# Baselining Generation, Disposal and Diversion of Packaging & Printed Paper and Beverage Containers in the Industrial, Commercial and Institutional Sector Research Report

Phase 2 March 2024
Prepared for
Environment & Climate Change Canada (ECCC)

Report prepared by Circular Innovation Council



*continued...*

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## 1. EXECUTIVE SUMMARY

Circular Innovation Council (CIC) has been commissioned to baseline the current generation, diversion and disposal performance for targeted packaging and printed paper (PPP) and beverage containers in the Industrial, Commercial, and Institutional (IC&I) sectors in Canada. The initial scope of this research focuses solely within the Province of Ontario with the intention to expand into other Provincial and Territorial jurisdictions in Canada in the next Phase.

The research was divided into two separate phases: Phase 1 (complete) analyzed existing data sets and information from CIC's 3RCertified Program submissions and corresponding audit reports. Additionally, the initial report provided information specifically on PPP and beverage container collection, recycling, and disposal activities as distinct categories and to the extent possible, subdivided into material specific sub-categories. CIC also leveraged existing relationships and partnerships to identify and expand on the data sets gathered from other audited and verified reports. This additional data was gathered from independent auditing firms that CIC that have taken CIC's Waste Auditor Training Program and follow the processes and practices from the waste audit training program when collecting and analysing data.

Phase 2 expands the data collection activities to a broader list of IC&I sources following the subsector categories outlined in the Ontario Regulation 347 (educational institutions, office buildings, retail shopping complex) as well as additional subsectors that ECCC requested to be included in the study (e.g. travel plaza, gas stations with convenience stores, entertainment venues). The data was collected by subsector; source, including recycling and disposal data as well as final disposition by material type. The material category list, located in Section 2, was developed in cooperation with ECCC.

The data collected is specific to the categories of regulated PPP and beverage (non alcohol) containers as defined through the packaging regulation under Ontario's Resource Recovery and Circular Economy Act (RRCEA). Plastic beverage containers collected were further sorted by brand and reported in Section 5 as part of the overall conclusions. Materials identified in the audit samples including organics, alcoholic beverage containers, wood, and general waste were not included in the total waste generated as they are not part of the scope of this study.

During Phase 2, CIC conducted 15 audits in various locations and subsector types that had been identified as a priority by ECCC and were conducted between July 2023 and March 2024. The data sets provided were collected and verified by trained auditors that have completed CIC's Waste Auditor Training Course and use the Standard Waste Audit Method (SWAM) (Appendix B) when collecting and reporting data. The data scope included total materials generated, and the separate amounts recycled and disposed. During this phase of the research, CIC collected all PPP

and included six main single-use plastic items as specific category data points (i.e. check out bags, cutlery, foodservice ware, ring carriers, stir sticks and straws.)

The audit included a questionnaire which asked participants for facility description, internal and external material handling practices. Auditees were also asked to evaluate their waste service provider's documentation and communication initiatives that support their waste reduction programs.

The summary of the total generation and collection of recycling and disposal (*Table 1*) provides aggregated weights by kilograms for each PPP category (including beverage containers) audited and according to each IC&I subsector types (e.g., post-secondary education institutions, entertainment venues, travel plaza, gas stations with convenience stores, office buildings and retail shopping complex). The average diversion performance rate from the 15 audit sites was 81 percent. However, the performance of each sub-sector ranged significantly: post-secondary education institutions 43 percent; entertainment venues 11 percent; travel plazas 34 percent; gas stations with convenience stores 2 percent, office buildings 82 percent; and retail shopping complex 87 percent.

The Continuous Improvement Fund created a monthly Price Sheet starting in 2013, reporting on a blend of municipal spot market prices for Ontario-based municipalities. It detailed current prices and trends for post-consumer metals, glass, plastic, and fibre and has been an invaluable tool for municipal officials and others involved in the recycled commodities marketplace. CIC used the Price Sheet to determine the value of the top priced commodities collected by each subsector. According to the Price Sheet December 2023, the most valuable commodities collected were: PET, HDPE, aluminum cans, and steel cans. The prices listed were used to determine the total potential revenue collected from recycling, and the potential total value lost to disposal. The commodity pricing tables for each subsector type can be found in Section 4 of this report along with the detailed data sheets.

The scope and timing of Phase 3, which will expand these activities in other provincial and territorial jurisdictions and its scope, will be determined by the results of Phase 1 and Phase 2 pending renewed funding.

*Table 1; Summary of Generation, Disposal and Recycled – PPP by IC&I subsector type.*

| FACILITY TYPE | NUMBER OF AUDITS | PPP COLLECTED FOR DISPOSAL KGS/YR | PPP COLLECTED FOR RECYCLING KGS/YR | TOTAL PPP GENERATED KGS/YR | PPP PERCENT COLLECTED FOR RECYCLING |
|---|---|---|---|---|---|
| **Post-Secondary Education Institutions** | 4 | 65,330 | 48,388 | 113,718 | 43% |
| **Entertainment Venues** | 2 | 117,875 | 14,299 | 132,174 | 11% |
| **Travel Plaza** | 1 | 19,158 | 9,785 | 28,943 | 34% |
| **Gas Stations / Convenience Stores** | 5 | 13,667 | 266 | 13,933 | 2% |
| **Office Buildings** | 2 | 2,483 | 11,632 | 14,115 | 82% |
| **Retail Shopping Complex** | 1 | 323,300 | 2,184,600 | 2,507,900 | 87% |
| **TOTALS** | **15** | **541,813** | **2,268,970** | **2,810,783** | **81%** |

## 1.1 DEFINITIONS

The definitions listed below were used to guide the audits or reporting templates for the audits, to ensure consistency of language.

**Subsector Type** Building properties based on Industrial, Commercial & Institutional source separation programs (refer to O. Reg 103/94)

**Disposal Stream**: Material that is collected for disposal rather than diversion. It will include both divertible material and non-divertible material.

**Disposal Zone**: A disposal zone is a predetermined area in the facility from which waste material is collected for an audit. All the collection bins in the zone are generated by activities that are similar in nature.

**Packaging & Printed Paper** Packaging is anything used for the containment, protection, handling, storage, transport, and presentation of goods, from raw materials processed goods, from the producer to the user or consumer, including processor, assembler or other intermediary. Printed Paper consists of printed and unprinted paper, such as a newspaper, magazine, greeting

| | |
|---|---|
| | cards, calendars (promotional or purchased), notebooks and daily planners, promotional material, directory, catalogue or paper used for copying, writing or any other general use. |
| **Recycling Efficiency Rate** | Recycling Efficiency Rate is a metric used to measure the effectiveness of a recycling process or program in converting waste materials into reusable resources. |
| **Recycling Stream:** | Material that is diverted from the disposal stream into a recycling program. |

## 1.2 BACKGROUND

Environment and Climate Change Canada is the lead Federal Department for a wide range of environmental issues. The Department delivers on its mandate through various actions including the implementation of the Pan-Canadian Framework on Clean Growth and Climate Change; engaging with strategic partners including provinces, territories, and Indigenous peoples; monitoring; science-based research; policy and regulatory development; and, through the enforcement of environmental laws. The Department's programs focus on minimizing threats to Canadians and their environment from pollution; equipping Canadians to make informed decisions on weather, water, and climate conditions; and conserving and restoring Canada's natural environment.

On June 22, 2022, the Government of Canada published the Single-use Plastics Prohibition Regulations (SUPPR), in the Canada Gazette, Part II. The Regulations prohibit the manufacture, import, and sale of six categories of single use plastics*: **checkout bags, cutlery, foodservice ware made from or containing problematic plastics, ring carriers, stir sticks, and straws** (with some exceptions). The Government published two guidance documents to accompany the Regulations, in order to provide information about the requirements of the Regulations and to help businesses and organizations transition away from the prohibited items. The Regulations are being implemented on a staggered timeline, from December 2022 to December 2025, to enable industry to adapt to the changes. * *These items have been highlighted in the data tables in section 4 of this report.*

## 1.3 ABOUT CIC

Circular Innovation Council is a national, not-for-profit, membership-based organization with over 40 years of experience delivering programming that educates and empowers Canadians to take action on the circular economy and to advance its environmental, economic, and social benefits. In concert with our members and partners, we leverage our experience and expertise to deliver on the broad gains inspired by the circular economy through research, policy,

programs, and pilots. Our mandate is to accelerate Canada's transition toward a circular economy by putting concepts into action.

Our deep history of working to reduce waste across entire value chains, in particular the IC&I sector, makes CIC well positioned to undertake data and market research. CIC is well known for its independent position and its market knowledge enables it to deliver credible research. CIC's previous and current programs focused on the ICI sector offer access to otherwise unavailable market data and key stakeholder contacts.

> **Launched in 2010, 3RCertified** is a points-based voluntary certification program for the IC&I sector and recognizes organizations that take a leadership position in waste reduction and diversion. Participating organizations achieve certification levels based on established criteria and third-party evaluation of waste management and reduction practices. Properties are awarded certification based on total points earned and verified through an on-site third-party evaluation. The criteria aim to capture the various ways an organization integrates its solid waste diversion and management program into operations and planning.

> **Waste Auditor Training** is one of CIC's training programs which is based on the SWAM, created in 2012. Participants learn about valid methods of performance measurement, methods of calculating waste reduction, and realistic indicators of effective source separation programs. The training also offers participants information as to how to apply audit findings into compliant and effective waste reduction work plans that focus on waste reduction and reuse as priority activities. Since 2012, hundreds of participants have taken the course including seasoned waste management professionals, municipal staff, university graduates and entrepreneurs.

## 1.4 OBJECTIVES

Despite the importance of establishing and achieving national recycling targets, currently there is limited performance information or verifiable data to accurately baseline the generation, diversion and disposal of PPP materials including and specifically plastic packaging and plastic beverage containers in the IC&I sector. This baselining information is essential to inform and advance national policy objectives on waste and in particular plastic waste reduction. Overall, there is very little comparable verifiable data at the provincial or at a national level for the generation, disposal or recycling of PPP and non-alcohol beverage containers. During Phase 2 of this study CIC conducted audits in various subsectors within the IC&I sector to gather the baseline data needed. Using the category list developed with ECCC, CIC reported on targeted material categories found in both the recycling and disposal streams of each facility audited and the performance of each facility's capture rate of recyclable materials.

## 1.5 DATA SCOPE

CIC and ECCC agreed upon the additional categories for auditing for Phase 2. The audit research included both weights and unit count for plastic beverage containers by brand where possible. The table containing the beverage containers, under their parent brands can be found in section five.

*Table 2; PPP Categories for Phase 2 Audits*

| Beverage Container Categories | Category Details |
|---|---|
| Beverage Aluminum Cans | Beverage Aluminum Cans |
| Beverage Aseptic packaging | Beverage Aseptic packaging with straw |
| Beverage Gable packaging | Gable top cartons |
| Beverage Glass | Beverage Glass |
| Beverage HDPE #2 | Beverage HDPE #2 - will be sorted by brand |
| Beverage PET #1 | Beverage PET #1 - will be sorted by brand |
| Beverage Steel | Beverage Steel |
| Mixed beverage containers | Mixed beverage containers: pouches, Yakult, Ensure |

| Plastics Categories | Category Details |
|---|---|
| Black plastic clamshell containers | Black plastic clamshell containers, lidded containers, plates, bowls |
| Commingled Mixed Plastics | Durable plastic products |
| Residential Plastic film | Residential Plastic film |
| Film Checkout Bags | Separate out from regular plastic film |
| Expanded polystyrene | Polystyrene foam clamshell containers, lidded containers, plates, bowls |
| Expanded polystyrene foam cups | Foam cups |
| HDPE #2 | High-density polyethylene (not beverage containers) |
| Industrial plastic film | Large LDPE plastic film |
| LDPE #4 | Low-density polyethylene |
| Mixed plastic cup lids | Drink cup lids |
| Mixed plastic cutlery, utensils | Plastic cutlery, plastic stir sticks |
| Non-expanded polystyrene | Polystyrene |
| PET (#1) | Polyethylene terephthalate (PET) resins (not beverage containers) |
| Plastic (#7) | Acrylonitrile-butadiene-styrene resins (typically make-up containers) |
| Plastic flexible ring carriers | Plastic flexible ring carriers |
| Plastic straws | Plastic straws |
| Polypropylene (#5) | Polypropylene |
| Plastic Film | Certified logo compostable plastic film |
| Plastic Film | Biodegradable logo plastic film |

| Paper Categories | Category Details |
|---|---|
| Boxboard | Industrial boxboard |

| | |
|---|---|
| Boxboard with poly | Residential boxboard, cereal, crackers etc. |
| Cardboard rolls, industrial | Cardboard rolls |
| Compostable paper cups | Only if certifiable compostable logo is present |
| Cup trays | From fast food, coffee shops |
| Fine paper | Office paper |
| Kraft paper | Kraft paper |
| Magazines | Including glossy |
| Mixed paper fibre | Mixed fibres that do not fall into any other category |
| Newsprint | Newspapers, flyers, inserts |
| OCC | Corrugated cardboard |
| Paper cups | All paper cups that are not compostable |
| Poly-lined/fused paper | Laminated paper packaging, oatmeal, goldfish bags |

| **Other Packaging Categories** | **Category Details** |
|---|---|
| Aluminum, bags, food trays | Food bags, meals trays, etc. |
| Steel cans | Non beverage |

# 2. APPROACH & METHODOLOGY

## 2.2 DATA COLLECTION METHOD

Each audit was conducted in accordance with Ontario Regulation 102/94 Waste Audits and Waste Reduction Work Plans (Appendix A). A waste audit under this regulation addresses: the amount, nature, and composition of the waste; the manner by which the waste is produced, including management decisions and policies that relate to the production of waste; and the way in which the waste is managed.

The data sets collected and used for this report were captured using the SWAM (Appendix B) which was developed by CIC in 2012 as part of the 3RCertified program. The program and its subsectors were developed in consultation with independent standard setting agencies, regulatory authorities, industry experts, and post-secondary institutions. SWAM applies globally recognized principles of auditing to set standards for defining acceptable practices of measurement of performance, consistent data analysis and reporting. SWAM forms the basis of the Waste Auditor Training Program and must be used by organizations seeking to achieve 3RCertified status.

## 2.3 WASTE SORTING & SAMPLE SIZE AND PERIODS

PPP and beverage containers found in the following waste audit results used for this baseline report, include sources from both disposal and recycling streams. Materials were collected and sorted from multiple points within the auditees' operations. The information below provides typical collection areas for each of the IC&I building subsector types examined. Each audit was conducted with a minimum 24-hour sample period.

**POST-SECONDARY EDUCATION INSTITUTIONS**

| | |
|---|---|
| Classrooms | Cafeteria |
| Hallways | Library |
| Offices | Outside |

**ENTERTAINMENT VENUES**

| | |
|---|---|
| Public Internal Collection Bins/Recycling Receptacles | Vendor Collection Bins/Recycling Receptacles |

**TRAVEL PLAZA**

| | |
|---|---|
| Public External Collection Bins/Recycling Receptacles | Public Internal Collection Bins/Recycling Receptacles |
| Food Court | Retail Outlets |
| Public Washrooms | |

**GAS STATIONS WITH CONVENIENCE STORES**

| | |
|---|---|
| Convenience Store Bins/Recycling Receptacles | Gas Pump Bins/Recycling Receptacles |

**OFFICE BUILDINGS**

| | |
|---|---|
| Cafeteria (if any) | Staff Lunchroom |
| Offices | Washrooms |
| Hallways | Food Court (if any) |
| Entrance Lobby | |

**RETAIL SHOPPING COMPLEX**

| | |
|---|---|
| Shipping/Receiving Area | Staff Lunchroom |
| Offices | Staff Washrooms |
| Public Washrooms | Food Court |
| Retail Outlets | Entrance Lobby |

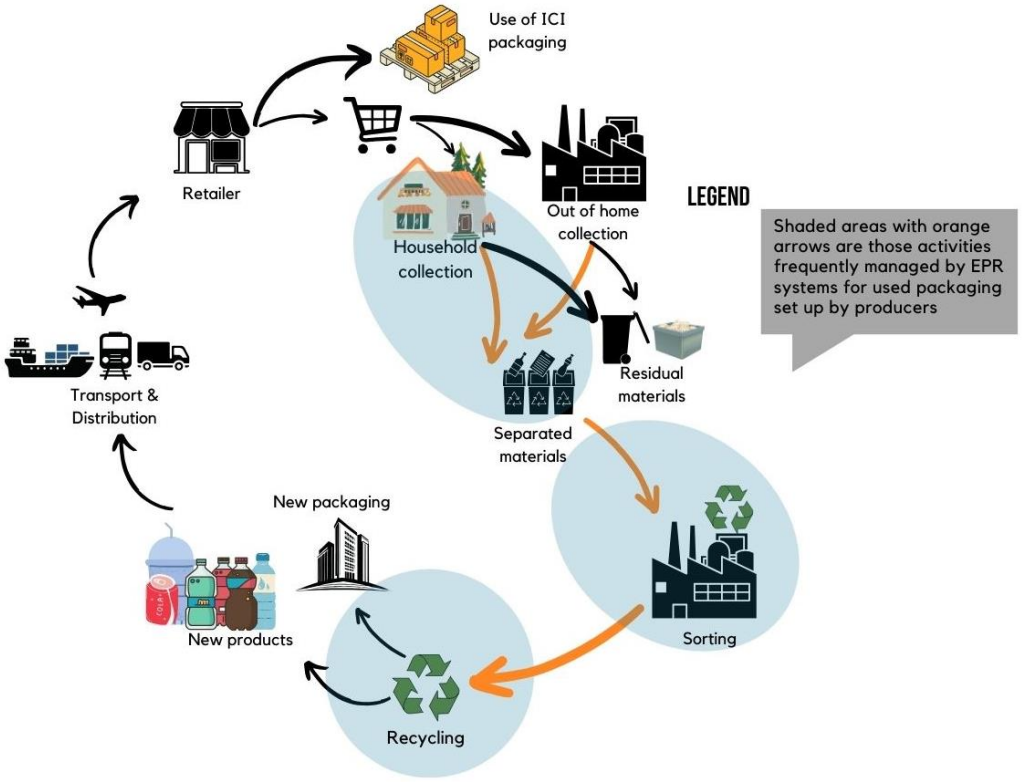
## 2.4 AUDIT ASSUMPTIONS & CALCULATIONS

For each individual audit, an annual calculation was made using the most appropriate method of annualization according to the building subsector type to ensure the sample was extrapolated accurately. For example, these may include the number of operating days, or square metres for an office location, and number of events for the entertainment venues. Each audit report relied on official records maintained by the establishment or supplied by the service providers.

## 2.5 PROOF OF FINAL DISPOSITION & RECYCLING EFFICIENCY RATES

It is important to note that proof of final disposition was requested from each auditee by way of documentation from their waste collection service providers, however not all service providers offered written confirmation of end fate, which made it difficult to verify a recycling efficiency rate. During the movement of the recyclable materials from one custodian to the next along the supply chain, there is inevitable losses due to human error, machinery malfunctions, and contamination. Therefore, it is likely that 100 percent of the original collected recyclable materials are not processed and do not re-enter the economy. The numbers reported by CIC for each subsector by materials and their recycling efficiency rate is solely based on the audit data collected at source and the verified records supplied by the facility. Below each phase of the journey and the way in which the materials are handled is described in more detail.

This study followed the flow of collected recyclable materials from each audited facility, as far as the waste hauler could confirm that the materials were transported to the material recycling facility (MRF) for sorting. The amount of recyclable materials that were reported to be baled and transported to a processor for recycling is unconfirmed. It is recommended that future phases of this research include a verification of final fate from collection, through sorting, and tracked to final processing.




