



# Study on the Operations and Effectiveness of the Major Appliance Collection and Recycling System in British Columbia

For the **Major Appliance Recycling Roundtable**

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## EXECUTIVE SUMMARY

### **Background**

Major household appliances are regulated under British Columbia's Recycling Regulation, under which "Producers" of the regulated products (i.e. manufacturers, retailers & first importers) are obligated to develop, implement and operate a product stewardship program that manages the recycling of the regulated products at their end-of-life.

The Association of Home Appliance Manufacturers (Canada) (AHAM Canada) and the Retail Council of Canada (RCC) developed a stewardship plan for major residential appliances and received the approval of the British Columbia Ministry of Environment on June 29, 2012. To manage the implementation and operation of the stewardship plan, AHAM Canada and RCC incorporated a not-for-profit stewardship agency known as the Major Appliance Recycling Roundtable (MARR) which is governed by a Board of Directors comprised of major appliance manufacturers and retailers. Product Care Association has been contracted by MARR to manage the MARR stewardship program in British Columbia (BC).

The MARR stewardship program includes major household appliances ('major appliances') powered either by 120 volt or 240 volt input power that have been designed for use in residential homes, including those that use natural gas or propane for heating purposes. Appliances used in or sold for industrial, commercial and/or institutional (IC&I) applications that have the same essential design characteristics as major household appliances, as defined above, are also included.

Major appliances in the MARR program include the following 17 categories:

1. Full-size Refrigerators, Wine Coolers and Beverage Centres
2. Compact Refrigerators, Wine Coolers and Beverage Centres
3. Freezers
4. Room Air Conditioners
5. Portable Air Conditioners
6. Dehumidifiers
7. Clothes Washers
8. Clothes Dryers
9. Ranges
10. Range Hoods and Downdrafts
11. Built-in Ovens
12. Built-in and Over the Range Microwave Ovens
13. Surface Cooking Units
14. Dishwashers
15. Food Waste Disposers
16. Trash Compactors
17. Electric Water Dispensers

The MARR plan is focused on enhancing the performance and transparency of the existing market-driven system of collecting and recycling major household appliances in BC. This aspect of the program makes the MARR plan for the recycling of major household appliances unique in BC. The focus of the MARR plan is on the improvement of the existing market-driven collection, transportation and recycling system and includes a commitment to conduct a study on the operation and performance of this existing recycling system. This study was commissioned in the fall of 2013 and this report provides the results of that study.

The existing major appliance recycling system has been operating in BC for decades, collecting and recycling major appliances. The major appliances are collected by a variety of collectors, including retailers, local governments, utilities and private companies who channel those products through to processors. Once there, the appliances, along with other forms of scrap metal, are processed to recover and recycle metal components which are sold to end markets such as steel mills.

Objectives of the study were to:

1. Identify the parties involved in collecting major appliances in BC;
2. Define the specific operating characteristics and material flows within the BC system;
3. Summarize the processing practices and technologies used within the system;
4. Quantify the overall collection and diversion performance of the existing system; and
5. Determine how often and at what levels fees are charged to end users for collection.

The study involved extensive surveying and interviews of stakeholders involved in major appliance collection and recycling, including:

1. A survey of 125 retailers of major appliances and in-depth interviews with 22 retailers;
2. Interviews with all Regional Districts involved in solid waste management and all 22 municipalities that offer their own major appliance collection service;
3. Interviews with 99 private collection sites, 5 peddlers and 4 refurbishing companies;
4. Interviews with the two utility bounty programs for refrigerators run by the two main electric utilities in BC;
5. Interviews with 17 property managers and property management associations to identify practices at multi-family buildings;
6. Interviews with 4 processors; and
7. Interviews with industry leaders in the scrap metal field (including the Canadian Association of Recycling Industries, the Automotive Recyclers Environmental Association and brokers).

