

Canada Plastics Pact  
Foundational Research  
and Study:

**Canadian Plastic  
Packaging Flows**



## Canada Plastics Pact Mission

The Canada Plastics Pact (CPP) is tackling plastic waste and pollution, as a multi-stakeholder, industry-led, cross-value chain collaboration platform. The CPP brings together Partners who are united behind a vision of creating a circular economy in Canada in which plastic waste is kept in the economy and out of the environment. It unites businesses, government, non-governmental organizations and other key actors in the local plastics value chain behind clear actionable targets for 2025. By aligning with the Ellen MacArthur Foundation's global Plastics Pact network and the New Plastics Economy's common vision of a circular economy for plastics, CPP Partners commit to fundamentally rethinking the way we design, use, and reuse plastic packaging. The Canada Plastics Pact is a member of the Ellen MacArthur Foundation's Global Plastics Pact network. It operates as an independent initiative of The Natural Step Canada, a national charity with over 25 years experience advancing science, innovation and strategic leadership aimed at fostering a strong and inclusive economy that thrives within nature's limits.

[www.plasticspact.ca](http://www.plasticspact.ca)

While we have taken reasonable steps to ensure this report is accurate, the Canada Plastics Pact does not accept liability for any loss, damage, cost or expense incurred or arising from reliance on this report. Readers are responsible for assessing the accuracy and conclusions of the content of this report. This material is subject to copyright, owned by the Canada Plastics Pact. You may use excerpts from it provided they are not used in a misleading context and you must identify the source of the material and acknowledge the Canada Plastics Pact copyright. You must not use this report or material from it to endorse or suggest the Canada Plastics Pact has endorsed a commercial product or service.

©Canada Plastics Pact, Revised May, 2021

Written and researched by:

**Glenda Gies &  
Associates Inc.**

**JTL**   
**SQUARED**  
CONSULTING INC.

**LICHENS**  
RECYCLABILITY

**NOVAXIA**

 **POLICY  
INTEGRITY**  
CONSULTING

 **WESTERVIEW**  
CONSULTING

# Table of Contents

<b>1 Executive Summary</b> .....	<b>4</b>
<b>2 Background</b> .....	<b>10</b>
<b>3 Objectives And Scope</b> .....	<b>10</b>
<b>4 Approach</b> .....	<b>10</b>
4.1 Key Terms And Points Of Measurement .....	10
4.2 Data Sources .....	12
4.3 Methodology .....	15
<b>5 Plastic Packaging Generated And Available For Collection</b> .....	<b>19</b>
5.1 By System .....	19
5.2 Under Regulated Systems And Non-Regulated Systems .....	19
<b>6 Collection And Management Of Plastic Packaging</b> .....	<b>20</b>
6.1 By Sector .....	20
6.2 By Resin And Format .....	26
<b>7 Comparison To Other Studies</b> .....	<b>28</b>
<b>8 Recyclability Assessment</b> .....	<b>28</b>
8.1 By Resin And Format .....	28
8.2 Dashboard .....	30
<b>9 Strengths And Weaknesses, Challenges And Opportunities</b> .....	<b>32</b>
9.1 Data Reliability .....	32
9.2 Strengths And Weaknesses .....	37
9.3 Rigid Plastic Packaging .....	37
9.4 Flexible Plastics Packaging .....	38
<b>10 References</b> .....	<b>39</b>
<b>Appendix A – Provincial, Territorial And Regional Summaries</b> .....	<b>40</b>



## 1 Executive Summary

This report was commissioned by the Canada Plastics Pact (CPP). The objective was to review the quantity of plastic packaging generated across Canada and to understand how the plastic packaging is being managed. The report provides a system-level view as an anchor point for CPP as it takes steps to meet its targets. The report also provides an overview of factors currently influencing the Canadian plastics packaging landscape, identifies potential solutions, and suggests where focus is necessary to achieve CPP's goals.

**This study distinguishes itself from prior studies in three ways:**

**1** Provides greater resolution and focus on plastic packaging specifically.

**2** Applies a 'bottom-up' approach using data from a variety of sources (waste composition studies, reports published by regulated programs, service providers) as the basis for modelling.