**Recycling Efficiency Rate (RER) definition:** "the mass of recycled materials exiting the recycling process and returned to the economy, divided by the mass of materials entering the recycling process, expressed as a percentage".

*Recycling Efficiency Rate = (Amount of recyclable material processed / Amount of recyclable material collected) x 100*

- **Amount of recyclable material collected at source**: The total volume or weight of materials that are collected for recycling within a facility that is destined to be transported to a Material Recycling Facility (MRF)

- **Contamination rate within the recyclable materials collected at source**: The number of items found within the recyclable materials collected that are not accepted e.g., non-recyclable materials, general debris, and "dirty" containers that have a large amount of product still in them. These contaminants may be removed by internal cleaning staff or by external service providers. If a bag of recyclables appears to be highly contaminated, the whole bag may be disposed of.

- **Amount of recyclable material captured**: The MRF capture rate is the proportion of the collected recyclable materials that were transported to the facility and were successfully captured into the correct commodity bins by sorting machines and/or personnel at the MRF. This excludes any materials that cannot be recycled due to the processor's acceptance criteria and/or contamination levels and are removed by staff during the sorting process.

- **Amount of recyclable material sent for processing**: The MRF bales the different recyclable commodities for processing and sends to the appropriate facility. The weight of the baled recyclable commodities would be considered the actual amount of successfully captured and recycled materials that will be returned to the economy, however, there are occasions where the processor may find contaminants within the baled materials, which if a small amount, could be removed before processing, or if it is a significant amount, the processor may reject the whole bale in which case, it could all end up in landfill.

# 3. AGGREGATED PERFORMANCE DATA BY SUBSECTOR TYPE

## 3.2 FACILITY PROFILE – POST-SECONDARY EDUCATION INSTITUTIONS

For the post-secondary education institutions, a total of four audits were conducted. All facilities are subject to O.Reg. 102/94 and 103/94; the waste audits were executed in two regions. Audits in educational institutions provide valuable data giving an insight into the extent the younger population participate in recycling programs. The number of full-time students ranged from ~5,000 to ~39,000 for a combined total of full-time and part-time students, which provides important information to calculate a weight by student as a performance comparator. Due to the second GTA college having more part-time students than full-time students it is difficult to calculate the amount of waste generated by each student, so only 50 percent of the part-time students have been used in the equation. All post-secondary education institutions had implemented a waste reduction work plan, which includes waste diversion programs. The audits all took place between February and March of 2024 and have been annualized to represent a typical school year. The total collection for disposal of PPP was 65,328 kilograms. Waste audit findings per participant are described below:

*Table 3; detailed data from waste audits at four Post-Secondary Education Institutions*

| Facility Location | Facility Profile | Number of Students | Number of Staff | Gross Weight PPP Generated in KGS | Gross Weight PPP Generated in KGS by Student | Gross Weight PPP Collected for Recycling in KGS/PY | Percent of PPP Collected for Recycling |
|---|---|---|---|---|---|---|---|
| Waterloo Region | University | 22,115 | 2,425 | 10,528 | 0.47 | 1,300 | 12% |
| Waterloo Region | College | 5,550 | 128 | 17,380 | 3.13 | 4,715 | 27% |
| GTA 1 | College | 38,769 | 5,455 | 31,937 | 0.82 | 15,177 | 48% |
| GTA 2 | College | 20,000 FT 70,000 PT | 2,150 | 53,868 | .98 | 27,193 | 50% |
| | | **Total # of Students** | | **Total PPP Generated** | **Average Gross Weight Generated by Student** | **Total PPP Collected for Recycling** | **% PPP Collected for Recycling** |
| Sum of all locations | | 121,434 | | 113,713 | 0.94 | 48,385 | 43% |

The University audited in the Waterloo Region collected waste from the various areas within the audited building including libraries, concourse, and hallways. The total square metres of the building is approximately 380,382. The concourse is attached to other departments, classrooms, and offices. According to the audit report, based on the total amount of waste generated and materials diverted, the combined waste diversion rate was 12 percent. The 2023 audit report conducted by their waste service provider reported 30 percent more diverted waste than what was found in this 24-hour waste audit sample. The main concerns conveyed by this participant included: a lack of resources internally to effectively manage their waste; and that their external service provider does not offer proper recycling waste management training to their own employees; and a lack of confidence in the reports they received from the service provider.

The College audited in the Waterloo Region collected waste from classrooms, hallways, offices, cafeteria, a library, and outside areas; the total number of square metres of the building is approximately 27,217. This campus operates a large culinary facility which produces a considerable amount of waste and packaging waste, which is why their overall waste produced is high in comparison to the number of students. The external waste service provider collects the college's waste from an 8-yard front load bin, six times per week, and they reported it was usually full at the time of collection. According to the audit report, based on the total amount of waste generated and materials diverted, the combined waste diversion rate is 27 percent. Some of the challenges reported by this participant included a high contamination rate in common area recycling receptacles as well as a high turnover of student population which impacts the success of the waste reduction programs operated by the campus.

The first College audited in the GTA collected waste from the food court and other common areas, which were considered the most utilized spaces for the 38,769 full-time students enrolled. The total area audited is approximately 26,116 square metres. The waste collection frequency was reported between bi-weekly and monthly, depending on traffic density in any given season. In addition, this participant reported they operate a low-waste designated space for events that does not allow single-use items. Some of the reported challenges include a high contamination rate of their collected recyclables despite strong communication campaigns as well as little clarity around the recovery rate from the external waste service provider. According to the waste audit report, based on the total amount of waste generated and materials diverted, the combined waste diversion rate for all areas of this college is 48 percent.

The second College audited in the GTA collected waste from the cafeteria, and other common areas. The total area audited was 63,150 square metres. They have 20,000 full-time students and 70,000 part-time students. According to the waste audit report based on the total amount of waste generated and materials diverted, the combined waste diversion rate for all areas of this college is 50 percent. In their audit questionnaire this college claimed to have a strong understanding of the impact of collaboration with students and staff to continue supporting

meaningful, sustainable development goals within their facility. They are currently working on embedding sustainability to cover procurement policies and waste management protocols that minimize waste packaging. They are also strongly actioning waste reduction plans through their award-winning programs that include e-waste, batteries, organic materials, and textiles.

## 3.3 FACILITY PROFILE – ENTERTAINMENT VENUES

Two large entertainment venues were audited as part of this study. Both hold large and smaller sporting events plus music concerts. Depending on the type of event, the capacity of the venues varied. Both venues reported their full capacity and the number of events they hold each year, with the expected capacity by event type. This information was used to annualize the audit samples collected. The audits were conducted from all waste and recycling receptacles on both premises in two different regions. The total PPP collection for disposal was 132,174 kilograms which represents 89 percent of the total collection of waste. Of note, both facilities had a large amount of other waste that was not in the scope of the audit, including organic waste and washroom waste. The table below provides details of the waste audit findings from the two audits:

*Table 4; detailed data from waste audits at two Entertainment Venues*

| Facility Location | Facility Size (sq metres) | # of Staff | Visitor Capacity | Gross Weight PPP Generated in KGS | Gross Weight PPP Collected for Recycling in KGS/PY | Percent of PPP Collected for Recycling |
|---|---|---|---|---|---|---|
| London Region | 214,000 | 30 FTE/150 PT | 10,000 | 45,014 | 14,299 | 32% |
| Ottawa Region | 630,000 | ~200 FTE/PT combined | 19,153 | 87,160 | 0 | 0% |
| | | | | Total PPP Generated | Total PPP Collected for Recycling | % PPP Collected for Recycling |
| Sum of all locations | | | | 132,174 | 14,299 | 11% |

The entertainment venue in the London region is a 19,881 square metre facility with a diversion rate of 32 percent. The facility has one large compactor that is usually full at the time it is emptied. The auditee reported that the frequency of waste collection depends on the type of event hosted in the venue. The auditee also noted that the hockey and basketball seasons have much higher volumes of traffic through the building than other mid-sized sporting events during

off-season. This auditee reported that their primary waste management concern is the misuse of public facing waste receptacles resulting in the products the vendors sell ending up in the wrong waste stream; many recyclable items are regularly found in the disposal bins, also a high amount of contamination is found in the recycling receptacles.

The entertainment venue in the Ottawa region is a 58,529 square metre facility with a zero percent recycling rate. Although the facility does have recycling receptacles their waste service provider collects all the waste generated together and takes the total amount to landfill. There are some charity receptacles intended to collect alcohol beverage containers that are then donated to a foundation that supports youth in the community. During the audit, these containers were not counted as they were outside the research scope. The facility holds two 40-yard compactors, that are collected twice a week.

## 3.4 FACILITY PROFILE – TRAVEL PLAZA

For the Travel Plaza, one audit was performed from all waste and recycling receptacles on the premises. The 2,055 square metre facility revealed a diversion rate of 34 percent. Although only one travel plaza along the 401 highway was audited, in total there are 22 plazas in that corridor both east and west bound combined. It is expected that amount of PPP waste generated in each plaza will not significantly vary as each plaza is designed with a similar layout; the number and type of food vendors are consistent across all locations. Therefore, it is expected that all travel plazas will generate a comparable amount of waste per year. If we multiply the single audit result by the 22 known locations, this will give an overall indication of the potential annual PPP waste generated by these facilities. The collection for disposal of PPP was of 19,158 kilograms which represents 66 percent of the total PPP waste collected. The following table displays the details of the travel plaza:

*Table 5; detailed data from waste audits from one Travel Plaza*

| Location | Square Metres | Number of Employees | Operating Days | Gross Weight PPP Generated in KGS | Gross Weight PPP Collected for Recycling in KGS | Percent PPP Collected for Recycling |
|---|---|---|---|---|---|---|
| Travel Plaza | 2,055 | 200 | 364 | 28,943 | 9,785 | 34% |

## 3.5 FACILITY PROFILE – GAS STATIONS WITH CONVENIENCE STORES

For the group of gas stations with convenience stores, we focused on five locations along the 401 corridors both east and west bound. They are open 24/7 operating 52 weeks per year. The total collection of PPP waste generated was 13,933 kilograms. All five locations have the same layout; therefore, we have aggregated the PPP waste audit findings as shown in the table below:

*Table 6; detailed data from waste audits from five Gas Stations with a Convenience Store*

| Location | Operating Days | Gross Weight PPP Generated in KGS | Gross Weight PPP Collected for Recycling in KGS | Percent PPP Collected for Recycling |
|---|---|---|---|---|
| 401 Corridor | 365 | 13,933 | 266 | 2% |

There are approximately 1,700 gas retail stores and gas stations of this sort across the country. They have operational waste, which results from the daily internal activities, including running the actual gas stations. They also have consumer waste, which either originates from a consumer disposing of a product or product packaging they purchased at the onsite convenience store, or waste they already had in their vehicle that they leave behind in one of the onsite waste disposal bins. Due to the extremely high contamination issues, currently the majority of their waste goes to landfill, with the exception of OCC. The OCC gathered by staff comes from packaging, is clean, and easy to flatten and store before collection.

## 3.6 FACILITY PROFILE – OFFICE BUILDINGS

For the office buildings, there were a total of two audits, one in the Waterloo Region and the other in the London Region. Both facilities are subject to O.Reg. 102/94 and 103/94. These two office buildings have implemented recycling programs, and both strongly support sustainability-related initiatives through communication efforts to staff. The total PPP collection for disposal was 2,481 kilograms which represents 18 percent of the total waste generated. The overall performance of recyclable capture rate for this subsector is high compared to other subsectors in this study. Below are the waste audit findings from the two audits.

*Table 7; detailed data from Office Buildings*

| Location | Operating Days | Gross PPP Weight Generated in KGS | Gross Weight PPP Collected for Recycling in KGS | Percent PPP Collected for Recycling |
|---|---|---|---|---|
| Waterloo Region | 280 | 7,140 | 5,150 | 72% |
| London Region | 250 | 6,975 | 6,482 | 93% |
| | | **Total PPP Generated** | **Total PPP Collected for Recycling** | **% PPP Collected for Recycling** |
| **Sum of both locations** | | 14,115 | 11,632 | 82% |

The office building audited in the Waterloo Region, covers 19,630 square metres, with approximately 2,000 employees. The data collected revealed a diversion rate of 72 percent with paper products having the highest recycling rate compared to the other material streams. This building belongs to an active collaborative network of municipalities and non-governmental organizations. Their commitment to a reduction of greenhouse gas emissions (GHG) in the region across all departments is guided by a Corporate Climate Action Plan to become resilient in the local environment. These types of activities are atypical for this sector, and clearly demonstrates that when an organization is committed to improving their waste management practices, they can achieve a much higher level of success.

The office building audited in the London Region occupies approximately 2.5 floors of a five-storey office tower with an approximate floor area of 43,750 square metres. The waste audit found that this facility has a diversion rate of 93 percent with paper products having the highest recycling rate compared to the other material streams. This facility is working with Green Economy London, to conduct their first GHG assessment on their operations. As a certified B Corp organization, they are using their B Impact Assessment as a guide to identify additional opportunities for improvement. In their audit questionnaire they noted that they are focused on further research and development over the next year and are striving to assist Canada in reaching net zero emissions by 2050.

## 3.7 FACILITY PROFILE – RETAIL SHOPPING COMPLEX

A large retail shopping complex with an occupied square meter of 164,059 in the retail portion and 9,783 in the office tower was audited. Located in the GTA area, this property has 180 staff and backed up with 30-seasonal staff and 70 housekeeping personnel. The housekeeping

personnel is properly trained to collect waste from common areas and offices. Tenants are responsible to communicate the facility rules and processes for recycling collection from their individual store fronts to their staff. The building management company carry out spot-audits and conduct regular training for both new tenants and refresher training for long-term tenants as needed. In the food-court area, they have staff located at the food waste collection stations where visitors drop off their food waste and packaging, to ensure any waste is separated and disposed of in the correct receptacles.

The waste audit revealed a total collection for disposal of 323,300 kilograms, representing 13% of the collection for disposal. The table below shows the diversion rate achieved by this Retail Complex:

*Table 8; detailed data from a Retail Shopping Complex*

| Location | Operating Days | Gross Weight PPP Generated in KGS | Gross Weight PPP Collected for Recycling in KGS | Percent PPP Collected for Recycling |
|---|---|---|---|---|
| GTA-1 | 360 | 2,507,900 | 2,184,600 | 87% |

The facility operates year-round and has various schedules that remain consistent throughout the year. This facility reported that a record for proof of final disposition is provided by their waste hauler and that a list of items that are not accepted within their recycling program is also provided. Additionally, their waste hauler also provides confirmation that the waste they collect and send to recycle is being processed as material feedstocks. If there is a percentage that does not get recycled, the property management has reported that the waste hauler provides photos of contamination in the waste stream in question as well as written communication (e.g., emails).

Some of their waste reduction efforts include the usage of certified compostable food packaging materials in the food court area, buying in bulk, coffee mugs for staff, donation of waste materials to charity, refillable products, purchasing of items in concentrate, 2-sided photocopying/printing, automatic paper towel dispensers, and hot-air hand driers. This retail complex has also noted they have a green procurement policy in place; a vendor take-back agreement program with some suppliers; and strong communication efforts including formal non-conformity communications to tenants, to haulers when there is contamination; green team meetings; and annual training to all tenants and staff on waste and recycling content. Of note, this facility is part of CIC's 3RCertified program.

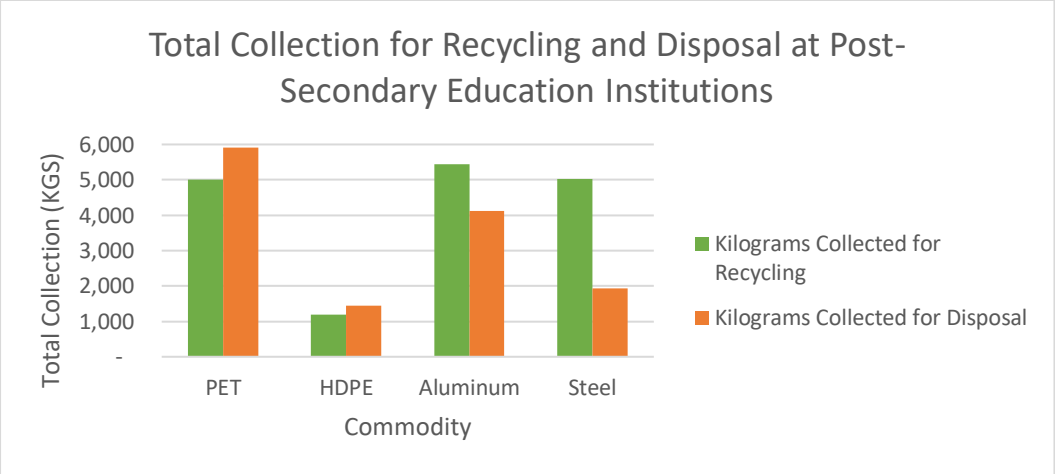
## 4. DATA SHEETS

### 1. POST-SECONDARY EDUCATIONAL INSTITUTIONS

*Items under the Single-Use Plastics Prohibition Regulation

| POST-SECONDARY EDUCATION INSTITUTIONS 4 AUDITS | PPP Collected for DISPOSAL KGS/YR | PPP Collected for RECYCLING KGS/YR | TOTAL PPP GENERATED KGS /YR | PERCENT PPP COLLECTED FOR RECYCLING |
|---|---|---|---|---|
| **Waste Stream Categories** | | | | |
| **BEVERAGE CONTAINERS** | **11,124** | **12,865** | **23,989** | **54%** |
| Beverage Aluminum Cans | 4,118 | 5,433 | 9,551 | |
| Beverage Aseptic packaging | 478 | 290 | 768 | |
| Beverage Gable packaging | 381 | 209 | 590 | |
| Beverage Glass | 295 | 1,295 | 1,590 | |
| Beverage HDPE #2 | 1,330 | 420 | 1,750 | 24% |
| Beverage PET #1 | 4,294 | 3,980 | 8,274 | 48% |
| Beverage Steel | 228 | 1,238 | 1,466 | |
| Mixed beverage containers | - | - | - | |
| **PLASTIC CATEGORIES** | **14,634** | **9,120** | **23,754** | **38%** |
| **Black plastic clamshell containers*** | - | - | - | |
| Commingled Mixed Plastics | 450 | 50 | 500 | |
| Residential Plastic film | 1,487 | 159 | 1,646 | |
| **Film Checkout Bags*** | 78 | 23 | 101 | |
| Expanded polystyrene | 55 | - | 55 | |
| Expanded polystyrene foam cups | - | - | - | |
| HDPE #2 | 113 | 763 | 876 | |
| Industrial plastic film | - | - | - | |
| LDPE #4 | 896 | 398 | 1,294 | |
| Mixed plastic cup lids | 2,381 | 686 | 3,067 | |
| **Mixed plastic cutlery, utensils*** | 509 | 134 | 643 | |
| Non-expanded polystyrene | 201 | 15 | 216 | |
| PET (#1) | 1,617 | 1,028 | 2,645 | |
| Plastic (#7) | 170 | 453 | 623 | |
| **Plastic flexible ring carriers*** | - | - | - | |
| **Plastic straws*** | - | - | - | |
| Polypropylene (#5) | 5,882 | 4,763 | 10,645 | |
| Plastic Film compostable | 795 | 648 | 1,443 | |
| Plastic Film biodegradable | - | - | - | |

| | | | | |
|---|---|---|---|---|
| **PAPER CATEGORIES** | **37,393** | **22,474** | **59,867** | **37%** |
| Boxboard | 295 | 1,994 | 2,289 | |
| Boxboard with poly | 8,794 | 3,465 | 12,259 | |
| Cardboard rolls, industrial | 795 | - | 795 | |
| Compostable paper cups | - | 53 | 53 | |
| Cup trays | 1,649 | 238 | 1,887 | |
| Fine paper | 1,835 | 2,872 | 4,707 | |
| Kraft paper | 1,653 | 464 | 2,117 | |
| Magazines | 200 | 83 | 283 | |
| Mixed paper fibre | 1,615 | 1,228 | 2,843 | |
| Newsprint | 393 | 1,838 | 2,231 | |
| OCC | 1,823 | 5,256 | 7,079 | |
| Paper cups | 8,808 | 2,848 | 11,656 | |
| Poly-lined/fused paper | 9,533 | 2,135 | 11,668 | |
| **OTHER PACKAGING** | **2,179** | **3,929** | **6,108** | **64%** |
| Aluminum, bags, food trays | 481 | 143 | 624 | |
| Steel cans | 1,698 | 3,786 | 5,484 | |
| **TOTALS** | **65,330** | **48,388** | **113,718** | **43%** |