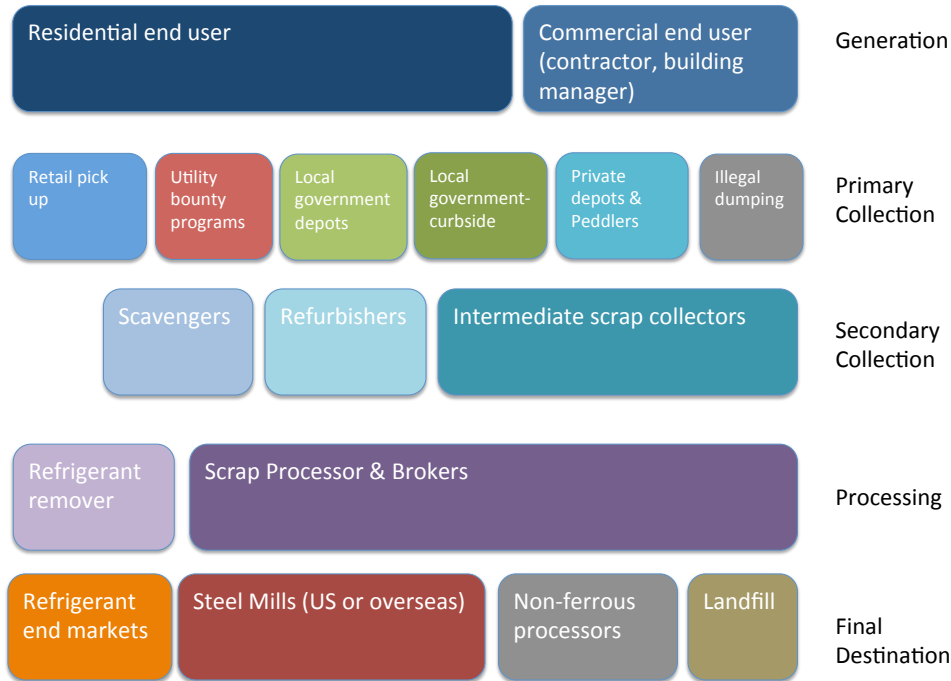
### **Chain of Custody**

The infrastructure for managing end-of-life major appliances in BC consists of a number of different inter-related players:

- Major appliance owners (residential and commercial owners of household appliances);
- Collectors and collection sites (local government, private sites, retailers, not-for-profit, etc.);
- Some curbside and household level collection services; and
- Processing sites and end markets.

In general, major appliances at end-of-life flow down through the levels of various organizations shown in Figure ES-1 but not every appliance will flow through each level as some may follow a more direct path to the processor and some may flow through multiple parties on one level.

Figure ES-1: Chain of Custody for End-of-Life Major Appliances in BC

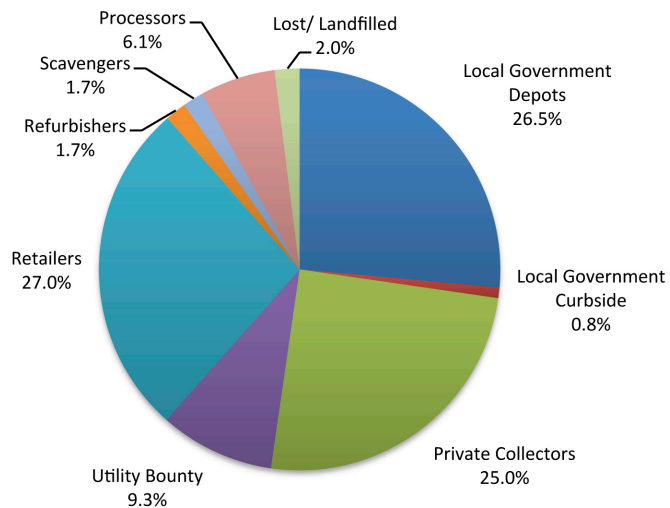


**Collection of Major Appliances**

Collection services, in the form of drop off sites and pick up services, are provided by a range of collectors including governments, private companies and not-for-profit organizations.

Figure ES-2 shows both forms of collection services (drop off and pick up services) and allocates the proportion of appliances received from generators to each type of collector. About 78% of all major appliances are collected by three players: retailers (27%), local governments (27%) and private collectors (25%).

Figure ES-2 Collectors of Major Appliances by Share Collected



**Collection Site Accessibility and Fees**

A Geographic Information System analysis of the collection sites in BC that accept all categories of major appliances showed that 98.5% of the BC population have access to a drop off location within the driving times set by the Stewardship Agencies of BC (30 minutes for urban communities and 45 minutes for rural communities). When the accessibility to only free drop off locations was analysed, 93.6% of the BC population was found to have access to collection sites for all major appliances that charge no fees for drop off, as shown in Table ES-1.

**Table ES-1: Accessibility Analysis Results for Entire BC Population and for Communities of Over 4,000 People**

Facility Category	Number of Collection Sites	Whole BC Population		SABC Standard (communities with a population over 4,000)	
		Population Covered	Percent Covered	Population Covered	Percent Covered
No Fee to Drop Off	110	4,119,076	93.6%	3,874,178	97.0%
All Sites	251	4,334,380	98.5%	3,979,391	99.6%

Across BC there are 305 identified sites where consumers can drop off some or all major appliance products for recycling. Of these:

- 186 (61%) are local government sites (both regional district and municipal);
- 102 (33%) are private and not-for-profit collectors; and
- 17 (6%) are processing companies.

Many private collection sites will pay the consumer for the major appliances they receive. The amount paid will generally depend on market prices for ferrous metal.

