| 3 | No | NA | NA |
| 4 | No | NA | NA |
| 5 | No | NA | NA |
| 6 | No | NA | NA |
| 7 | No | NA | NA |
| 8 | No | NA | NA |
| 9 | No | NA | NA |
| 10 | No | NA | NA |
| 11 | No | NA | NA |
| 12 | No | NA | NA |
| 13 | No | NA | NA |
| 14 | No | NA | NA |
| 15 | Yes | 1 | \$150 |
| 16 | Yes | 1 | \$150 |
| 17 | Yes | 4 | \$50 |

⁵⁸ Note: since many ads are posted on Craigslist each day, it is not uncommon for people to repost their ad every few days so potential buyers are able to spot the ad easily at the top of the list. Ads are seen chronologically with the newest ad at the top of the list.

5 Awareness of the Program and Its Effects on the Secondary Market

Awareness of the Program among market actors appears to be low. Municipalities and hauling/recycling companies were generally unaware of the Program, while retailers were aware of it or similar programs in other states.

5.1 Municipalities

None of the six municipal respondents were knowledgeable about the Program, and they did not think their residents were, either. Two had no awareness of the Program, and the other four expressed that they might have heard of it, but had no real knowledge of it. Most were, however, aware of other ENERGY STAR incentive programs. One respondent noted:

“I haven’t heard of that before, and I would bet that’s true for a lot of people in our town. ... I would think that being in the business we’re in, we would have heard something about it. Why would [residents] call us and pay, ... and have to haul it to the curb, ... if you would come and take it out of their cellar for free? So I don’t think it’s very well known.”

All six municipalities reported steady appliance disposal rates, and they reported that they thought the Program was not influencing how residents were disposing of appliances because awareness of the Program was low. One respondent also commented that affluent customers were unlikely to participate in the Program because they could afford a secondary unit, and low-income customers did not participate due to lack of education.

Municipal respondents suggested they could increase awareness of the Program by marketing it to their residents. Suggestions included promoting the Program directly to residents, advertising it on their websites, social networking pages, and in their mailings.

Municipalities reported using multiple strategies to inform residents about their own appliance disposal programs, including online marketing, mailers, press releases, brochures and flyers in their offices or at transfer stations, and several noted that consumers discover these programs through word of mouth or call the municipality directly. All of the interviewed municipalities provide details about their white goods programs on their websites. One city reported that it does not advertise its program as much as it used to, because of the expense of advertising. Another respondent noted that residents often put refrigerators on the curb as trash, but the local compliance officer then informs the resident of the Massachusetts waste bans and provides instructions on proper refrigerator recycling. This respondent reported that the waste ban itself is thus an effective marketing tool for their municipal program, because *“the trash guys just won’t take them in the trash.”*

5.2 Haulers and Recyclers

Of the nine haulers and recyclers interviewed, only one was knowledgeable about the Program, and only two others had heard of it.

Most of these respondents reported the Program would have minimal, if any, impact on their businesses, because hauling refrigerators was a small percentage of their overall business and most of their appliances did not come directly from residential customers. Two metal shredders thought the program would positively impact their business by increasing the amount of scrap metal on the market. Two recyclers (including a JACO competitor) viewed the Program favorably because it encouraged responsible recycling of inefficient units.

As they were relatively unfamiliar with the program, most of these respondents were unsure about the effect this program might be having on the secondary appliance market. Several of these haulers and recyclers thought the program would result in a net decrease in secondary appliance usage in Massachusetts, but multiple respondents also noted that as attractive as the \$50 incentive may be, it still may not be enough for those customers that want the convenience of a secondary unit. One major recycler thought that *“in the long run, the net impact [of the Program] is probably reducing the number of secondary [units],”* and while consumers were *“motivated”* to be more environmentally friendly, *“I think that if they have an uncle who's a hunter and shows up with 150 pounds of venison every fall, they're still going to have a freezer, it just may be a newer one and more efficient.”*

Several respondents did think that that the Program would have a strong effect on the secondary appliance market because of how much more attractive this incentive was than the other options available to consumers from haulers, municipalities, or retailers, who would typically charge consumers for the haul-away service. One scrap dealer with this view said, *“If I was a consumer and I wanted to get rid of a refrigerator and they were offering \$50, I'd take it all day long as opposed to bringing it to a scrap yard where you might get \$10 for it.”*

5.3 Dealers

Four of the six appliance dealers were aware of the Program. The two major retailers were not aware of the Massachusetts program, but were familiar with similar programs elsewhere in the country.