**Commodity Pricing from The Continuous Improvement Price Sheet December 2023**

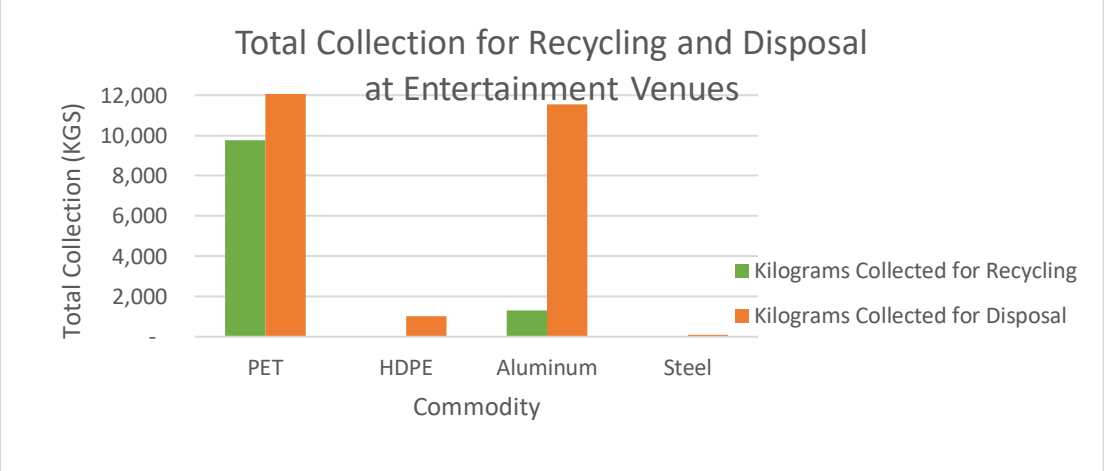
| Commodity Price in CAD Per Metric Tonne | Value of Recycled Amount | Value of Disposed Amount |
|---|---|---|
| **PET $367** | $1,838 | $2,169 |
| **HDPE $565** | $668 | $815 |
| **Aluminum Cans $1,875** | $10,187 | $7,721 |
| **Steel Cans $415** | $2,085 | $799 |

## 2. ENTERTAINMENT VENUES

*Items under the Single-Use Plastics Prohibition Regulation

| ENTERTAINMENT VENUES 2 AUDITS | PPP Collected for DISPOSAL KGS/YR | PPP Collected for RECYCLING KGS/YR | TOTAL PPP GENERATED KGS /YR | PERCENT PPP COLLECTED FOR RECYCLING |
|---|---|---|---|---|
| **Waste Stream Categories** | | | | |
| **BEVERAGE CONTAINERS** | **21,564** | **6,912** | **28,476** | **24%** |
| Beverage Aluminum Cans | 11,528 | 1,296 | 12,824 | |
| Beverage Aseptic packaging | 137 | 11 | 148 | |
| Beverage Gable packaging | 126 | - | 126 | |
| Beverage Glass | - | - | - | |
| Beverage HDPE #2 | 60 | - | 60 | 0% |
| Beverage PET #1 | 9,605 | 5,605 | 15,210 | 37% |
| Beverage Steel | 108 | - | 108 | |
| Mixed beverage containers | - | - | - | |
| **PLASTIC CATEGORIES** | **24,893** | **5,735** | **30,628** | **19%** |
| **Black plastic clamshell containers*** | - | - | - | |
| Commingled Mixed Plastics | 464 | - | 464 | |
| Residential Plastic film | 4,596 | - | 4,596 | |
| **Film Checkout Bags*** | 65 | - | 65 | |
| Expanded polystyrene | - | - | - | |
| Expanded polystyrene foam cups | - | - | - | |
| HDPE #2 | 971 | - | 971 | |
| Industrial plastic film | - | - | - | |
| LDPE #4 | - | - | - | |
| Mixed plastic cup lids | 2,659 | 1,080 | 3,739 | |
| **Mixed plastic cutlery, utensils*** | 157 | - | 157 | |
| Non-expanded polystyrene | 1,246 | - | 1,246 | |
| PET (#1) | 4,455 | 4,147 | 8,602 | |
| Plastic (#7) | - | - | - | |
| **Plastic flexible ring carriers*** | - | - | - | |
| **Plastic straws*** | 211 | 119 | 330 | |
| Polypropylene (#5) | 10,069 | 389 | 10,458 | |
| Plastic Film compostable | - | - | - | |
| Plastic Film biodegradable | - | - | - | |

| | | | | |
|---|---|---|---|---|
| **PAPER CATEGORIES** | **71,126** | **1,652** | **72,778** | **2%** |
| Boxboard | 1,966 | - | 1,966 | |
| Boxboard with poly | 23,169 | - | 23,169 | |
| Cardboard rolls, industrial | - | - | - | |
| Compostable paper cups | 32 | 1,123 | 1,155 | |
| Cup trays | 5,778 | 281 | 6,059 | |
| Fine paper | 8,696 | 140 | 8,836 | |
| Kraft paper | 307 | - | 307 | |
| Magazines | - | - | - | |
| Mixed paper fibre | 134 | - | 134 | |
| Newsprint | 765 | - | 765 | |
| OCC | 5,706 | - | 5,706 | |
| Paper cups | 12,453 | - | 12,453 | |
| Poly-lined/fused paper | 12,120 | 108 | 12,228 | |
| **OTHER PACKAGING** | **292** | **-** | **292** | **0%** |
| Aluminum, bags, food trays | 292 | - | 292 | |
| Steel cans | - | - | - | |
| **TOTALS** | **117,875** | **14,299** | **132,174** | **11%** |




**Commodity Pricing from The Continuous Improvement Price Sheet December 2023**

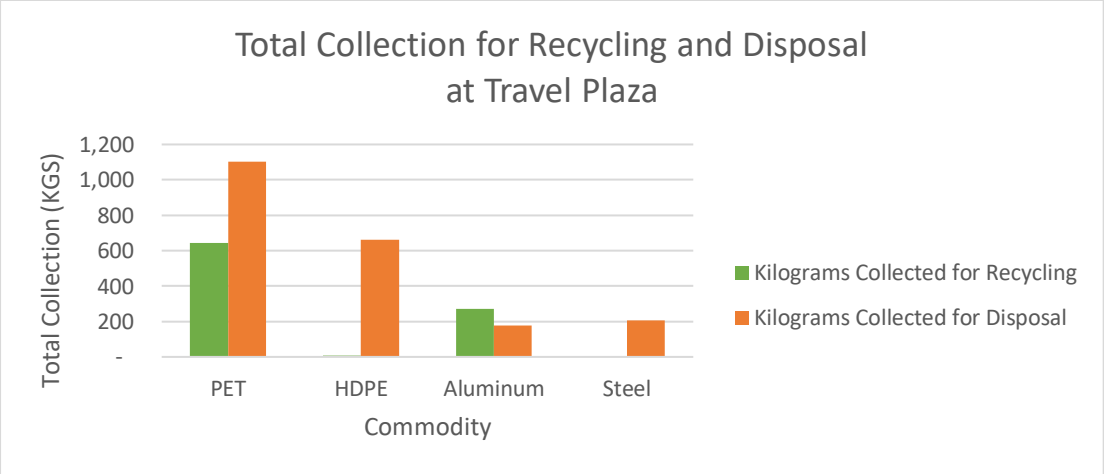
| Commodity Price in CAD Per Metric Tonne | Value of Recycled Amount | Value of Disposed Amount |
|---|---|---|
| **PET $367** | $3,579 | $5,160 |
| **HDPE $565** | - | $583 |
| **Aluminum Cans $1,875** | $2,430 | $21,615 |
| **Steel Cans $415** | - | $173 |

## 3. TRAVEL PLAZA

*Items under the Single-Use Plastics Prohibition Regulation

| TRAVEL PLAZA 1 AUDIT | PPP Collected for DISPOSAL KGS/YR | PPP Collected for RECYCLING KGS/YR | TOTAL PPP GENERATED KGS /YR | PERCENT PPP COLLECTED FOR RECYCLING |
|---|---|---|---|---|
| **Waste Stream Categories** | | | | |
| **BEVERAGE CONTAINERS** | **1,776** | **1,856** | **3,632** | **51%** |
| Beverage Aluminum Cans | 179 | 273 | 452 | |
| Beverage Aseptic packaging | 193 | 33 | 226 | |
| Beverage Gable packaging | 41 | 11 | 52 | |
| Beverage Glass | - | 906 | 906 | |
| Beverage HDPE #2 | 193 | 7 | 200 | 4% |
| Beverage PET #1 | 1,101 | 626 | 1,727 | 36% |
| Beverage Steel | 69 | - | 69 | |
| Mixed beverage containers | - | - | - | |
| **PLASTIC CATEGORIES** | **7,101** | **708** | **7,809** | **9%** |
| **Black plastic clamshell containers*** | - | - | - | |
| Commingled Mixed Plastics | - | - | - | |
| Residential Plastic film | 5,023 | 22 | 5,045 | |
| **Film Checkout Bags*** | 234 | 44 | 278 | |
| Expanded polystyrene | - | 22 | 22 | |
| Expanded polystyrene foam cups | 14 | - | 14 | |
| HDPE #2 | 468 | - | 468 | |
| Industrial plastic film | - | - | - | |
| LDPE #4 | - | - | - | |
| Mixed plastic cup lids | 385 | 186 | 571 | |
| **Mixed plastic cutlery, utensils*** | 41 | 4 | 45 | |
| Non-expanded polystyrene | 179 | 22 | 201 | |
| PET (#1) | - | 18 | 18 | |
| Plastic (#7) | - | 22 | 22 | |
| **Plastic flexible ring carriers*** | 14 | - | 14 | |
| **Plastic straws*** | 14 | 4 | 18 | |
| Polypropylene (#5) | 729 | 364 | 1,093 | |
| Plastic Film compostable | - | - | - | |
| Plastic Film biodegradable | - | - | - | |

| | | | | |
|---|---|---|---|---|
| **PAPER CATEGORIES** | **10,115** | **7,221** | **17,336** | **42%** |
| Boxboard | - | - | - | |
| Boxboard with poly | 1,624 | 349 | 1,973 | |
| Cardboard rolls, industrial | - | - | - | |
| Compostable paper cups | - | - | - | |
| Cup trays | 96 | 76 | 172 | |
| Fine paper | 468 | 157 | 625 | |
| Kraft paper | 1,018 | 644 | 1,662 | |
| Magazines | - | - | - | |
| Mixed paper fibre | - | - | - | |
| Newsprint | - | - | - | |
| OCC | - | 4,634 | 4,634 | |
| Paper cups | 3,124 | 1,081 | 4,205 | |
| Poly-lined/fused paper | 3,785 | 280 | 4,065 | |
| **OTHER PACKAGING** | **166** | **-** | **166** | **0%** |
| Aluminum, bags, food trays | 28 | - | 28 | |
| Steel cans | 138 | - | 138 | |
| **TOTALS** | **19,158** | **9,785** | **28,943** | **34%** |




**Commodity Pricing from The Continuous Improvement Price Sheet December 2023**

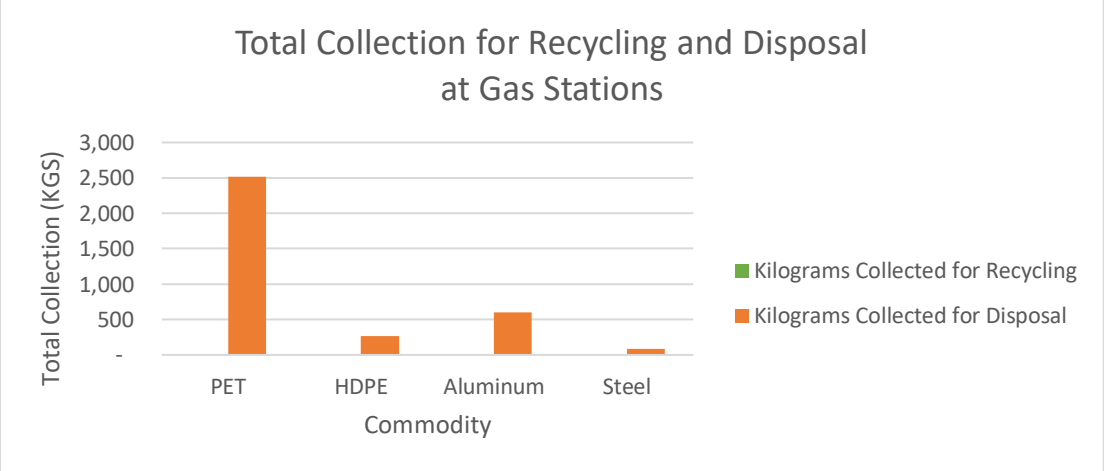
| Commodity Price in CAD Per Metric Tonne | Value of Recycled Amount | Value of Disposed Amount |
|---|---|---|
| **PET $367** | $236 | $404 |
| **HDPE $565** | - | $373 |
| **Aluminum Cans $1,875** | $512 | $336 |
| **Steel Cans $415** | - | $86 |

## 4. GAS STATIONS WITH A CONVENIENCE STORE

*Items under the Single-Use Plastics Prohibition Regulation

| GAS STATIONS WITH CONVENIENCE STORES 5 AUDITS | PPP Collected for DISPOSAL KGS/YR | PPP Collected for RECYCLING KGS/YR | TOTAL PPP GENERATED KGS /YR | PERCENT PPP COLLECTED FOR RECYCLING |
|---|---|---|---|---|
| **Waste Stream Categories** | | | | |
| **BEVERAGE CONTAINERS** | **3,938** | | | |
| Beverage Aluminum Cans | 604 | | | |
| Beverage Aseptic packaging | 80 | | | |
| Beverage Gable packaging | 124 | | | |
| Beverage Glass | 815 | | | |
| Beverage HDPE #2 | 25 | | | |
| Beverage PET #1 | 2,275 | | | |
| Beverage Steel | - | | | |
| Mixed beverage containers | 15 | | | |
| **PLASTIC CATEGORIES** | **3,289** | | | |
| **Black plastic clamshell containers*** | 15 | | | |
| Commingled Mixed Plastics | 109 | | | |
| Residential Plastic film | 1,252 | | | |
| **Film Checkout Bags*** | 66 | | | |
| Expanded polystyrene | 25 | | | |
| Expanded polystyrene foam cups | - | | | |
| HDPE #2 | 244 | | | |
| Industrial plastic film | - | | | |
| LDPE #4 | 7 | | | |
| Mixed plastic cup lids | 475 | | | |
| **Mixed plastic cutlery, utensils*** | 55 | | | |
| Non-expanded polystyrene | 22 | | | |
| PET (#1) | 240 | | | |
| Plastic (#7) | 142 | | | |
| **Plastic flexible ring carriers*** | 0 | | | |
| **Plastic straws*** | 33 | | | |
| Polypropylene (#5) | 604 | | | |
| Plastic Film compostable | - | | | |
| Plastic Film biodegradable | - | | | |

| | | | | |
|---|---|---|---|---|
| **PAPER CATEGORIES** | **6,320** | **266** | **6,586** | **4%** |
| Boxboard | - | | | |
| Boxboard with poly | 859 | | | |
| Cardboard rolls, industrial | - | | | |
| Compostable paper cups | - | | | |
| Cup trays | 488 | | | |
| Fine paper | 1,023 | | | |
| Kraft paper | 1,005 | | | |
| Magazines | - | | | |
| Mixed paper fibre | 55 | | | |
| Newsprint | 47 | | | |
| OCC | - | 266 | | |
| Paper cups | 2,206 | | | |
| Poly-lined/fused paper | 637 | | | |
| **OTHER PACKAGING** | **120** | | | |
| Aluminum, bags, food trays | 36 | | | |
| Steel cans | 84 | | | |
| **TOTALS** | **13,667** | **266** | **13,933** | **2%** |




**Commodity Pricing from The Continuous Improvement Price Sheet December 2023**

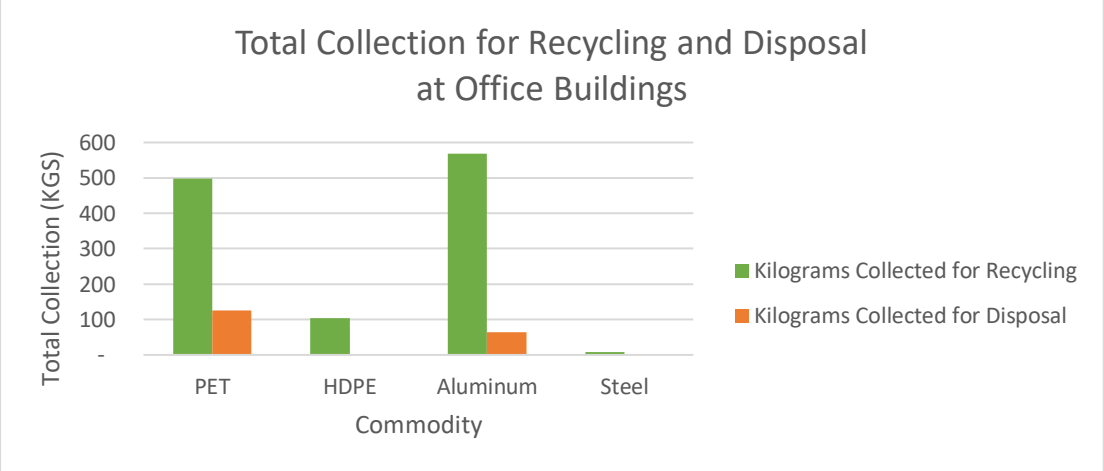
| Commodity Price in CAD Per Metric Tonne | Value of Recycled Amount | Value of Disposed Amount |
|---|---|---|
| **PET $367** | - | $923 |
| **HDPE $565** | - | $152 |
| **Aluminum Cans $1,875** | - | $1,132 |
| **Steel Cans $415** | - | $35 |