In addition to drop off accessibility, pick up services are also available to most generators in BC. Pick up services collect from the generator rather than requiring the generator to transport the appliance to a drop off location, and are offered by a number of stakeholders:

- 84% of retailers surveyed offered take-back services when a new appliance is delivered;
- 14 local BC governments offer either a pick-up day or curbside service on demand;
- Bounty programs offered by BC Hydro and Fortis BC provide a rebate to consumers; and
- Most tenant-occupied multi-family buildings provide removal of an old appliance at end-of-life.

The application of fees to drop off major appliances varies significantly between collectors, but generally it is more likely that a local government collection site will charge a fee than a private site, and sites will either charge for all appliances, or for only refrigerant-containing appliances.

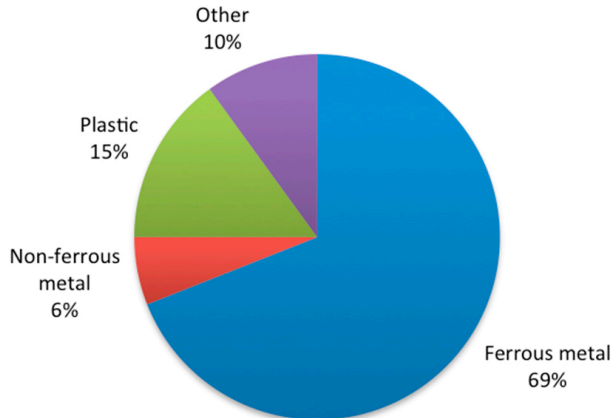
For sites that do charge fees to drop off, the fees charged ranged significantly from site to site between:

- \$5 to \$30 on a per unit basis; and
- \$10 to \$73 per tonne on a weight basis.

### **Composition of Appliances**

The study estimates that the composition of the average major household appliance reaching end-of-life in 2012 is 69% ferrous metal, 6% non-ferrous metal and the remainder comprised of plastic and other materials (see Figure ES-3). Composition varies by appliance, and some appliances such as freezers and clothes dryers have a very high ferrous metal content, whereas other appliances such as refrigerators have a relatively low ferrous metal content.

**Figure ES-3: Composition of Appliances Available to Collect by Weight**



### **Processing & End Markets**

The study looked at the systems and procedures for decommissioning major appliances. Decommissioning is the process for removing substances of concern and preparing the major appliances for processing. The study also examined the prevalence of removing valuable materials or parts prior to transporting the collected appliances. In general, refrigerant is extracted responsibly but there remain some gaps. Though the occurrence of some substances of concern in major appliances is very low, very few collectors or processors are aware of other substances of concern (e.g. mercury switches) or have a system to screen and remove them.

Almost all appliances in BC flow to two Lower Mainland-based metal shredders. The shredding process separates the scrap metal into ferrous metal, non-ferrous metals and residue. There is a 98% recovery of metals for recycling in the shredding process. The residue, composed of plastic, insulation, rubber and other non-metal components, is landfilled.

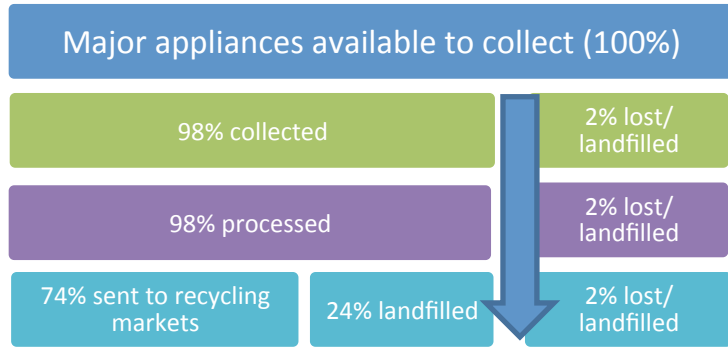
At present, ferrous metal material is generally transported by sea to Asian markets directly or via Washington State. Non-ferrous metal is generally transported via truck or rail into the North American market.

**System Performance**

To evaluate the system performance, a Lifespan Model was developed using historical sales data for each type of major appliance. The model output indicates that there were 594,000 units (36,248 tonnes) available to collect in 2012, the reference year for the study.

Using the information obtained from the surveys and interviews of collectors of major appliances, 35,699 tonnes are estimated to have been collected in 2012.

**Figure ES-4 Flow of Discarded Major Appliances in BC**



This represents a 98% capture rate, which is the amount collected in a given year divided by the amount available to collect in that same year. The remaining 2% of major appliances were estimated to have been illegally dumped or landfilled.

The collected appliances are processed into recyclable (75% of the weight of the appliances) and non-recyclable fractions (25% of the weight of the appliances). To establish the recycling rate, the amount of

materials recycled was divided by the amount of materials available to collect. Consequently, an estimated 26,775 tonnes, or 74% of the total weight of all major appliances available to collect in 2012 was ultimately recycled.

This value is also representative of the weight of major appliances recycled in 2013 as there were no significant changes in historic sales in the relevant years or collection habits over this short period of time that would greatly impact the recycling rate.