**3** Estimates flows at every stage in the process, from generation through to recycling.

## DATA RELIABILITY

One of the most significant findings of this report was in respect to the data reliability and availability, which presents challenges for taking targeted system-level action.

The report presents the best available information or, where data was limited or unavailable, the best estimate. While data for plastic packaging managed under regulated deposit systems and regulated producer responsibility systems is generally more available, with more detailed and comprehensive reporting occurring in deposit systems,

measurement and reporting of the generation, collection, sorting and recycling of plastic packaging is inconsistent across Canada and across systems and sectors.

Data gaps led to the application of confidence ranges that reflect uncertainty. Table ES1 provides an overview of the confidence levels in the national data presented in the report.

**Measurement and reporting of the generation, collection, sorting and recycling of plastic packaging is inconsistent across Canada and across systems and sectors.**

Table ES1: **National Data Reliability**

Categories	Generated	Collected	Sorted	Recycled
Plastic Packaging under Deposit	Higher	Higher	Higher	Medium-High
Other Plastic Packaging from Residences				
Producer responsibility	Medium-High	Medium-High	Medium-High	Medium-High
Non-Producer responsibility	Medium-Low	Medium-Low	Medium-Low	Medium-Low
Other Plastic Packaging from Businesses and Institutions	Lower	Lower	Lower	Lower

Higher
  Medium-High
  Medium-Low
  Lower

Data challenges will need to be addressed to allow for better measurement against the targets set by the CPP, particularly to address the following data limitations:

- Inconsistent methodologies being used across jurisdictions to track and measure generation, collection and sorting;
- Minimal tracking of the use of sorted material in remanufacturing with the result that data on the portion of the sorted material that is actually recycled is limited.
- Minimal data on Other Plastic Packaging from Businesses and Institutions.

Given interest at all levels of government and business in the management of plastic packaging, there are a number of opportunities to work collaboratively to improve measurement, tracking and reporting of data, including:

- Develop and implement a national standard for publicly reporting supplied, collected, sorted and recycled data;
- Obligate processors to measure and report sorted and recycled data through industry contracts or government requirements;

- Establish data sharing agreements between producers and processors to compile national data on an annual basis through a third-party;
- Establish an industry standard for inbound material and outbound bale audit composition methodologies and apply to CPP signatory contracts with corporate recycling service providers;
- Work with municipalities to standardize a waste and recycling composition audit methodology;
- Incent more residential and business waste and recycling composition audits to be completed; and
- Expand regulated programs consistently to all Canadian provinces and territories and ensure broad and consistent definitions of obligated plastic packaging (e.g., in producer responsibility and deposit return systems).

## PLASTIC PACKAGING GENERATED AND RECYCLED

Based on the best available data and best estimates, Canada generated 1.89 million tonnes of plastic packaging in 2019. Slightly more rigid plastic packaging is generated than flexible plastic packaging. Figure ES1 provides an overview of the key plastic packaging flows:

- Plastic packaging (e.g., beverage containers) from residences, businesses and institutions managed through provincial deposit return systems.
- Other plastic packaging generated from residences and managed through provincial producer responsibility systems or programs delivered by local governments.
- Other plastic packaging generated from business and institutions managed mainly through private sector contracts.