## 5. OFFICE BUILDINGS

*Items under the Single-Use Plastics Prohibition Regulation

| OFFICE BUILDINGS 2 AUDITS | PPP Collected for DISPOSAL KGS/YR | PPP Collected for RECYCLING KGS/YR | TOTAL PPP GENERATED KGS /YR | PERCENT PPP COLLECTED FOR RECYCLING |
|---|---|---|---|---|
| **Waste Stream Categories** | | | | |
| **BEVERAGE CONTAINERS** | **364** | **1,381** | **1,745** | **79%** |
| Beverage Aluminum Cans | 64 | 569 | 633 | |
| Beverage Aseptic packaging | - | 8 | 8 | |
| Beverage Gable packaging | 39 | 54 | 93 | |
| Beverage Glass | 188 | 300 | 488 | |
| Beverage HDPE #2 | - | 14 | 14 | 100% |
| Beverage PET #1 | 73 | 436 | 509 | 86% |
| Beverage Steel | - | - | - | |
| Mixed beverage containers | - | - | - | |
| **PLASTIC CATEGORIES** | **574** | **816** | **1,390** | **59%** |
| **Black plastic clamshell containers*** | - | 3 | 3 | |
| Commingled Mixed Plastics | 25 | 134 | 159 | |
| Residential Plastic film | 30 | 160 | 190 | |
| **Film Checkout Bags*** | 15 | 3 | 18 | |
| Expanded polystyrene | 10 | - | 10 | |
| Expanded polystyrene foam cups | 8 | - | 8 | |
| HDPE #2 | - | 90 | 90 | |
| Industrial plastic film | - | - | - | |
| LDPE #4 | - | - | - | |
| Mixed plastic cup lids | 149 | 123 | 272 | |
| **Mixed plastic cutlery, utensils*** | 171 | 26 | 197 | |
| Non-expanded polystyrene | 15 | 15 | 30 | |
| PET (#1) | 53 | 62 | 115 | |
| Plastic (#7) | - | 6 | 6 | |
| **Plastic flexible ring carriers*** | - | - | - | |
| **Plastic straws*** | - | - | - | |
| Polypropylene (#5) | 98 | 194 | 292 | |
| Plastic Film compostable | - | - | - | |
| Plastic Film biodegradable | - | - | - | |

| | | | | |
|---|---|---|---|---|
| **PAPER CATEGORIES** | **1,528** | **9,391** | **10,919** | **86%** |
| Boxboard | 78 | 250 | 328 | |
| Boxboard with poly | 185 | 164 | 349 | |
| Cardboard rolls, industrial | - | - | - | |
| Compostable paper cups | - | 6 | 6 | |
| Cup trays | 14 | 53 | 67 | |
| Fine paper | 42 | 2,955 | 2,997 | |
| Kraft paper | 159 | 447 | 606 | |
| Magazines | - | 428 | 428 | |
| Mixed paper fibre | 216 | 2,868 | 3,084 | |
| Newsprint | - | 1,216 | 1,216 | |
| OCC | - | 388 | 388 | |
| Paper cups | 599 | 599 | 1,198 | |
| Poly-lined/fused paper | 235 | 17 | 252 | |
| **OTHER PACKAGING** | **17** | **44** | **61** | **72%** |
| Aluminum, bags, food trays | 17 | 36 | 53 | |
| Steel cans | - | 8 | 8 | |
| **TOTALS** | **2,483** | **11,632** | **14,115** | **82%** |




**Commodity Pricing from The Continuous Improvement Price Sheet December 2023**

| Commodity Price in CAD Per Metric Tonne | Value of Recycled Amount | Value of Disposed Amount |
|---|---|---|
| **PET $367** | $183 | $46 |
| **HDPE $565** | $59 | - |
| **Aluminum Cans $1,875** | $1,067 | $120 |
| **Steel Cans $415** | $3 | - |

## 6. RETAIL SHOPPING COMPLEX

*Items under the Single-Use Plastics Prohibition Regulation

| RETAIL SHOPPING COMPLEX 1 AUDIT | PPP Collected for DISPOSAL KGS/YR | PPP Collected for RECYCLING KGS/YR | TOTAL PPP GENERATED KGS /YR | PERCENT PPP COLLECTED FOR RECYCLING |
|---|---|---|---|---|
| **Waste Stream Categories** | | | | |
| **BEVERAGE CONTAINERS** | **61,400** | **209,000** | **270,400** | **77%** |
| Beverage Aluminum Cans | 4,900 | 44,900 | 49,800 | |
| Beverage Aseptic packaging | 11,300 | 2,100 | 13,400 | |
| Beverage Gable packaging | - | - | - | |
| Beverage Glass | 22,800 | 116,400 | 139,200 | |
| Beverage HDPE #2 | - | - | - | |
| Beverage PET #1 | 10,500 | 26,700 | 37,200 | 72% |
| Beverage Steel | 11,900 | 18,900 | 30,800 | |
| Mixed beverage containers | - | - | - | |
| **PLASTIC CATEGORIES** | **27,800** | **127,700** | **155,500** | **82%** |
| **Black plastic clamshell containers*** | - | - | - | |
| Commingled Mixed Plastics | - | - | - | |
| Residential Plastic film | 11,300 | 73,900 | 85,200 | |
| **Film Checkout Bags*** | - | - | - | |
| Expanded polystyrene | 1,000 | 13,100 | 14,100 | |
| Expanded polystyrene foam cups | - | - | - | |
| HDPE #2 | 13,600 | 12,700 | 26,300 | |
| Industrial plastic film | - | - | - | |
| LDPE #4 | - | - | - | |
| Mixed plastic cup lids | - | - | - | |
| **Mixed plastic cutlery, utensils*** | - | - | - | |
| Non-expanded polystyrene | - | - | - | |
| PET (#1) | - | - | - | |
| Plastic (#7) | - | 4,100 | 4,100 | |
| **Plastic flexible ring carriers*** | - | - | - | |
| **Plastic straws*** | - | - | - | |
| Polypropylene (#5) | 1,900 | 23,900 | 25,800 | |
| Plastic Film compostable | - | - | - | |
| Plastic Film biodegradable | - | - | - | |

| | | | | |
|---|---|---|---|---|
| **PAPER CATEGORIES** | **234,100** | **1,847,900** | **2,082,000** | **89%** |
| Boxboard | 20,600 | 143,600 | 164,200 | |
| Boxboard with poly | - | - | - | |
| Cardboard rolls, industrial | - | - | - | |
| Compostable paper cups | 159,800 | 71,600 | 231,400 | |
| Cup trays | - | - | - | |
| Fine paper | 4,800 | 78,800 | 83,600 | |
| Kraft paper | - | - | - | |
| Magazines | 6,900 | 100 | 7,000 | |
| Mixed paper fibre | - | - | - | |
| Newsprint | 8,700 | 411,400 | 420,100 | |
| OCC | 22,600 | 1,047,200 | 1,069,800 | |
| Paper cups | 10,700 | 95,200 | 105,900 | |
| Poly-lined/fused paper | - | - | - | |
| **OTHER PACKAGING** | **-** | **-** | **-** | |
| Aluminum, bags, food trays | - | - | - | |
| Steel cans | - | - | - | |
| **TOTALS** | **323,300** | **2,184,600** | **2,507,900** | **87%** |


**Commodity Pricing from The Continuous Improvement Price Sheet December 2023**

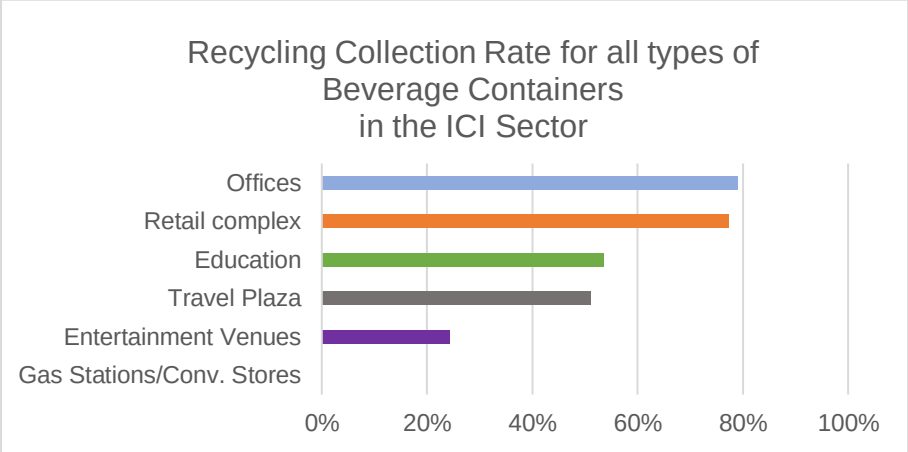
| Commodity Price in CAD Per Metric Tonne | Value of Recycled Amount | Value of Disposed Amount |
|---|---|---|
| **PET $367** | $9,799 | $3,854 |
| **HDPE $565** | $7,176 | $7,684 |
| **Aluminum Cans $1,875** | $84,188 | $9,188 |
| **Steel Cans $415** | $7,844 | $4,939 |

## 5. CONCLUSIONS

The audits examined for this report demonstrate a rate of diversion performance between the different IC&I sectors including; post-secondary education institutions, entertainment venues, travel plaza, gas stations with a convenience store, office buildings, and a retail shopping complex. In addition, each waste audit included a unit count of beverage containers per brand, listed in *figure 2*, to understand the share percentage across all IC&I sectors.

Each subsector type did not have the same number of audits, so it would not be useful to compare the overall waste generated, or the amount by weight that was collected for recycling. The graphs below compare the percentage amount collected for recycling from the total waste generated by subsector type within each of the waste stream category groups to show their overall performance against each other.

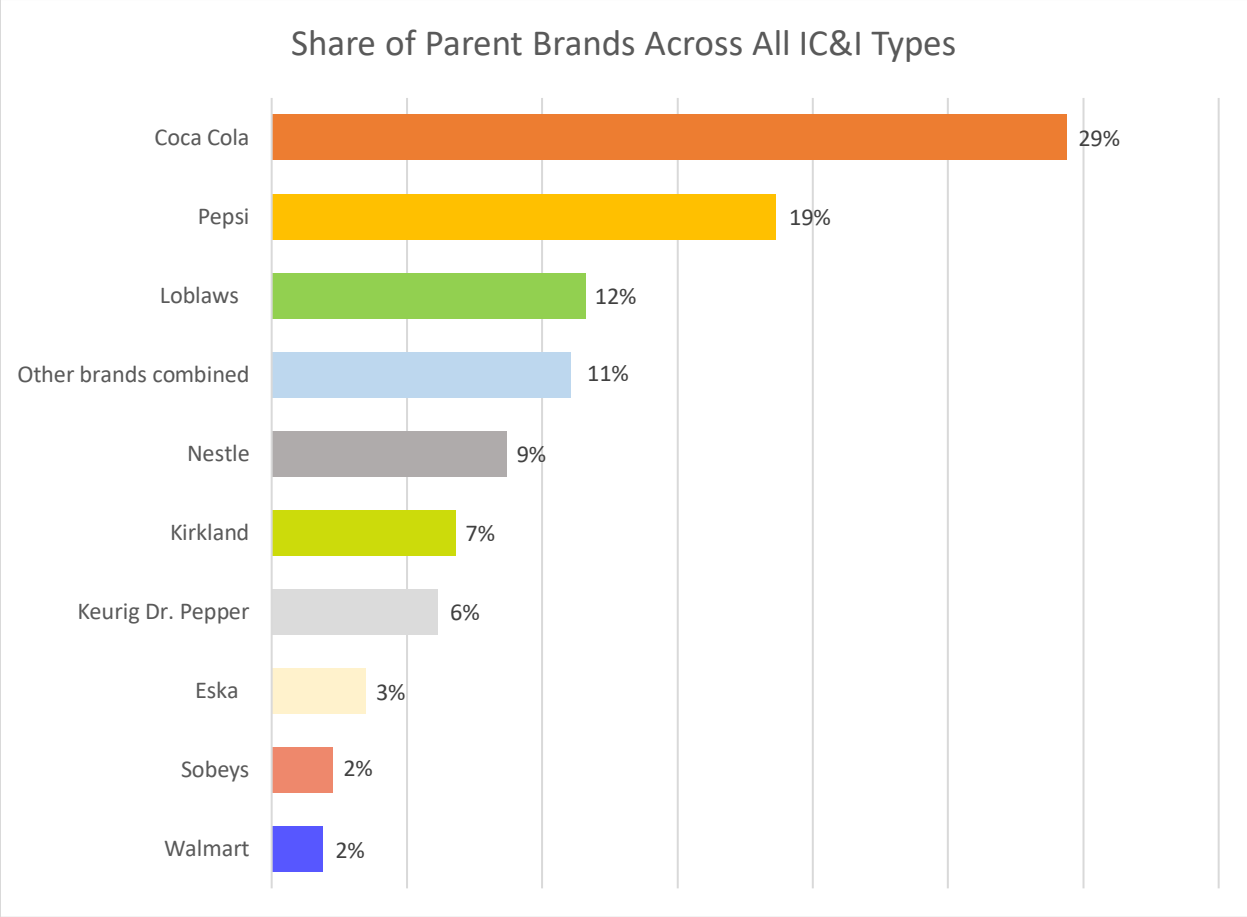
*Figure 1; Recycling Collection Rate for all Beverage Containers Across Subsector Types*




- The two office buildings and the retail shopping complex reported the most beverage containers in the recycling stream.
- The entertainment venues had the lowest recycling rate for beverage containers, with one of the venues sending the majority of their waste directly to landfill mostly due to the way the waste is generated in the stands by the visitors and high contamination rates.
- The group of gas stations with convenience stores did not separate their waste which is collected for disposal only, except for OCC.

Each waste audit included a breakdown of the beverage containers by brand. The graph below compares the percentage of the share for all the subsector types from the total unit count to represent the overall brand share.

*Figure 2; Percentage of Beverage Containers by Brand Across All Subsector Types*



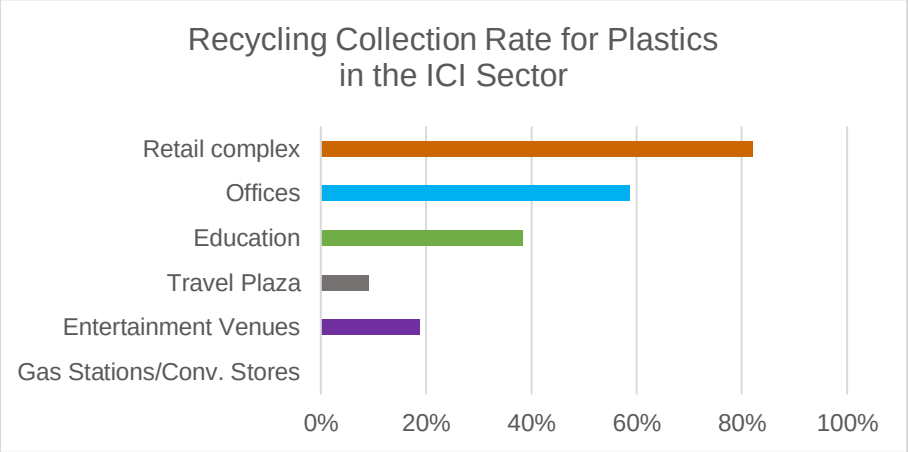

- The top three major brands combined totaled 60% of the overall beverage count; Coca Cola was the highest followed by Pepsi and then Loblaws.
- There were very small counts of other brands that were not significant alone, so they have been combined into one number totaling 11% of the total count.
- Nestle, Kirkland and Keurig Dr. Pepper had fairly similar counts.
- Sobeys, Walmart and Eska had the lowest counts at approximately two percent.

*Figure 3; Plastic Beverage Containers by Consumer Brand Names*

| Plastic Beverage Container Parent Brand Name | Consumer Facing Brand Names |
|---|---|
| **Agropur** | Logo, Quebon |
| **Alimentation Couche-Tard** | Circle K |
| **Blue Triton Brands** | Ice Mountain, Poland Spring |
| **Bolthouse Farm** | Bolthouse Farm |
| **Calpis Co.** | Calpico |
| **Coca Cola Company** | Barqs, Body Armour, Coca Cola, Coke, Core Power, Dansani, Fairlife, Fanta, Gold Peak, Minute Maid, Nestea, Oasis, Powerade, Simple, Simply Orange, Smart Water, Sprite, Vitamin Water |
| **Crystal Geyser** | Alpine Valley |
| **CVC Capital Partners** | Lipton |
| **Danone** | Activia, Danone Yoghurt Drink, Evian, Oikos |
| **Dole** | Dole |
| **Empire Company** | Longos |
| **Eska Inc.** | Eska |
| **GNC Canada** | Prime |
| **Harvest Hill Beverage Company** | Sunny D |
| **Hensley Beverage Company** | Sparkling Ice |
| **Hy-Vee Inc.** | Hyvee |
| **Keurig Dr. Pepper** | Canada Dry, Crush, Dr. Pepper, Motts, Schwepps, Selection |
| **Kirkland** | Kirkland |
| **Lactalis Canada** | Lactancia |
| **Lassonde** | Fairlee, Oasis |
| **Living Essentials LLC** | 5H Energy |
| **Loblaw Companies** | Natural Spring Waster, Presidents Choice, Real Canadian |
| **Mars** | Mars |
| **National Beverage Corporation** | Faygo |
| **Naya Waters Inc.** | Naya |
| **Nestle** | Nestle, Pure Life, San Pelligrino |
| **Ocean Spray** | Ocean Spray |
| **PepsiCo** | Aquafina, Brisk, Gatorade, Mountain Dew, Pepsi, Pureleaf |
| **Restaurant Brand Internationals** | Tim Hortons |
| **Sam's Club** | Members Mark |
| **Saputo** | Milk 2 Go |
| **Sobeys** | Compliments |

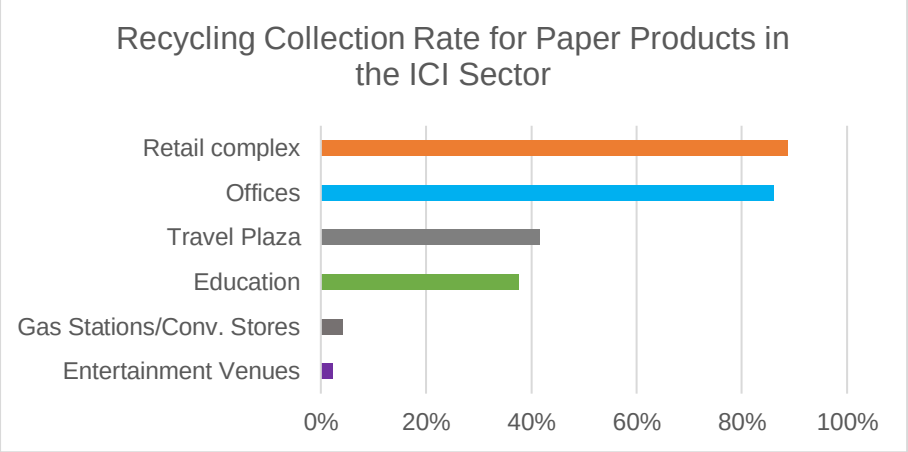
| | |
|---|---|
| **Sodiaal** | Yop |
| **The Gott Family** | Ice River |
| **The Wonderful Company** | Fiji |
| **Walmart** | Great Value, Mogamosa |
| **Woolworths** | Bfit |

*Figure 4; Plastics Recycling Collection Rate Across Subsector Types*



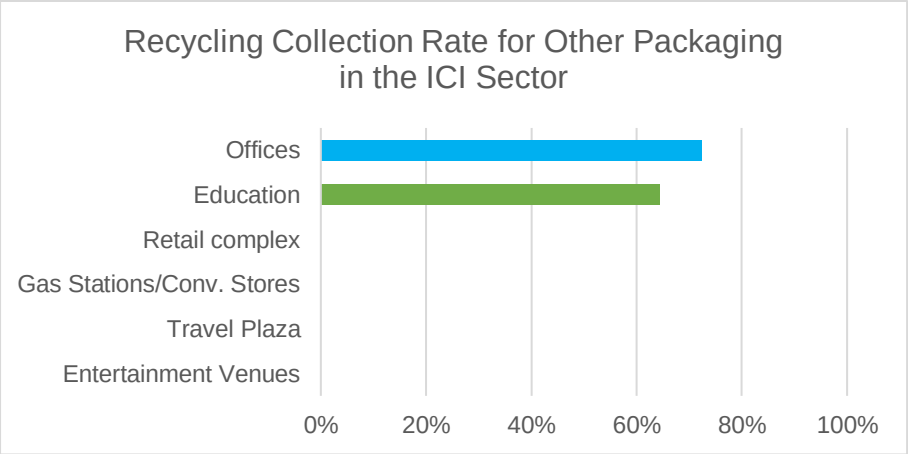

- The retail shopping complex out performed all the other subsector types for plastics.
- Offices found 68% of plastic cups lids and plastic cutlery in the disposal stream.
- Education institutions also found 78% of plastic cup lids and cutlery disposed.
- The travel plaza had a large amount of residential film which made up 65% of their overall plastics in the disposal stream.
- The entertainment venues had 90% of plastic cup lids and food containers combined rate along with a large amount of residential film in the disposal stream.