The two used appliance dealers indicated the Program might be negatively affecting their business by removing potential inventory from the market. One reported that customers used to bring in units to avoid hauler or municipal program fees, but that has become rare due to the Program and increasing numbers of scavengers who intercept units before dealers can get them. The other used dealer thought landlords and tenants would always serve as a strong customer base, even while acknowledging that the Program made it more difficult to obtain appliances. This dealer said that customers use the Program as a negotiating tool to convince the dealer to pay \$50 for their old unit (the dealer would not).

One retailer that sold primarily new but some used units reported the Program did not seem to be hurting sales, but expressed an extremely unfavorable opinion of the program, due to its perceived effects on low income households, as *“taking them off the market is hurting the poorer people who can’t afford new.”*

6 Collaboration with Sponsors

Respondents of all types were eager to participate in the Program, whether by promoting the Program to their customers, or assisting with program implementation.

6.1 Municipalities

All six municipalities expressed interest in collaborating with the Sponsors to participate in or promote the Program. Suggested means of collaboration included promoting the Program to residents, advertising it on their websites, social networking pages, and in their mailings, providing storage space for collected units, or participating in the hauling and rebate process. One municipality noted that increasing awareness of the program “*would be fantastic to residents, [and] it might eliminate some of the volumes that we pick up,*” and also noted that if residents “*have the opportunity to get a rebate, I don’t think most people even know where to begin or how to start the process, including a lot of us in the administration here.*”

6.2 Haulers & Recyclers

Of the nine haulers and recyclers interviewed, all but one⁵⁹ expressed interest in collaborating with the Sponsors by providing pickup services, storage space, refrigerant evacuation, or metal processing and shredding. Even a junk hauler who competes with the program for used appliances was willing to refer customers to the Program if that meant lifting fewer refrigerators.

6.3 Dealers

The two major new appliance retailers were eager to collaborate with the Sponsors, and reported that they have partnerships with utilities in other states that have seen increased recycling rates for secondary units (5% to 7%, by one retailer’s estimates). This respondent noted that the energy savings from these programs are “*huge. ... I think this is probably the most effective, most impressive thing that we’re doing in the country today in the appliance business, is the utility programs. They’re dynamite.*” Retailers suggested they could provide in-store program promotion, hauling services, and guaranteed appliance demanufacture, in exchange for a portion of the incentive to offset operating costs.⁶⁰ Another suggested that it could perform pickups from customers’ homes in addition to, or instead of JACO, and JACO could pick up units already consolidated at central locations operated by retailers. One small retailer already promotes the Program, as that lessens the number of free haul-aways the retailer would otherwise do, and this retailer thought brochures about the program would be helpful to provide to customers.

⁵⁹ This respondent preferred working with businesses rather than residential customers.

⁶⁰ Presumably for customer convenience, one retailer did note that it could not support a program that would “send a separate truck to retrieve a refrigerator from a customer’s home on a different day as when their newly purchased unit is delivered.”

7 Conclusions and Recommendations

This report reviewed the current state of the appliance recycling and disposal market and the used appliance market in Massachusetts to better understand the environments in which the Program operates.

The findings summarized above suggest that the Program offers an attractive financial incentive to customers with secondary appliances. The Program is also far more convenient than most traditional options for disposing of a secondary appliance in Massachusetts. Selling units on Craigslist, however, does appear to be a significant competitor for used appliances.

The following are recommendations resulting from the review of the disposal and used appliance markets.

Increase Program marketing efforts to residents. Municipal programs seem to be quite successful—up to 2% of households may remove units through these programs. However, most municipal programs are fee-based and burdensome, requiring door removal, moving an appliance to the curb, etc. In addition, hauling companies typically charge for appliance removal, and those that pay based on scrap value pay less than the Program. These barriers may encourage some consumers to keep their secondary appliances, and marketing the Program to residents faced with these barriers might allow the Sponsors to collect additional units that would not otherwise be removed from the grid.

Market the Program to those less likely to use Craigslist, including the elderly and customers in central and western Massachusetts. The elderly use Craigslist less than younger customers, and the Craigslist market appears significantly less active in central and western parts of the state. Without Craigslist as a practical option for getting rid of their secondary appliances, customers may keep them in use, particularly if their municipal programs are burdensome.

Consider increasing marketing efforts outside of urban areas and targeting residents of towns without municipal recycling programs. Residents in less densely populated areas may be more likely to have secondary appliances than their counterparts in cities. Also, some towns do not have municipal appliance recycling programs at all, making the Program particularly attractive to these residents.