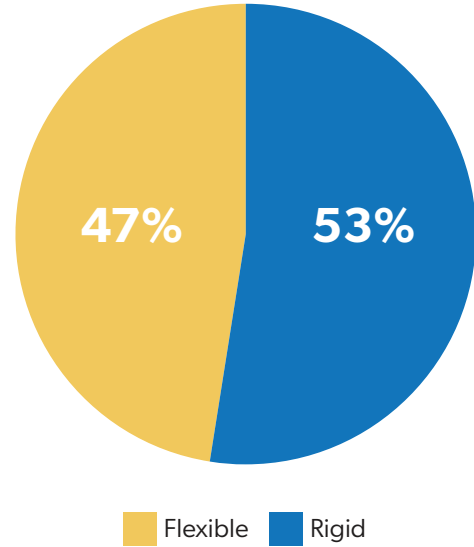
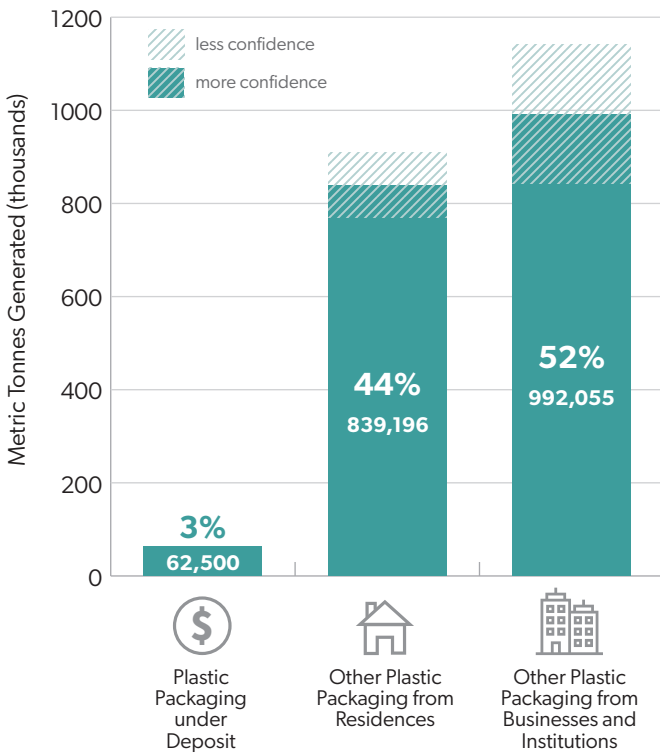
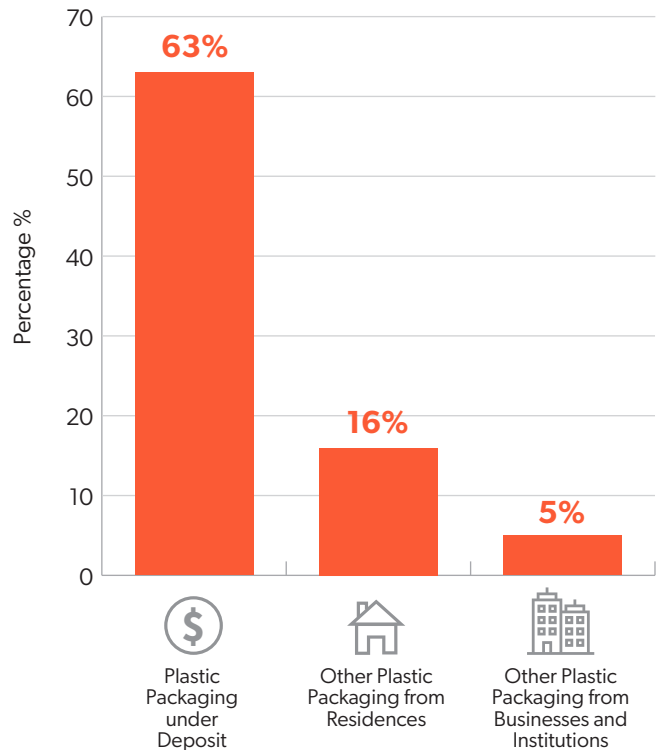


Figure ES1: **Plastic Packaging Generated by System**



\* Numbers may not add up to 100 due to rounding.

Figure ES2: **Recycling Performance by System**



## Canada generated 1.89 million tonnes of plastic packaging in 2019.

# 12%

12% of plastic packaging is estimated to have been recycled in 2019

# 21%

with 21% of rigid plastic being recycled

# 1%

and 1% of flexible packaging being recycled.

Performance varies significantly by the system (see Figure ES2) in which it is managed and by material type and format (see Figures ES3 and ES4).