*Figure 5; Paper Recycling Collection Rate Across Subsector Types*




- In the retail shopping complex the majority of their paper products in the recycling stream, 57%, was OCC and 22% was newsprint.
- In the office buildings 31% of their recycling was fine paper, closely followed by mixed paper fibres at 30%.
- The travel plaza had mostly OCC at 64% of their total paper products for recycling.
- For the education institutions, boxboard with poly, paper cups and poly-lined paper projects made up approximately 60% combined of all their paper products, but only 14% was found in the recycling stream.
- The gas stations only recycled their OCC in paper products.
- The entertainment venues only recycled 2% of their total paper products collected.

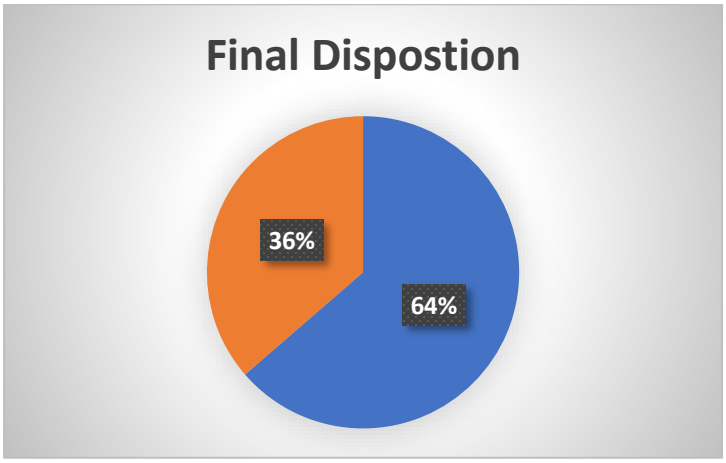
*Figure 6; Other Packaging Recycling Collection Rate Across Subsector Types*




**Other Packaging includes steel cans, aluminum foil and aluminum food trays.*

- Only office buildings and education institutions recycled the other packaging.
- The retail complex did not have any of these types of packaging onsite.
- The gas stations, travel plaza and entertainment venues, all had these types of packaging in the disposal stream only.

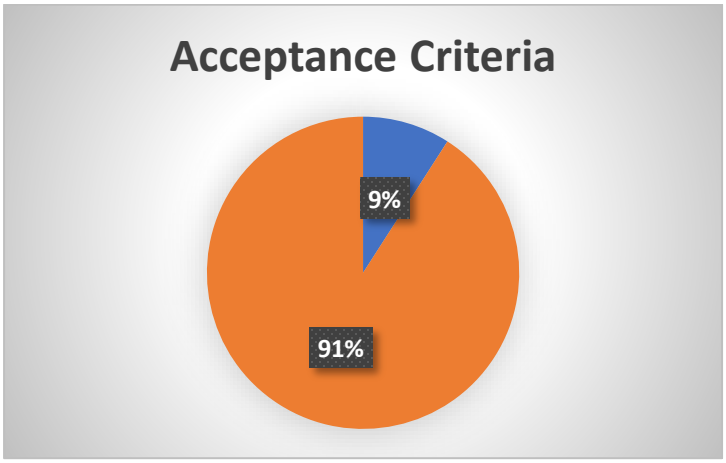
*Figure 7; Proof of Final Disposition*




Participants were asked if their waste service providers gave them written confirmation of the collected recyclable materials' final disposition.

64% said no
36% said yes

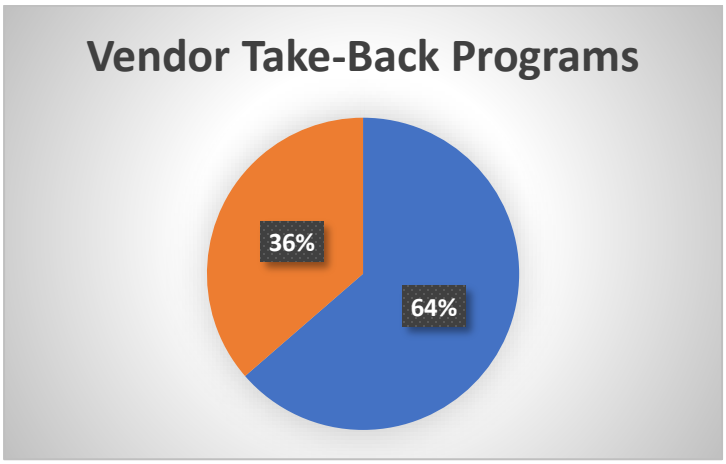
*Figure 8; Acceptance Criteria*




Participants were asked if their waste service providers supplied them with a list of accepted items for the recycling stream, and clear instructions on how they should be collected, e.g., bagged, loose etc.

9% said no
91% said yes

*Figure 9; Vendor Take-Back Programs*




Participants were asked if any of their vendors offered take-back programs like returning pallets, totes, drums, and other packaging.

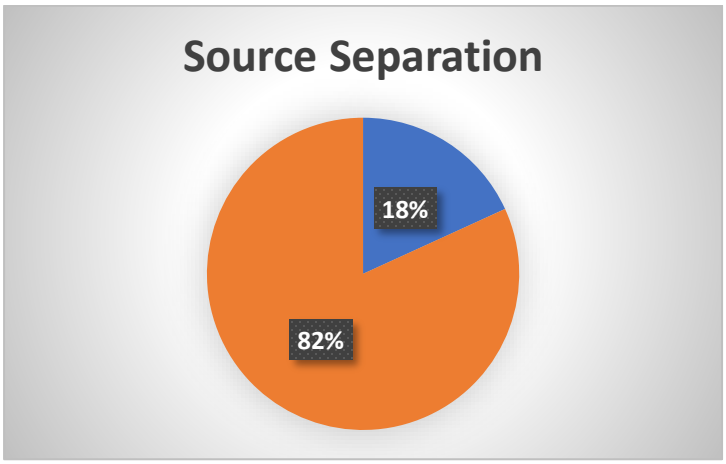
64% said no
36% said yes

*Figure 10; Internal Waste Management*


Participants were asked if they managed their waste collection with internal staff or if they used an outside contractor.

27% said they used a contractor
73% said they had internal staff

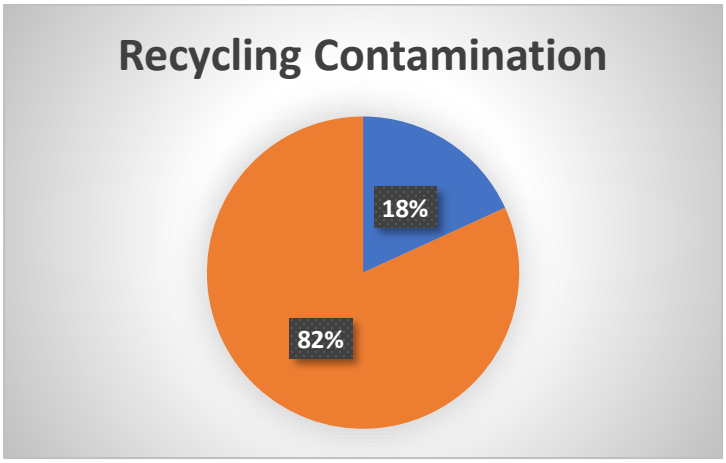
*Figure 11; Source Separation*




Participants were asked if they carried out some source separation of recyclables on site.

82% said yes
18% said no

*Figure 12; Recycling Contamination*




Participants were asked if they had an issue with contamination within their recycling streams.

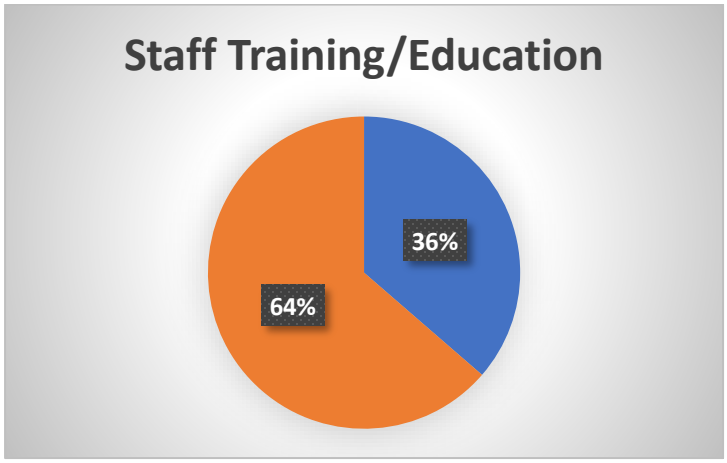
82% said yes
18% said no

*Figure 13; Waste Reduction Practices*


Participants were asked if their organization had waste reduction practices like using recycled content where possible, bulk purchasing, coffee mugs for staff onsite.

82% said yes
18% said no

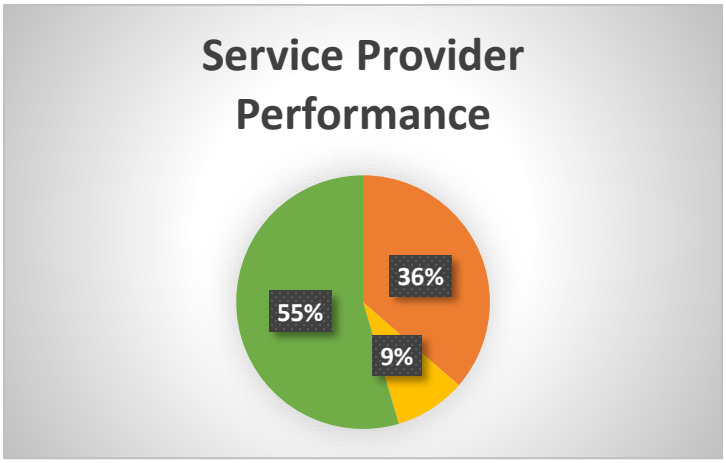
*Figure 14; Staff Training/Education*




Participants were asked if they carried out internal staff training regarding waste reduction or provided educational newsletters or had posters in common areas about the items accepted for recycling.

64% said yes
36% said no

*Figure 15; Service Provider Performance*




Participants were asked to rate their service providers' performance regarding communication, educational resources, and reporting on their waste and recycling rates.

9% rated high
55% rated medium
36% rated low

## 6. RECOMMENDATIONS

During the study, it became clear that there are several factors that can inhibit effective materials management practices, including:

- Lack of commitment
- Insufficient staff to manage internal waste reduction and recycling programs
- Lack of training for internal staff
- Insufficient space for storing recyclable materials
- Contamination due to poor training, or public misuse
- Financial constraints

Each subsector experienced similar barriers; education institutions, entertainment venues, and gas stations with convenience stores all reported that contamination was their biggest barrier to high performance contributable to high on the go traffic. Additionally, these facilities have a high turnover of consumers and therefore limited opportunity for consistent education. Most of the subsectors also reported a lack of space for source separation and storing large quantities of separated recyclable materials. The cost of collection was also noted as an issue. However, due to the limited number of audits carried out within the scope of the study, it is hard to draw strong conclusions of the common barriers by subsector.

It is recommended that Phase 3 of this study consists of a larger number of audits by subsector to create richer data sets and would allow for more opportunity to verify performance. Phase 3 of this study should also include following the captured recyclable materials to give full traceability on the chain of custody. With this knowledge, an accurate recycling efficiency rate would be possible.

It is also recommended that the same subsectors and number of audits are carried out in other provinces and territories across Canada. Accounting for the market variation and policy intervention differences between the waste management practices and effective handling of recyclable materials. With these broader and richer data sets we would be better positioned to set national recycling performance targets and examine the federal role in reducing PPP and beverage container waste.

## APPENDICIES

Ontario is the only province with regulations targeting the IC&I sector, requiring waste audits and waste reduction work plans. In 2017 the Ontario government launched: Strategy for a Waste-Free Ontario; Building the Circular Economy. Within the strategy there are 15 actions listed; Action 5 includes amending the 3R regulations (1994); 102/94, 103/94 and 104/94. As at the date of writing this report, the regulations have not yet been updated.

## *APPENDIX A – ONTARIO REGULATION 102/94*

Environmental Protection Act
Loi sur la protection de l'environnement
ONTARIO REGULATION 102/94
WASTE AUDITS AND WASTE REDUCTION WORK PLANS
Consolidation Period: From March 3, 1994 to the e-Laws currency date.
No amendments.
*This Regulation is made in English only.*

PART I
GENERAL

In this Regulation,
"waste" means municipal waste as defined in Regulation 347 of the Revised Regulations of Ontario, 1990;
"waste audit" means a study relating to waste;
"waste reduction work plan" means a plan to reduce, reuse and recycle waste. O. Reg. 102/94, s. 1.
A waste audit required under this Regulation shall address,
the amount, nature and composition of the waste; the manner by which the waste gets produced, including management decisions and policies that relate to the production of waste; and the way in which the waste is managed. O. Reg. 102/94, s. 2.
3. (1) A waste reduction work plan required under this Regulation shall include, to the extent that is reasonable, plans to reduce, reuse and recycle waste and shall set out who will implement each part of the plan, when each part will be implemented and what the expected results are.
(2) In developing the work plan, regard shall be had to the following principles:
Reduction is the first objective.
If reduction is not possible, then reuse is the next objective.
If reduction and reuse are not possible, then recycling is the final objective. O. Reg. 102/94, s. 3.
A person who is required under this Regulation to prepare a report of a waste audit or a waste reduction work plan shall prepare it on a form provided by the Ministry or in the same format as such a form. O. Reg. 102/94, s. 4.

(1) A person who is required under this Regulation to prepare a report of a waste audit or a waste reduction work plan shall retain a copy of the report or plan for at least five years after it was prepared.

(2) A person who is required under this Regulation to prepare a report of a waste audit or a waste reduction work plan shall submit to the Director, on request, the required report or plan, within seven days of the Director requesting them. O. Reg. 102/94, s. 5.

6. (1) A person who becomes subject to an obligation under this Regulation to prepare a report of a waste audit or a waste reduction work plan shall do so within six months of becoming subject to the obligation.

This section does not apply with respect to updated reports or plans.

This section does not apply with respect to obligations of a builder under Part IV or a demolisher under Part V. O. Reg. 102/94, s. 6.

7. (1) A new owner or operator to whom this Regulation applies is not required to conduct a new waste audit or prepare a new waste reduction work plan if an audit or work plan was conducted or prepared by a previous owner or operator and the new owner or operator updates the audit and work plan as required under this Regulation.

(2) This section does not apply with respect to a builder under Part IV or a demolisher under Part V. O. Reg. 102/94, s. 7.

8. (1) A person who has an obligation to conduct a waste audit and prepare a report under Part II, III, VI, VII, VIII, IX, X or XI in respect of more than one retail shopping establishment, retail shopping complex, building, restaurant, hotel or motel, hospital, location or campus of an educational institution, or site of a manufacturing establishment, may conduct a single audit and prepare a single report for two or more of them if it is reasonable to expect that separate audits would have similar findings.

(2) Subsection (1) applies with necessary modifications with respect to updates of waste audits and reports. O. Reg. 102/94, s. 8.

PART II

## RETAIL SHOPPING ESTABLISHMENTS

9. This Part applies to the owner of an establishment that sells goods or services at retail to persons who come to the establishment if,

the establishment occupies premises with a floor area of at least 10,000 square metres; or

the establishment occupies premises in a complex in respect of which Part III applies and the owner of the establishment is solely responsible for the establishment's waste management. O. Reg. 102/94, s. 9.

10. (1) The owner shall conduct a waste audit covering the waste generated by the operation of the establishment. The audit shall also address the extent to which materials or products used or sold consist of recycled or reused materials or products.

After conducting the waste audit, the owner shall prepare a written report of the audit.

In every year following the initial waste audit, the owner shall update the audit and prepare an updated written report. O. Reg. 102/94, s. 10.

11. (1) The owner shall prepare a written waste reduction work plan, based on the waste audit, to reduce, reuse and recycle waste generated by the operation of the establishment.
(2) In every year following the preparation of the initial waste reduction work plan, the owner shall prepare an updated written plan. O. Reg. 102/94, s. 11.
The owner shall implement the waste reduction work plan as updated. O. Reg. 102/94, s. 12.
The waste reduction work plan shall include measures for communicating the plan to the owner's employees who work at the establishment and, as a minimum, those measures shall require, that the plan or a summary be posted in places where most employees will see it; and if a summary is posted, that any employee who requests to look at the plan be allowed to do so. O. Reg. 102/94, s. 13.

PART III

## RETAIL SHOPPING COMPLEXES

This Part applies to the owner of a complex that contains premises occupied by establishments that sell goods or services at retail to persons who come to the establishments if the total floor area of such premises is at least 10,000 square metres. O. Reg. 102/94, s. 14.
(1) The owner shall conduct a waste audit covering waste generated at the complex other than the waste generated at premises for which the owner is not responsible, either directly or indirectly, for waste management. The audit shall also address the extent to which materials or products used by the owner consist of recycled or reused materials or products.
The waste audit need not cover the waste generated in the operation of an establishment in the complex if Part II applies to the owner of the establishment.
After conducting the waste audit, the owner shall prepare a written report of the audit.
In every year following the initial waste audit, the owner shall update the audit and prepare an updated written report. O. Reg. 102/94, s. 15.
16. (1) The owner shall prepare a written waste reduction work plan, based on the waste audit, to reduce, reuse and recycle waste generated at the complex other than the waste generated at premises for which the owner is not responsible, either directly or indirectly, for waste management.
The waste reduction work plan need not cover the waste generated in the operation of an establishment in the complex if Part II applies to the owner of the establishment.
In every year following the preparation of the initial waste reduction work plan, the owner shall prepare an updated written plan. O. Reg. 102/94, s. 16.
The owner shall implement the waste reduction work plan as updated. O. Reg. 102/94, s. 17.
The waste reduction work plan shall include measures for communicating the plan to the owner's employees who work at the complex and to the occupiers of premises in the complex and, as a minimum, those measures shall require,
that the plan or a summary be posted in places where most employees and occupiers will see it; and if a summary is posted, that any employee or occupier who requests to look at the plan be allowed to do so. O. Reg. 102/94, s. 18.

PART IV

LARGE CONSTRUCTION PROJECTS

19. (1) This Part applies to a person who undertakes, on their own behalf or on behalf of another person, a construction project consisting of the construction of one or more buildings with a total floor area of at least 2,000 square metres.

(2) In this Part,

"builder" means a person described in subsection (1). O. Reg. 102/94, s. 19.