Sponsors should consider reaching out to Craigslist sellers. The average listing price on Craigslist was \$230 more than the Program's incentive. However, 10% of units were \$50 or less, and 23% percent were \$100 or less, and six postings offered their refrigerator for free. Although those with high-value refrigerators may not be dissuaded from selling them on Craigslist, sellers with low-priced units may prefer the ease and environmental benefits of the Program.

Consider partnering with municipalities to promote the Program, and discourage charitable donation of working units. Sponsors could consider allowing residents to recycle their appliance, and donate the \$50 incentive to a charity of their choice, rather than donating the inefficient

appliance. This would prevent customers from thinking that the Sponsors are trying to reduce charitable donations.

Consider partnering with major retailers to market and implement the Program. Major retailers could promote the Program in their stores to customers who may be making a decision to keep or discard of an existing unit

- Major retailers already work with electric companies, JACO, and ARCA in other states to implement similar programs – one reported a 5% to 7% increase in program participation due to the retail partnership.
- With less than half of major retailers’ customers using their haul-away services, it seems likely that significant numbers of appliances are remaining in use as secondary units.
- Retailers’ sales staff can screen for functioning secondary appliance ownership before discussing the Program, so as to discourage misrepresentation of primary units as secondary units. This is a particularly important part of discouraging free-ridership, and it may be happening in some cases – one appliance retailer reported that it encourages customers to use the Program to haul-away units being replaced with new units.
- Major retailers pick up many of the used appliances being discarded in Massachusetts through their haul-away programs. Retailers usually sell these appliances to haulers and recyclers who then sell the appliances into the used appliance market or the scrap metal market. If the Sponsors partner with major retailers, they could require that units picked up by the retailer are fully demanufactured, rather than being resold by haulers.
- Retailers may be willing to partner with the Sponsors as some retailers already offer hauling services to customers who do not otherwise purchase new appliances and to other dealers. This may be profitable for retailers – they charge for the service, sell the units for scrap, more fully utilize delivery trucks already driving through neighborhoods, and increase their “green” reputation.

Sponsors may also have several opportunities to claim non-energy environmental benefits from the Program.

- *Reduction of ozone layer damage and decreased greenhouse gases through proper destruction of foam insulation.* The foam in refrigerators often contains CFCs and HCFCs, potent greenhouse gases that contribute to climate change and damage the ozone layer. These can be released into the environment if the foam is not properly destroyed, typically through high temperature incineration. Electric companies participating in the EPA’s RAD program report capturing 1.0 lb. of harmful chemicals from each properly recycled refrigerator or freezer – more than twice as much as is captured from the refrigerant.⁶¹ Respondents also indicated that this foam is not properly destroyed outside

⁶¹ U.S. Environmental Protection Agency. “Responsible Appliance Disposal Program 2009 Annual Report.” August 2010. http://www.epa.gov/ozone/partnerships/rad/downloads/RAD_2009_Annual_Report.pdf (accessed Jan. 9, 2010).

of programs like that of the Sponsors. The Program provides a clear environmental benefit here not being otherwise offered in the market.

- *Reduction of ozone layer damage and decreased greenhouse gases through proper recycling of refrigerants.* Refrigerants, like foam, contain CFCs and HCFCs. According to the program records collected by JACO, Sponsors successfully captured nine ounces of refrigerant per refrigerator or freezer. Because the Program picks up used units from inside customers' homes, the Sponsors minimize the ability of scavengers with no regulatory oversight to poach units off curbs before municipal programs can pick them up, thereby ensuring proper refrigerant recycling.
- *Recycling of non-hazardous materials.* Respondents, including metal shredders – the companies directly involved in dismantling appliances and other metal goods into their respective materials – consistently reported that non-metal, non-hazardous materials in demanufactured appliances end up in landfills, rather than being recycled. The Sponsors can quantify the amount of such materials recycled to calculate amounts of materials diverted from landfills and corresponding CO₂ reductions from reduced demand for virgin materials.
- *Fuel savings from retail partnerships.* Sponsors could partner with major retailers not just to increase participation rates, but also to save fuel. One retailer suggested that the Sponsors allow retailers to provide haul-away services under the Program, rather than using only JACO for this purpose, because then JACO could “*come to me and pick them up at one place instead of having to drive to the same 50 places I already drove by.*” This trip consolidation would result in decreased fossil fuel consumption.