20. (1) The builder shall conduct a waste audit covering the waste that will be generated in the construction project. The audit shall also address the extent to which materials or products used consist of recycled or reused materials or products.

(2) After conducting the waste audit, the builder shall prepare a written report of the audit. O. Reg. 102/94, s. 20.

The builder shall prepare a written waste reduction work plan, based on the waste audit, to reduce, reuse and recycle waste generated in the construction project. O. Reg. 102/94, s. 21.

The builder shall implement the waste reduction work plan. O. Reg. 102/94, s. 22.

The waste reduction work plan shall include measures for communicating the plan to the workers at the construction site and, as a minimum, those measures shall require,

that the plan or a summary be posted at the construction site in a place where most of the workers will see it; and

if a summary is posted, that any worker who requests to look at the plan be allowed to do so. O. Reg. 102/94, s. 23.

24. (1) The report of the waste audit and the waste reduction work plan required under this Part shall be prepared before construction work begins at the site.

(2) If construction work has begun at the site before this Regulation comes into force, the following transitional rules apply with respect to the waste audit, the report and the plan:

The report and plan shall be prepared within six months after this Regulation comes into force.

The report and plan need not be prepared if all work is finished within six months after this Regulation comes into force. The waste audit need not cover any waste generated within six months after this Regulation comes into force. The plan need not address any waste generated within six months after this Regulation comes into force. O. Reg. 102/94, s. 24.

PART V

LARGE DEMOLITION PROJECTS

25. (1) This Part applies to a person who undertakes, on their own behalf or on behalf of another person, a demolition project consisting of the demolition of one or more buildings with a total floor area of at least 2,000 square metres.

(2) In this Part, "demolisher" means a person described in subsection (1). O. Reg. 102/94, s. 25.

26. (1) The demolisher shall conduct a waste audit covering the waste that will be generated in the demolition project.

(2) After conducting the waste audit, the demolisher shall prepare a written report of the audit. O. Reg. 102/94, s. 26.

The demolisher shall prepare a written waste reduction work plan, based on the waste audit, to reduce, reuse and recycle waste generated in the demolition project. O. Reg. 102/94, s. 27.

The demolisher shall implement the waste reduction work plan. O. Reg. 102/94, s. 28.

The waste reduction work plan shall include measures for communicating the plan to the workers at the demolition site and, as a minimum, those measures shall require,

that the plan or a summary be posted at the demolition site in a place where most of the workers will see it; and

if a summary is posted, that any worker who requests to look at the plan be allowed to do so. O. Reg. 102/94, s. 29.

30. (1) The report of the waste audit and the waste reduction work plan required under this Part shall be prepared before demolition work begins at the site.

(2) If demolition work has begun at the site before this Regulation comes into force, the following transitional rules apply with respect to the waste audit, the report and the plan:

The report and plan shall be prepared within six months after this Regulation comes into force.

The report and plan need not be prepared if all work is finished within six months after this Regulation comes into force. The waste audit need not cover any waste generated within six months after this Regulation comes into force. The plan need not address any waste generated within six months after this Regulation comes into force. O. Reg. 102/94, s. 30.

## PART VI
## OFFICE BUILDINGS

31. (1) This Part applies to the owner of a building or group of buildings that has at least 10,000 square metres of floor area for use as offices.

(2) For the purposes of subsection (1), "group of buildings" means two or more buildings where,

(a) each of the buildings has the same ownership, and

(b) each of the buildings is in proximity to at least one other of the buildings such that there is at most one building or other real property of different ownership located between the two.

(3) For purposes of determining, under subsection (2), whether there is at most one building or other real property of different ownership located between two buildings, the following properties shall not be counted: public roads; public parks; and any land over which the public has a general right of access. O. Reg. 102/94, s. 31.

32. (1) The owner shall conduct a waste audit covering the waste generated at the building. The audit shall also address the extent to which materials or products used by the owner consist of recycled or reused materials or products.

After conducting the waste audit, the owner shall prepare a written report of the audit.

In every year following the initial waste audit, the owner shall update the audit and prepare an updated written report. O. Reg. 102/94, s. 32.

33. (1) The owner shall prepare a written waste reduction work plan, based on the waste audit, to reduce, reuse and recycle waste generated at the building.
(2) In every year following the preparation of the initial waste reduction work plan, the owner shall prepare an updated written plan. O. Reg. 102/94, s. 33.
The owner shall implement the waste reduction work plan as updated. O. Reg. 102/94, s. 34.
The waste reduction work plan shall include measures for communicating the plan to the owner's employees who work at the building and to any persons who occupy premises in the building as tenants of the owner and, as a minimum, those measures shall require,
that the plan or a summary be posted in places where most employees and tenants will see it; and if a summary is posted, that any employee or tenant who requests to look at the plan be allowed to do so. O. Reg. 102/94, s. 35.

PART VII

RESTAURANTS

36. (1) This Part applies to the owner of a restaurant, including a take-out restaurant.
This Part does not apply with respect to a restaurant that occupies premises in any of the places set out in subsection (3) if the owner of the restaurant co-operates in the conducting of the waste audit and the preparation of the waste reduction work plan required under this Regulation for the place set out in subsection (3).
The places referred to in subsection (2) are,
an establishment in respect of which Part II applies;
a complex in respect of which Part III applies;
a building in respect of which Part VI applies;
a hotel or motel in respect of which Part VIII applies;
a hospital in respect of which Part IX applies;
a location or campus of an educational institution in respect of which Part X applies.
(4) This Part does not apply to an owner of a restaurant in a particular calendar year if,
during the two preceding calendar years there was no year in which the gross sales for all restaurants operated by the owner in Ontario equalled or exceeded $3,000,000; and
the owner is able to demonstrate this fact, within seven days of a request from the Director, through evidence satisfactory to the Director.
(5) Copies of the records related to purchase and sale maintained under subsection 5 (1) of Regulation 1013 of the Revised Regulations of Ontario, 1990 shall be deemed to be sufficient evidence of the gross sales of a restaurant if the copies are certified by the owner or the owner's representative as to the accuracy of the records. O. Reg. 102/94, s. 36.
37. (1) The owner shall conduct a waste audit covering waste generated by the operation of the restaurant. The audit shall also address the extent to which materials or products used consist of recycled or reused materials or products.
After conducting the waste audit, the owner shall prepare a written report of the audit.
In every year following the initial waste audit, the owner shall update the audit and prepare an updated written report. O. Reg. 102/94, s. 37.

38. (1) The owner shall prepare a written waste reduction work plan, based on the waste audit, to reduce, reuse and recycle waste generated by the operation of the restaurant.
(2) In every year following the preparation of the initial waste reduction work plan, the owner shall prepare an updated written plan. O. Reg. 102/94, s. 38.
The owner shall implement the waste reduction work plan as updated. O. Reg. 102/94, s. 39.
The waste reduction work plan shall include measures for communicating the plan to the owner's employees who work at the restaurant and, as a minimum, those measures shall require, that the plan or a summary be posted in places where most employees will see it; and if a summary is posted, that any employee who requests to look at the plan be allowed to do so. O. Reg. 102/94, s. 40.

PART VIII

## HOTELS AND MOTELS

This Part applies to the owner of a hotel or motel that has more than 75 units. O. Reg. 102/94, s. 41.
(1) The owner shall conduct a waste audit covering waste generated by the operation of the hotel or motel. The audit shall also address the extent to which materials or products used consist of recycled or reused materials or products.
After conducting the waste audit, the owner shall prepare a written report of the audit.
In every year following the initial waste audit, the owner shall update the audit and prepare an updated written report. O. Reg. 102/94, s. 42.
43. (1) The owner shall prepare a written waste reduction work plan, based on the waste audit, to reduce, reuse and recycle waste generated by the operation of the hotel or motel.
(2) In every year following the preparation of the initial waste reduction work plan, the owner shall prepare an updated written plan. O. Reg. 102/94, s. 43.
The owner shall implement the waste reduction work plan as updated. O. Reg. 102/94, s. 44.
The waste reduction work plan shall include measures for communicating the plan to the owner's employees who work at the hotel or motel and, as a minimum, those measures shall require, that the plan or a summary be posted in places where most employees will see it; and if a summary is posted, that any employee who requests to look at the plan be allowed to do so. O. Reg. 102/94, s. 45.

PART IX

## HOSPITALS

This Part applies to the operator of a public hospital classified as a class A, B or F hospital in Regulation 964 of the Revised Regulations of Ontario, 1990. O. Reg. 102/94, s. 46.
(1) The operator shall conduct a waste audit covering the waste generated by the operation of the hospital. The audit shall also address the extent to which materials or products used consist of recycled or reused materials or products. After conducting the waste audit, the operator shall prepare a written report of the audit.
In every year following the initial waste audit, the operator shall update the audit and prepare an updated written report. O. Reg. 102/94, s. 47.

48. (1) The operator shall prepare a written waste reduction work plan, based on the waste audit, to reduce, reuse and recycle waste generated by the operation of the hospital.

(2) In every year following the preparation of the initial waste reduction work plan, the operator shall prepare an updated written plan. O. Reg. 102/94, s. 48.

The operator shall implement the waste reduction work plan as updated. O. Reg. 102/94, s. 49.

The waste reduction work plan shall include measures for communicating the plan to the operator's employees who work at the hospital and, as a minimum, those measures shall require, that the plan or a summary be posted in places where most employees will see it; and if a summary is posted, that any employee who requests to look at the plan be allowed to do so. O. Reg. 102/94, s. 50.

PART X

EDUCATIONAL INSTITUTIONS

51. (1) This Part applies to the operator of an educational institution in respect of a location or campus of the institution if, at the location or campus, at any time during the calendar year, more than 350 persons are enrolled.

(2) This Part continues to apply in respect of a location or campus for the two calendar years following the last year in which more than 350 persons were enrolled at the location or campus. O. Reg. 102/94, s. 51.

52. (1) The operator shall conduct a waste audit covering the waste generated by the operation of the institution at the location or campus. The audit shall also address the extent to which materials or products used consist of recycled or reused materials or products.

After conducting the waste audit, the operator shall prepare a written report of the audit.

In every year following the initial waste audit, the operator shall update the audit and prepare an updated written report. O. Reg. 102/94, s. 52.

53. (1) The operator shall prepare a written waste reduction work plan, based on the waste audit, to reduce, reuse and recycle waste generated by the operation of the institution at the location or campus.

(2) In every year following the preparation of the initial waste reduction work plan, the operator shall prepare an updated written plan. O. Reg. 102/94, s. 53.

The operator shall implement the waste reduction work plan as updated. O. Reg. 102/94, s. 54.

The waste reduction work plan shall include measures for communicating the plan to the operator's employees who work at the location or campus and, as a minimum, those measures shall require, that the plan or a summary be posted in places where most employees will see it; and if a summary is posted, that any employee who requests to look at the plan be allowed to do so. O. Reg. 102/94, s. 55.

PART XI

## LARGE MANUFACTURING ESTABLISHMENTS

56. (1) This Part applies to the owner or operator of a site that is a manufacturing establishment.

(2) This Part does not apply to an owner of a site in a particular calendar year if,

during the two preceding calendar years there was no calendar month in which the hours worked by the persons employed at the site exceeded 16,000 hours; and

the owner is able to demonstrate this fact, within seven days of a request from the Director, through evidence satisfactory to the Director. Copies of the records related to hours of employment maintained under section 11 of the *Employment Standards Act* shall be deemed to be sufficient evidence of hours worked at a site if the copies are certified by the owner or the owner's representative as to the accuracy of the records. In this Part, "owner" includes the operator of a manufacturing establishment but does not include a landlord; "site" means one property and includes nearby properties owned or leased by the same person where passage from one property to another involves crossing, but not travelling along, a public highway. O. Reg. 102/94, s. 56.

57. (1) The owner shall conduct a waste audit covering the waste generated by the operation of the establishment at the site. The audit shall also address the extent to which materials or products used or sold consist of recycled or reused materials or products.

After conducting the waste audit, the owner shall prepare a written report of the audit.

In every year following the initial waste audit, the owner shall update the audit and prepare an updated written report. O. Reg. 102/94, s. 57.

58. (1) The owner shall prepare a written waste reduction work plan, based on the waste audit, to reduce, reuse and recycle waste generated by the operation of the establishment.

(2) In every year following the preparation of the initial waste reduction work plan, the owner shall prepare an updated written plan. O. Reg. 102/94, s. 58.

The owner shall implement the waste reduction work plan as updated. O. Reg. 102/94, s. 59.

The waste reduction work plan shall include measures for communicating the plan to the owner's employees who work at the site and, as a minimum, those measures shall require,

that the plan or a summary be posted in places where most employees will see it; and

if a summary is posted, that any employee who requests to look at the plan be allowed to do so. O. Reg. 102/94, s. 60.

# APPENDIX B – STANDARD WASTE AUDIT METHOD

# Disclaimer

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# Contents

## ❶ Application

The *Standard Waste Audit Method* is intended for use by a waste auditor to conduct a study of materials management and solid waste generation at a site. The method is designed to meet and exceed the requirements of Ontario Regulation 102/94 and can be applied to any size or type of industrial, commercial or institutional solid waste generator in any jurisdiction.

For application purposes, the use of the term "must" implies that the action is mandatory to meet *Standard Waste Audit Method* requirements. The use of the term "should" implies that the action is elective.

## ❷ Scope

All solid waste generated from regular activities at the site, whether destined for reuse, recycling or disposal, is to be considered in the course of the waste audit. Temporary waste generation, such as waste from construction and demolition projects that are not part of the regular activities of the site, is to be documented under a separate audit and work plan.

## ❸ Definitions

**ACCEPTANCE CRITERIA:** Specifications set by the process for materials management that when met, facilitate optimum processing results as planned, such as commingling and contamination thresholds.

**ANNUALIZATION FACTOR:** The ratio of the number of operating days at the site to the sample size in days.

**ANNUALIZE:** To calculate the mass of materials generated for an entire year based on any sample size.

**AUDIT TEAM LEADER:** An auditor who in addition to his or her role as an auditor has the capability, authority and responsibility to lead the audit activities.

**AUDIT OBJECTIVE:** The objective of the waste audit is to conduct a study of non-hazardous wastes generated by the auditee site through regular, day-to-day operations. The audit objective may also include additional information that the client wishes to learn through the audit process.

**AUDITEE:** The site being audited.

**AUDITOR:** A member of the audit team with the capability and responsibility to objectively obtain audit evidence and compare the evidence against the criteria.

**CAPTURE RATE:** The proportion of divertible waste, expressed as a percentage, which is successfully diverted from disposal.

**CLIENT:** The organization commissioning the audit.

**DISPOSAL:** Landfilling, incineration, gasification, pyrolysis, plasma arc treatment or another method of thermal treatment, or by deposit at a dump that does not include the handling, storing, transferring, treating or processing of waste at the dump.

**DIVERSION:** The following activities are considered diversion actions: actions to prevent waste materials from

being generated, actions to reduce material generation, reuse (internal or external,) source-separated recycling, composting (on-site or off-site.)

**DIVERSION RATE:** The proportion by mass of all waste diverted from disposal (i.e. landfill or incineration) to the total mass of all waste material generated, expressed as a percentage.

**EXTRAPOLATION METHOD OF ANNUALIZATION:** Estimating the annual mass by extending the sample findings to an annual rate by multiplying an annualization factor.

**FINAL DISPOSITION:** The final destination in the downstream flow of materials where the processed material is to be used as a feedstock or raw material in a manufacturing process or ends up in the disposal stream. With respect to reused items, the disposition chain ends when the material fully changes ownership with confirmation that all parts of the item are being reused.

**HIGH-PRIORITY MATERIALS:** These are materials (i) that are designated to be source-separated as per O. Reg. 103/94, (ii) that are currently divertible or preventable.

**MOECC:** The Ontario Ministry of the Environment and Climate Change.

**MASS RATIO:** The ratio of a specific material found in an audit sample to the total sample size, by mass.

**MASS RATIO METHOD OF ANNUALIZATION:** A method of annualization of findings by applying the mass ratio of each material to the total mass of material generated that year.

**NET WEIGHT:** The net weight of an item is equal to the gross weight (total weight) subtracted by the tare weight (container weight.)

**NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM (NAICS):** The six-digit code corresponding to the establishment's industry classification according to Statistics Canada.

**PER UNIT REDUCTION:** The amount of waste reduced per unit, compared to last year's waste generated per unit (see Waste Generation Index.)

**POINT-OF-GENERATION WASTE AUDIT:** A solid waste audit that classifies the specific origin of the waste in a facility though coding, bag-labelling, or other identification methods.

**SITE:** One property, including nearby properties owned or leased by the same person where passage from one property to another involves crossing, but not travelling along, a public highway.

**SOURCE-SEPARATED MATERIAL:** Material that is separated from other kinds of waste at the source of the material at the generating site and that consists solely of waste from one or more of the following categories as per O. Reg. 103/94:

1. The categories of waste set out in the part of the entity Schedule applicable to the person required to implement the source separation program.

2. The categories of waste set out in Schedule 1, 2 or 3 of Ontario Regulation 101/94 that the source separation program accepts.

Post-collection sorting, such as recyclable material removed from a commingled waste bin at the transfer station, does not qualify as a source-separated diversion activity for the original generator of the waste even though the hauler or processor may ultimately divert the discarded material from disposal.

**SOURCE SEPARATION PROGRAM:** A program to facilitate the separation of waste at the point of generation for reuse or recycling that must include the following: the provision of facilities for the collection, handling and storage of source-separated wastes; measures to ensure that the source-separated wastes that are collected are removed; the provision of information to users and potential users of the program describing the performance of the program encouraging effective source separation of waste and full use of the program;

reasonable efforts to ensure that full use is made of the program and that the separated waste is reused or recycled. The source separation program must provide for all the categories of waste set out in O. Reg. 103/94 applicable to the person required to implement the program except for categories of waste that cannot be reasonably anticipated.

**SWAM:** *Standard Waste Audit Method.*

**TARE:** The allowance or deduction from the gross mass of materials in a container to allow for the mass of the container. It is used to calculate the net mass of a material without removing the material from its container.

**WASTE AUDIT:** A study relating to solid non-hazardous wastes generated by the auditee site through regular, day-to-day operations. The audit must address the amount, nature and composition of the waste; the manner by which the waste is generated, including management decisions and policies that relate to the generation of waste; and the way in which the waste is managed.

**WASTE GENERATION INDEX:** The waste generation index is the unit most closely related to the amount of solid waste generated by the facility such as production units or building population.

**WASTE REDUCTION WORK PLAN:** From O. Reg. 102/94, "a plan to reduce, reuse and recycle waste."

# 4 Waste Audit Activities

## 4.1 Pre-Audit

The waste audit must be completed annually and should be updated whenever there is a significant change in operations or waste streams. The waste audit must be documented in a report and retained for five years.

**Auditee Profile**

A profile of the auditee should be created, describing the scope of the current waste management program and the activities, products and services being performed at the site. The profile should consider the number of operational days at the site, the waste generation index, the size of the facility and other sector-specific data that may impact the amount and nature of waste being generated. The profile should include the NAICS code for the facility.

**Audit Plan**

The audit plan should be developed by the audit team leader in agreement with the Audit Client. The audit plan describes the activities and arrangements for the audit.

The audit plan must include the defined audit scope, audit objective, and audit criteria. The plan should also include the audit team identification; timetable for activities and other information such as language; confidentiality requirements and the audit report contents and distribution.

- **Audit Scope:** The audit scope should be defined by the Client and confirmed by the audit team leader. The scope describes activities, time period and geographic location to be included in the audit.

- **Audit Objective:** The objective is to conduct a study of solid non-hazardous wastes generated by the auditee site through regular, day-to-day operations.

  The waste audit must address the amount, nature and composition of the waste; the manner by which the waste is generated, including management decisions and policies that relate to the generation of waste; and the way in which the waste is managed.

- **Recommendations and Waste Reduction Work Plan:** The client and the audit team leader should determine if recommendations are to be included in the audit report. The findings can be used by the auditee and client to develop a waste reduction work plan. Development of this work plan, which may be a regulatory requirement, is not always in the scope of the audit but can be included in the next phase of the project.

- **Audit Criteria:** The waste audit must be conducted to meet the requirements of Ontario Regulation 102/94 WASTE AUDITS AND WASTE REDUCTION WORK PLANS and Ontario Regulation 103/94 INDUSTRIAL, COMMERCIAL AND INSTITUTIONAL SOURCE SEPARATION PROGRAMS as a minimum.

- **Audit Work Sheets:** The auditor should predict typical waste streams and ensure these are reflected in the waste audit work sheets. Work sheets may be printed or electronic format. The audit must take into account the designated waste streams from O. Reg. 103/94 and any other typical streams and high-priority items.

- Section 7.1, *Table of Standard Waste Streams* is appended. It is recommended that, for comparison

purposes, these streams be referenced as specifically as possible. For example, polyethylene terephthalate (PET) beverage bottles could be included in the stream "Commingled containers for recycling" but if the site separates these containers, a more appropriate and specific stream description would be, "PET (#1) plastic food and beverage bottles."

- **ACCEPTANCE CRITERIA:** Obtain and review the acceptance criteria for staging and contamination for all materials reused, recycled and disposed.

- **SAMPLING:** Decide if the sample will be captured at the source, (e.g. a point-of-generation study,) or at the point of collection, (e.g. the waste staging area, dumpster, compactor area, etc.)

  Establish an appropriate sample size and date. Choose a typical time period of operation, preferably avoiding time periods of surges or lulls in solid waste generation (such as holidays, shutdowns, etc.) Ensure that the sample size is not less than 10% by mass of the typical time period of operation.

  Determine which materials will not likely be found in the audit sample and ensure that reliable records are available for these materials.

  Decide on the time period for the audit sample and ensure that the outbound waste containers are locked or taken out of use for this period. Set up an area for cleaning staff to deposit waste and recycling for measuring by the audit team. Detailed instructions should be supplied to the auditee in advance through a written communique and/or an opening meeting. Ensure instructions include any contractors that are involved with solid waste, such as maintenance contractors or night cleaning staff.

- **ANOMALIES:** The auditor should confirm that the sampling period for the audit will not have any changes in operations that will significantly affect the quantity or composition of the waste sample. Any anomalies encountered or suspected should be confirmed and recorded in the audit report.

## 4.2 PREPARATION OF SORTING AREA

The sample inspection area should be secure, free from pedestrian and vehicular traffic, and protected from the elements. The sample should be stored in a dry, cool (not freezing,) sheltered area. If the sample is left out and exposed to rain, the result will be a falsely-high weight due to high moisture content and a new sample must be arranged. If the sample is allowed to freeze, the analysis may be impossible as the material cannot be separated into components.

The sort area should be in close proximity to the waste and recycling collection containers if possible, unless the audit plan requires a different arrangement.

Materials should be measured before they are placed in the totes, compactors, bins, etc. for disposal, recycling or reuse. Materials must not be compacted before inspection in the waste audit.

The waste sorting should occur in the presence of a representative of the organization if the waste sorting is conducted by a third-party auditor.

**POINTS OF GENERATION**
All functional areas that are in the scope of the waste audit must be identified.

In consultation with the auditee's cleaning staff, the audit team leader should determine how much waste and recycling is typically generated over the sample time period. For example, if material is collected in bags, the audit team should determine an estimate of the number of bags of waste and recycling typically generated in each functional area and create labels or tags for each of these bags.

## 4.3 ON-SITE AUDIT ACTIVITIES

### 4.3.1 QUALITATIVE ACTIVITIES

**INTERVIEWS:** When conducting interviews, auditors should introduce themselves to the interviewee and explain the purpose of the assessment. The auditor should reassure the interviewee that the information is to evaluate the waste management practices of the facility and is not a reflection of the individual interviewee's performance.

**OBSERVATIONS:** Objective observations should be recorded in the audit work sheets. Waste samples and staging areas should be observed to determine if the materials meet the pre-determined acceptance criteria for each material's respective method of disposition.

If agreed in advance, digital photographs may be used as part of the process of collecting audit evidence. Auditors should obtain permission before taking a photograph. Auditors should ensure that no pictures of people or confidential items are captured.

Through on-site interviews or a pre-audit questionnaire, auditors should obtain the following information:

1. ***Reused and Recycled Content:*** Can the organization demonstrate that it considers reduction, re-use and recycled content options in the products and materials it uses internally? Describe how the organization uses products and materials that consist of reused or recycled content, and describe the rationale behind the organization's choice of these products and materials.
2. ***Base Year:*** What is the base year for the waste audit? The base year is the first year that a waste audit was conducted and/or the year being used for benchmark comparison purposes. Obtain a copy of the base year audit summary and the most recent audit summary, if applicable. If this is the first year a waste audit is being conducted, then this should be considered the base year.
3. ***Other inspections, audits and assessments:*** What was the date of the most recent physical waste inspection, not necessarily a full waste audit?
4. ***Waste Generation Index:*** Define the measurable per unit indicator for the facility that is most closely related to solid waste generation. For example, for a manufacturing facility, the number of production units per annum.
    - ***a.*** What was the per unit waste generation index of the facility for this year?
    - ***b.*** What was the per unit waste generation index last year?

***5. Operational days:*** How many days per year does the facility operate?

***6. Other materials:*** Which materials will not be included in the waste audit sample? Obtain records for these to ensure that the amounts are added in to the annualized material mass totals. For example, temporary bins or materials sent out for external reuse.

***7. A profile of each solid waste stream generated:***

- The name of the material, product or waste stream. (e.g. fine paper, PET drink containers, glass, etc.)
- A description of how the waste is generated.
- A description of the management decisions and policies that affect the generation of this material.
- A description of the acceptance criteria for this stream.
- A description of the source separation program for this stream.
- Determination if the waste stream is divertible in current viable markets and a related explanation if the material is deemed not divertible.
- Related regulatory permit requirements and assurances each and any reuse, recycling and waste handler in the disposition chain. Obtain copies of Certificates of Approval and/or equivalent assurances.
- Identification of the chain of disposition of each waste stream:
    - The first location, processor name and phone number through to the final location, processor name and phone number.
    - A description of the method of final disposition and end market for the material should be recorded.

### 4.3.2 Quantitative Activities

The auditor should verify or calibrate scales at least once per audit day and keep records. Auditors must ensure that the scale is placed on a level surface and is reset each time the scale used. Auditors must ensure that consistent units are used as appropriate and that the final report is made using SI units (metric tonnes.)

**Sampling methods:**

The auditor must document the most appropriate sampling method used, or a combination of each:

**1) Bulk sorting:**

**a.** Re-affirm that materials meet the pre-determined acceptance criteria for each material's respective method of disposition. If materials do not meet the acceptance criteria, record the finding.

**b.** Empty containers onto a table or tarped area for sorting into material component categories.

**c.** Record the origin of material.

**d.** Record the intended destination of the material (reuse, recycling or disposal.)

**e.** Sort materials into component categories.

**f.** Weigh each component category and record on the audit work sheets.

**g.** Optional: Photograph observations which will enhance the report and/or be of interest to the client.

**h.** When the measurements and observations are complete, place contents in a cart or in the designated bin for recycling, reuse or disposal.

**2) SORTING BY CONTAINER OR BAG:**

For each bag or container of material in the sample:

**a.** Re-affirm that materials meet the pre-determined acceptance criteria for each material's respective method of disposition. If the materials do not meet the acceptance criteria, record the finding.

**b.** Place the entire bag on the scale, or within secondary containment, ensuring the entire bag is on the platform and not touching any other item or the ground. If secondary containment is to be used, ensure that the scale is tared to allow for the mass of the container. Record the total mass of the bag or container contents in the audit work sheets.

**c.** Record the origin of the bag/container.

**d.** Record the intended destination of material (reuse, recycling or disposal.)

**e.** Open the bag/container and identify the main elements of the bag/container.

**f.** For each material type that is divertible and/or a high-priority item, remove all items of this type and place aside for weighing or record the difference on the scale.

**g.** Optional: Photograph observations which will enhance the report and/or be of interest to the client.

**h.** When measurements and observations are complete, place contents in a cart or in the designated bin for recycling, reuse or disposal.

▷ **CONTAMINATION OF RECYCLABLE AND/OR REUSABLE MATERIALS:**

If materials destined for reuse or recycling are deemed too highly contaminated as per the pre-determined acceptance criteria, auditors must note the non-conformity in the sampling notes, and the mass of all of the materials in the contaminated sample must be categorized as disposed.

**BENCHMARKING**

It is preferable to use actual weights whenever possible with all balances and scales being calibrated or verified. If this is not possible, then the next option is to weigh representative samples, ensuring that this type of benchmark is realistic and verifiable. The benchmarking should be revisited and updated periodically and whenever a significant change in operation occurs. The benchmarking method should only be used for standard sized containers and predictable streams. Rationale and methods must be documented by the auditors.

Estimates may be used in absence of verified measurements and for comparison purposes. If estimates are used, the method of estimation should be described in the audit report.

**RECORDS**

Auditors should obtain waste, recycling and reused material records of the past year from the auditee. Auditors should also obtain calibration records of the waste transfer station, hauler, processors, etc., from the auditee. These can be included in an appendix in the audit report. The auditor may use the records to compare against the audit sampling quantitative findings and to determine an annualized total of solid waste generated for disposal, reuse and recycling along with any temporary bins from atypical operations.

**YEAR-OVER- YEAR CHANGES IN RECORD-KEEPING AND OTHER ANOMALIES:**

It is possible that a facility may improve its record-keeping practices in subsequent years as processes improve. This may lead to the false conclusion that the facility has had an increase in material generation. For example, a facility implemented a tracking system to record all of the materials being donated for external reuse but the records were not available until the second year.

If this occurs, it is acceptable for the facility to update the base year/previous year data only to allow for the items not previously recorded if it is reasonable to assume that no additional material was actually generated. This is particularly important with per unit waste generation comparisons. This information and the related rationale must be included in the audit report.

## 5 Data Analysis

Determine the mass of all waste materials and the corresponding destination. This should be calculated for each category waste stream (i.e. cardboard, fine paper, steel) and each method of disposition (reuse, recycle, and disposal.)

In the formulae describing annualization methods, the following variables are used:

$T_s$ is the total material generated in a specific category found in the audit sample.

$T_c$ is the total mass of all materials found in the audit sample with a specific method of disposition (reuse or recycling or disposal.) For materials analyzed during the audit, there will likely be a different value of $T_c$ for all materials sent for disposal, for all materials sent for reuse, and for all materials sent for recycling during the sampling period.

$T_r$ is the annual mass per category of materials of items not found in the audit sample for which there are records or reasonable estimates. These would be materials that would not have been found in the audit sample but are a regularly generated waste stream, such as furniture or wood pallets offered for external reuse. This is quantified and substantiated by records kept by the auditee. These materials should be accounted for in the final calculation.

$T_t$ is the total annual mass of material, substantiated by records, per container. For example, a site may have records for each haul of a 40 yard bin of waste. Therefore, $T_t$ for this container would be the sum of the mass of all hauls that year for that container.

$m$ is the total annual mass of each material. Note that this should be calculated for each category of waste and for each method of disposition (reuse, recycling and disposal.)

$N$ is the number of operational days per year.

$S$ is the sample size measured in number of days.

### 5.1 Extrapolation Method of Annualization

If annual waste and recycling records are not available, are deemed inaccurate or are not verifiable, and if the sample is representative (there are very few fluctuations in the day to day operations of the facility) then the extrapolation method may be used. For each material generated and for each method of disposition, the total annual mass is:

$$m = \left(\frac{N}{S}\right)(T_s) + T_r$$

## 5.2 Mass Ratio Method of Annualization

This method is preferred if the annual waste and recycling records are deemed accurate and verifiable. For each material and for each method of disposition, the total annual mass is:

$$m = \left(\frac{T_s}{T_c}\right)(T_t) + T_r$$

## 5.3 Performance Indicators

### 5.3.1 Diversion Rate (D)

$$D = \frac{(the\ total\ mass\ of\ all\ materials\ diverted\ to\ reuse\ or\ recycling\ this\ year)}{(the\ total\ mass\ of\ all\ materials\ generated\ this\ year)} \times 100\%$$

### 5.3.2 Capture Rate (C)

$$C = \frac{(mass\ of\ all\ divertible\ materials\ that\ were\ actually\ diverted\ to\ reuse\ or\ recycling\ this\ year)}{(the\ total\ mass\ of\ all\ divertible\ materials\ generated\ this\ year)} \times 100\%$$

### 5.3.3 Waste Reduction: Year-Over-Year change in waste generation, ΔP

$I_c$ is the waste generation index for the current year (for example, for a school, this year's enrolment.)

$I_p$ is the waste generation index for the previous year (for example, last year's enrolment.)

$A_c$ is the annual waste generation per unit for the current year.

$$A_c = \frac{total\ mass\ of\ all\ materials\ generated\ in\ the\ current\ year}{I_c}$$

$A_p$ is the annual waste generation per unit for the previous year.

$$A_p = \frac{total\ mass\ of\ all\ materials\ generated\ in\ the\ previous\ year}{I_p}$$

$\Delta P$ is the change in waste generation per unit, year-over- year. *A negative result is desirable, and means that waste per unit has decreased.*

$$\triangle P = (-1)(A_p - A_c)$$

$\%\Delta P$ is the percentage change per unit year-over-year comparison.

$$\%\triangle P = \frac{(-1)(A_p - A_c)}{A_p} \times 100\%$$

# 6 Post-Audit Activities

## 6.1 Audit Report

The audit report must include the audit scope, objectives, criteria and conclusion. The audit conclusion describes the extent to which the audit objectives have been fulfilled.

The audit report must address the amount, nature and composition of the waste; the manner by which the waste is generated including management decisions and policies that relate to the generation of waste; and the way in which the waste is managed.

Audit reports must include:

- a description of the audit sampling method used,
- the sample size,
- the sample date, and
- the method of annualization.

Audit reports should also include:

- highlights of observations (annotated and/or photographs,)
- qualitative findings,
- quantitative findings,
- recommendations (if in the scope of the audit,) and
- waste audit summary forms or equivalent in in accordance with O. Reg. 102/94.

The report must also include a description of any anomalies and a statement of sampling limitations. The auditor should confirm that the sampling period for the audit did not have any changes in operations which would have significantly affected the quantity or composition of the waste sample.

Copies of waste, recycling, reuse, scale verification and calibration records may be included in an appendix. If in the scope of the audit, an audit report may also include a waste reduction work plan and the related summary forms or equivalent in accordance with O. Reg. 102/94.

## 6.2 Waste Reduction Work Plan

Using the results of the waste audit, the auditee should develop, approve and implement a waste reduction work plan in compliance with ONTARIO REGULATION 102/94 WASTE AUDITS AND WASTE REDUCTION WORK PLANS. The auditee should define the one-year time period for the waste reduction work plan.

The waste reduction work plan must be updated annually and should be updated whenever there is a significant change in operations or waste streams.

The waste reduction work plan must include plans to reduce, reuse and recycle waste and must set out who will implement each part of the plan, when each part will be implemented, and what the expected results are.

In developing the work plan, the 3Rs Hierarchy principles must be followed:

1. Reduction is the first objective.
2. If reduction is not possible, then reuse is the next objective.
3. If reduction and reuse are not possible, then recycling is the final objective.

The work plan must include measures for communicating the work plan to the users of the waste management program. The waste reduction work plan or a summary of the plan must be posted on site so that users of the program can see it.

The work plan should address for each divertible waste stream identified in the waste audit:

- **i.** Summarized plans to reduce the stream.
- **ii.** Projected reduced amount for the next year in annual tonnes.
- **iii.** Summarized plans to reuse the stream.
- **iv.** Projected reused amount for the next year in annual tonnes.
- **v.** Summarized plans to recycle the stream.
- **vi.** Projected recycled amount for the next year in annual tonnes.
- **vii.** Name of individual responsible for implementing the waste reduction work plan.
- **viii.** Scheduled date of program completion (on-going or date, if a finite time period.)
- **ix.** Program status as of the work plan date.

## 7 Reference

Ontario Ministry of the Environment and Climate Change Regulations: O. Reg. 101/94, O. Reg. 102/94, O. Reg. 103/94
Statistics Canada North American Industry Classification System (NAICS) Canada 2012

### 7.1 Table of Standard Waste Streams

ABS
Acrylic scrap
Aluminum
Aluminum food or beverage cans (including cans made primarily of aluminum)
Aluminum turnings, extrusions, wire, etc.
Aseptic packaging
Batteries
Boxboard
Boxboard with poly
Boxboard, waxed
Brass, bronze scrap, turnings, etc.
Building/renovation material
Carbon interleaved ledger paper
Cardboard, contaminated
Cardboard, corrugated
Cardboard, waxed
Carpet scrap
Cast iron scrap
Cell phones
Clothing/textiles
Coffee grinds
Commingled containers for recycling
Commingled fibre for recycling
Compostable paper cups
Compostable waxed paper
Copper pipes, wire turnings, etc.
Cross-linked polyethylene
Cup trays
Diapers
Drywall (painted)
Drywall (unpainted)
EVA
Feminine hygiene
Fine paper
Food containers
Furniture not already classified by its main component, such as steel or wood
Glass
Glass bottles and jars for food or beverages
Glossy magazines, catalogues, flyers
Groundwood fibre
HDPE (#2) food and beverage containers
HDPE (#2) plastic jugs, crates, totes and drums
High-density polyethylene drool/purging
High-density polyethylene fines
High-density polyethylene regrind
High-density polyethylene scrap
IT equipment/audio-visual equipment
Kraft paper
Label backing
Latex rubber
LDPE (#4) plastic film
LDPE (#4) plastic film, contaminated
Lead dross, solder, scrap, etc.
Low-density polyethylene drool/purge
Low-density polyethylene regrind
Low-density polyethylene scrap
Magnesium dross, turnings, scrap, etc.
Metal strapping
Mixed/fused plastics
Multi-layered material, contaminated food wrapping
Newsprint
Non-compostable paper cups
Nylon
Nylon purging/drool
Nylon regrind
Organics
Other electronic waste
Other non-ferrous scrap metals
Other non-fine paper
Other organic waste such as plant trimmings, yard waste
Other PET packaging
Other plastic (#7)
Other plastic
Other polypropylene
Other polystyrene
Other rubber waste
Other scrap iron and steel
Other scrap metal
Other shrink wrap

Other spent lamps
Other textiles
Other wood waste
Paper cups
Paper towels
PET (#1) plastic food and beverage bottles
PET flake
PET scrap
Plastic garment hangers
Plastic gloves
Polycarbonate
Polyester
Polyethylene (high density) jugs, pails, crates, totes and drums
Polyethylene (linear low density and low density) film
Poly-lined/fused paper
Polypropylene (#5)
Polypropylene drool/purge
Polypropylene regrind
Polypropylene strapping
Polypropylene twine
Polystyrene (#6)
Polystyrene (expanded) foam
Polystyrene drool/purge
Polystyrene scrap
Polystyrene trays, reels and spools
Polyurethane foam
Post-consumer food waste
Precious metals
Pre-consumer food waste
Printer cartridges
PVB
PVC (#3)
PVC piping
Rigid polystyrene
Rigid polyurethane
Rubber tires
Sawdust

Single use protective clothes not otherwise classified
Solid fibre containers
Spent fluorescent lamps
Spent single cup coffee cartridges
Steel bushings
Steel cans
Steel food and beverage cans
Steel food or beverage cans (including cans made primarily of steel)
Steel scrap
Sticky labels
Strapping not otherwise classified
Super sacks
Textile gloves
Textile rags
Thermal ledger paper
Tin pewter, dross, solder, etc.
Toner cartridges
Used clothing and footwear
Vinyl shrink wrap
Vinyl wrap
White goods
Wood (not including painted or treated wood
or laminated wood)
Wood (painted/treated)
Wood crates
Wood offcuts
Wood skids
Zinc borings, turnings, dross, dust, etc

# STANDARD WASTE AUDIT METHOD

## *APPENDIX C – CONTINUOUS IMPROVEMENT FUND COMMODITY PRICE SHEET*

Ontario market trends of CAD per metric tonne. December 2023 results, plus a 12-month comparison. Also, yearly averages since 2006.



*continued…*

CIF
CONTINUOUS IMPROVEMENT FUND

# Price Sheet – December 2023

Ontario Market Price Trends | CDN$/Metric Tonne | Page 1

## MONTHLY AVERAGES (CDN$/Metric Tonne)

| | July 2022 | Aug 2022 | Sept 2022 | Oct 2022 | Nov 2022 | Dec 2022 | Jan 2023 | Feb 2023 | Mar 2023 | Apr 2023 | May 2023 | June 2023 | July 2023 | Aug 2023 | Sept 2023 | Oct 2023 | Nov 2023 | Dec 2023 | # of Muni. (Monthly Change) | Price Range (CDN/Metric Tonne) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Newspaper (ONP #8 / SRP #56)[1] | 193 | 161 | 139 | 73 | 49 | 50 | 49 | 50 | 58 | na | na | na | na | na | na | na | na | na | *2 (0)* | *na* |
| Mixed Paper #54 / ONP#6[2] | 101 | 55 | 13 | (10) | (22) | (14) | (10) | (13) | (3) | 11 | 4 | 10 | 9 | 12 | 21 | 29 | 30 | 33 | *4 (0)* | *(20) - 71* |
| Corrugated (OCC) | 216 | 187 | 128 | 68 | 57 | 62 | 60 | 64 | 73 | 84 | 90 | 96 | 95 | 103 | 114 | 134 | 140 | 147 | *7 (0)* | *133 - 156* |
| Hardpack (OBB/OCC) | 123 | 81 | 44 | (1) | (5) | (5) | (5) | (1) | (2) | 23 | 19 | 24 | 9 | 13 | 24 | 31 | 38 | 40 | *4 (0)* | *(42) - 94* |
| Bosboard (OBB) | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | *1 (1)* | *na* |
| Polycoat Containers | na | 67 | na | na | 40 | 34 | 30 | 20 | 19 | 36 | 12 | na | na | na | na | na | na | na | *1 (-1)* | *na* |
| PET (mixed) | 640 | 283 | 169 | 186 | 247 | 293 | 334 | 376 | 406 | 430 | 433 | 334 | 177 | 88 | 146 | 246 | 324 | 367 | *10 (0)* | *345 - 407* |
| HDPE (mixed) | 509 | 328 | 219 | 240 | 301 | 276 | 296 | 433 | 440 | 506 | 591 | 470 | 227 | 235 | 403 | 481 | 606 | 565 | *6 (-3)* | *475 - 650* |
| Plastic Tubs & Lids | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | *0 (-1)* | *na* |
| Mixed Plastics[3] | 80 | 97 | 51 | 47 | 54 | 48 | 68 | 86 | 98 | 107 | 104 | 63 | (25) | (38) | (20) | 27 | 28 | 34 | *7 (0)* | *25 - 40* |
| Film Plastic | na | 17 | na | na | na | (53) | na | na | na | na | na | na | na | na | na | na | na | na | *1 (-1)* | *na* |
| Aluminum Cans | 2251 | 2085 | 2002 | 1920 | 1978 | 2039 | 2087 | 2345 | 2332 | 2159 | 2133 | 2015 | 1885 | 1840 | 1823 | 1883 | 1888 | 1875 | *8 (-2)* | *1631 - 1977* |
| Steel Cans | 343 | 310 | 285 | 277 | 254 | 270 | 318 | 342 | 425 | 415 | 356 | 324 | 319 | 351 | 352 | 363 | 385 | 415 | *10 (0)* | *395 - 438* |
| Glass (mixed) | (44) | (44) | (44) | (49) | (52) | (47) | (44) | (45) | (40) | (42) | (43) | (43) | (39) | (39) | (40) | (38) | (39) | (39) | *6 (0)* | *(80) - (15)* |
| **Composite Index** | **223** | **164** | **117** | **86** | **84** | **92** | **104** | **118** | **130** | **138** | **137** | **125** | **101** | **96** | **113** | **131** | **147** | **151** | | |
| **Fibre Composite Index[4]** | **162** | **126** | **80** | **34** | **21** | **27** | **30** | **31** | **39** | **52** | **52** | **58** | **54** | **60** | **71** | **85** | **89** | **94** | | |
| **Container Composite Index[5]** | **343** | **238** | **190** | **188** | **207** | **222** | **256** | **295** | **315** | **314** | **310** | **262** | **195** | **169** | **198** | **225** | **264** | **265** | | |

## YEARLY AVERAGES (CDN$/Metric Tonne)

| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Newspaper (ONP #8 / SRP #56)[1] | 89 | 118 | 121 | 72 | 90 | 126 | 76 | 71 | 69 | 72 | 103 | 111 | 62 | 44 | 58 | 145 | 146 | 52 |
| Mixed Paper #54 / ONP#6[2] | | | | | | | | | | 43 | 73 | 73 | 2 | (18) | (4) | 78 | 62 | 11 |
| Corrugated (OCC) | 80 | 131 | 111 | 68 | 149 | 173 | 133 | 131 | 131 | 127 | 152 | 221 | 128 | 84 | 117 | 201 | 170 | 100 |
| Hardpack (OBB/OCC) | 50 | 89 | 76 | 42 | 74 | 95 | 61 | 53 | 51 | 66 | 91 | 121 | 57 | 19 | 30 | 103 | 85 | 18 |
| Bosboard (OBB) | 41 | 70 | 62 | 26 | 61 | 84 | 62 | 46 | 48 | 50 | 50 | na | na | na | na | na | na | na |
| Polycoat Containers | 59 | 84 | 75 | 39 | 105 | 127 | 96 | 65 | 79 | 114 | 114 | 64 | 63 | 40 | 20 | 14 | 48 | 23 |
| PET (mixed) | 314 | 368 | 352 | 187 | 391 | 652 | 431 | 372 | 377 | 295 | 265 | 383 | 431 | 377 | 212 | 470 | 628 | 305 |
| HDPE (mixed) | 565 | 524 | 573 | 320 | 464 | 562 | 552 | 497 | 659 | 617 | 533 | 497 | 483 | 444 | 310 | 1227 | 567 | 438 |
| Plastic Tubs & Lids | 128 | 146 | 204 | 22 | 54 | 247 | 265 | na | na | na | na | na | na | na | na | na | na | na |
| Mixed Plastics[3] | | | | | | 48 | 32 | 38 | 46 | 58 | 61 | 32 | 47 | 74 | 82 | 220 | 195 | 44 |
| Film Plastic | 137 | 51 | 35 | 3 | 13 | 25 | 23 | 14 | 29 | 47 | 40 | 24 | 15 | 3 | (21) | 4 | 16 | na |
| Aluminum Cans | 2169 | 2065 | 1904 | 1215 | 1591 | 1790 | 1516 | 1523 | 1783 | 1548 | 1576 | 1772 | 1733 | 1354 | 1311 | 1995 | 2462 | 2022 |
| Steel Cans | 141 | 168 | 245 | 89 | 263 | 335 | 277 | 257 | 299 | 179 | 200 | 262 | 322 | 253 | 215 | 431 | 371 | 364 |
| Glass (mixed) | (31) | (31) | (24) | (18) | (15) | (11) | (18) | (22) | (22) | (30) | (37) | (42) | (41) | (38) | (37) | (41) | (44) | (41) |
| **Composite Index** | **111** | **145** | **150** | **80** | **124** | **169** | **118** | **107** | **117** | **105** | **129** | **154** | **118** | **90** | **82** | **204** | **203** | **124** |
| **Fibre Composite Index[4]** | | | | | | | | | | **77** | **109** | **132** | **75** | **49** | **51** | **136** | **119** | **60** |
| **Container Composite Index[5]** | | | | | | | | | | **188** | **184** | **217** | **239** | **205** | **160** | **359** | **369** | **256** |

Disclaimer: The CIF Price Sheet provides an estimate of the average commodity prices from a sample of municipalities located across Ontario. Please note the estimate in no way represents, reflects or captures all municipal conditions. You acknowledge that in using the CIF Price Sheet neither CIF, nor any of its agents, partners, affiliates, directors, employees, assigns and associates may be held liable, responsible or accountable for any type of damage, litigation or other legal action that may arise directly or indirectly from the reliance on the CIF Price Sheet.

**Pricing Notes:**

1. Paper Stock Industries (PSI) have eliminated the ONP#8 grade specification. For continuity, the new PSI grade specification, Sorted Residential Paper (SRP #56), has been included as it most closely represents the ONP#8 commodity ON municipalities are producing.
2. Paper Stock Industries (PSI) have eliminated the ONP#6 grade specification and added a new PSI grade specification, Mixed Paper #54. Mixed Paper has already been capture on the price sheet with the new grade number being added.
3. The composition for mixed plastics varies from each municipality based on the range of materials accepted and the specifications from their end markets.
4. The Fibre Composite Index is calculated using ONP#8 / SRP#56, Mixed Paper #54 / ONP#6, Corrugated (OCC), Hardpack (OBB/OCC), and Boxboard (OBB).
5. Polycoat containers are included in the container composite index and NOT the fibre composite index.

**General Notes:**

A. Prices are for baled post-consumer residential materials except glass, which is loose.
B. As of May 2012, prices for all materials are FOB the municipality including glass. Prior to May 2012, prices for glass were delivered prices.
C. The Composite Index is calculated using the overall composition of residential Blue Box material recovered and marketed in Ontario as reported from the approved 2021 RPRA (formerly WDO) Datacall with some additional allocations to material categories. Mixed glass includes coloured glass. Composition figures are updated annually. Details available upon request.
D. Materials with a listed price of "NA" indicate either an insufficient number of municipalities reported a price in the given month (<4) or variation in the reported price which is not considered representative of Ontario.
E. Prices are compiled from a range of municipal programs across Ontario combined with information from industry representatives. Prices may not be the same as actual prices being paid in any given program.
F. "Price Range" reflects the second highest and lowest prices used in calculating the average (trim mean). The highest and lowest prices have been excluded to account for outliers/unique local conditions.

For more information:
Neil Menezes, EcoCompass Inc.
nmenezes@ecocompass.ca, 416-735-3674



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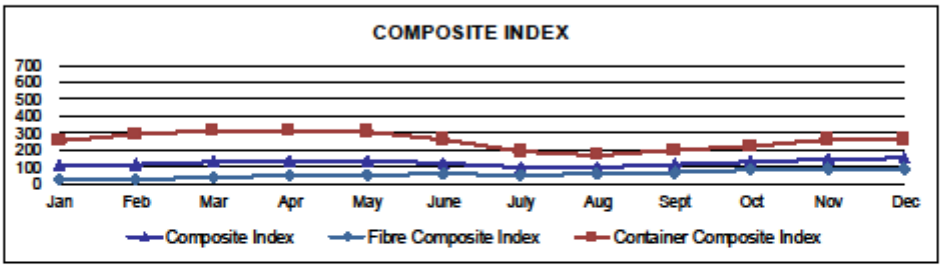
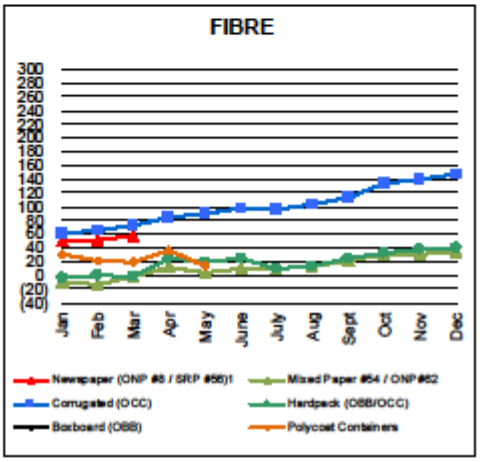
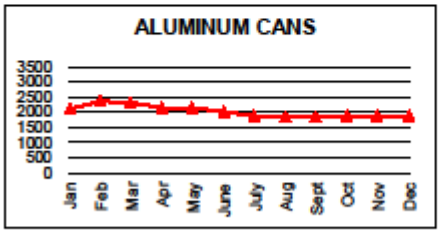
CIF CONTINUOUS IMPROVEMENT FUND

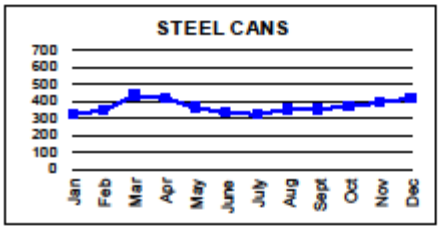
# Price Sheet – December 2023

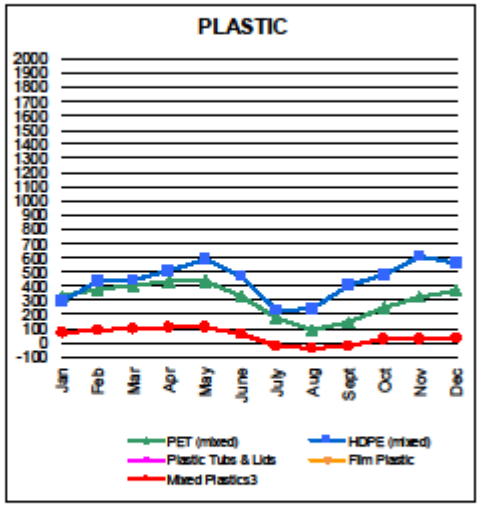
Ontario Monthly Averages | CDN$/Metric Tonne | Page 2

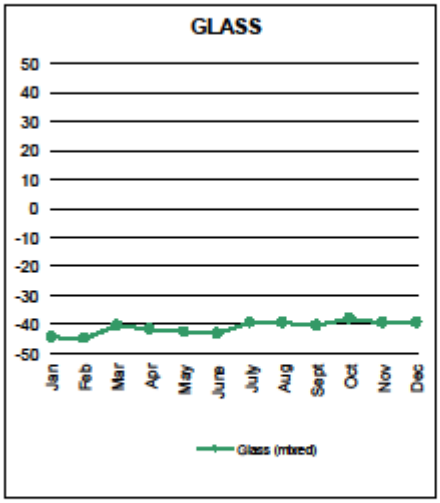



Graphs produced from Monthly Averages Table.

For more information:
Neil Menezes, EcoCompass Inc.
nmenezes@ecocompass.ca, 416-735-3674



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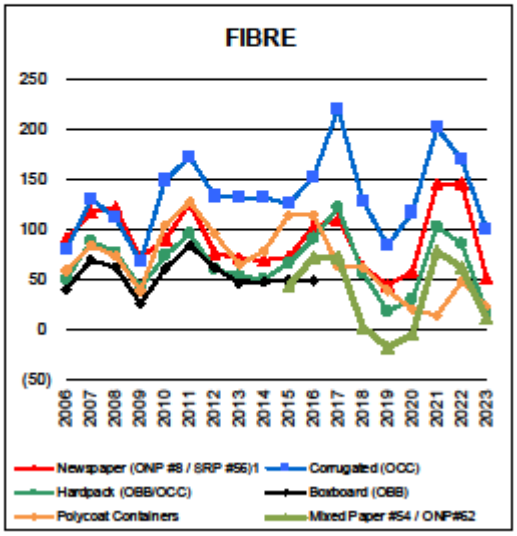
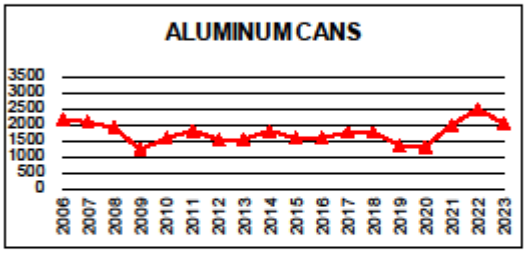
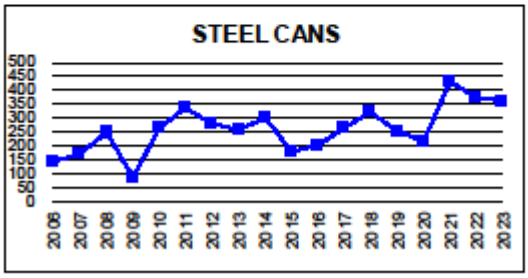
CIF CONTINUOUS IMPROVEMENT FUND

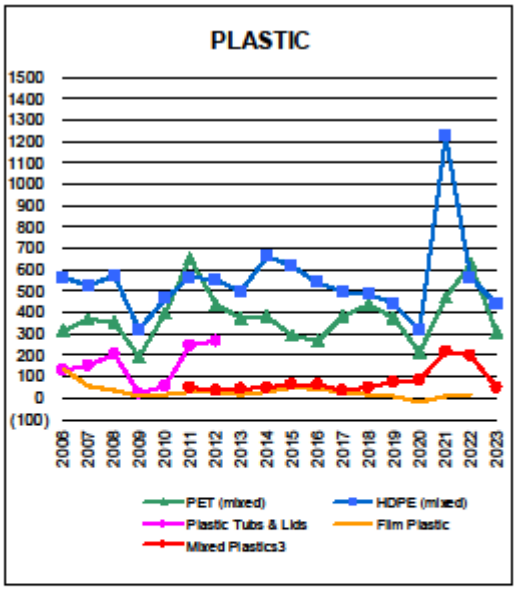
# Price Sheet – December 2023

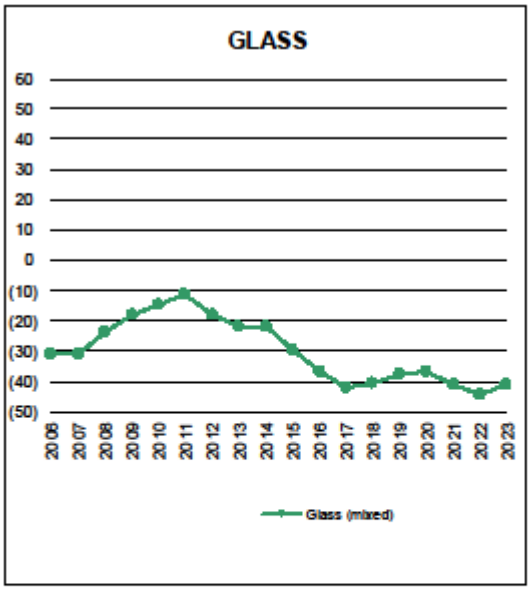
Ontario Historical Yearly Averages | CDN$/Metric Tonne | Page 3




Graphs produced from Yearly Averages Table

For more information:
Neil Menezes, EcoCompass Inc.
nmenezes@ecocompass.ca, 416-735-3674



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