Figure ES3: **Recycling Performance of Rigid Packaging**

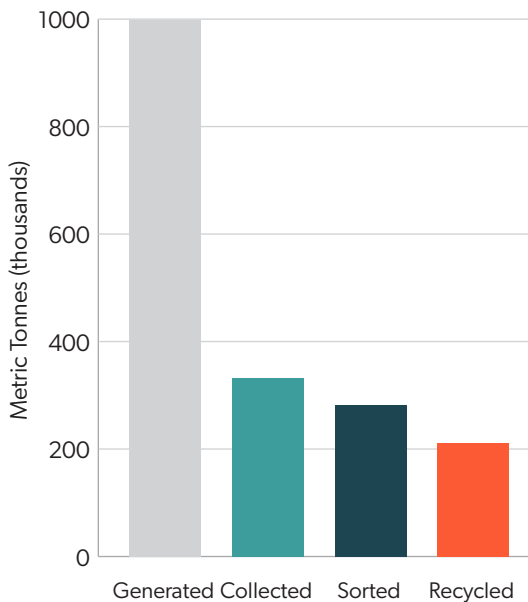
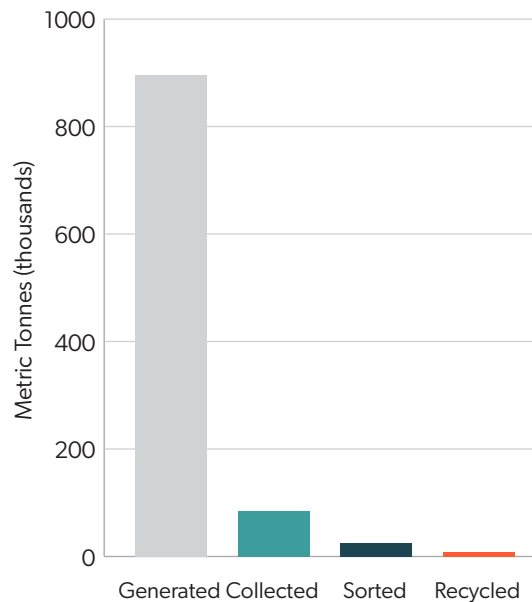


Figure ES4: **Recycling Performance of Flexible Packaging**



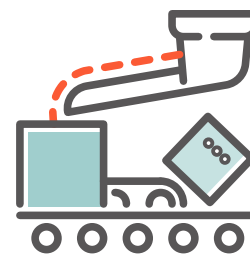
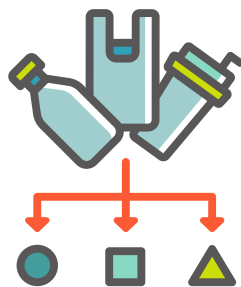
The most significant opportunities to improve performance of packaging formats and material types lie with **better aligning packaging design to eliminate or minimize sorting and recycling challenges.**

## Challenges including:

- Sizes and dimensions that are too large or too small to be mechanically sorted
- Multi-material/multi-layer packaging and/or components that contribute to contamination in recycled materials
- Packaging of similar design made from different resins that contribute to contamination in recycled materials
- Labels that are incongruent with the packaging resin type, including labels made from PVC or paper, that contribute to contamination in recycled materials
- Adhesives, non-bleeding inks and additives that impact the recycling process
- Heavily pigmented packaging that impacts the recycling process
- Flexible biodegradable plastic packaging that cannot be mechanically sorted from non-biodegradable plastic packaging
- Consumer confusion caused by inconsistent or inaccurate labelling that contributes to contamination in collected materials
- Resins that have no market demand (e.g., PVC)
- Increase end-market demand for sorted plastic packaging through the use of post-consumer recycled content in new packaging and products



There are also opportunities to improve the collection, sorting and recycling systems through **Collection system redesign, Sorting system improvements** and **Recycling system improvements**.



**Collection system redesign to:**

- **Segregate** collection of EPS and film;
- **Collect** biodegradable rigid plastics in 'green waste' systems rather than in recycling systems;
- **Enhance** film sorting in MRFs and downstream processing facilities; and
- **Standardize** collection systems across jurisdictions to minimize consumer confusion.

**Sorting system improvements to:**

- **Reduce** processing losses during Film sorting;
- **Reduce** processing losses during EPS sorting; and
- **Improve** sorting technologies and efficiencies to ensure PVC and biodegradable rigid and flexible plastic packaging are not present in shipments of other types of plastic packaging.

**Recycling system improvements to:**

- **Develop** EPS recycling technologies that can remove contamination;
- **Effectively** degrade biodegradable rigid and flexible plastics in aerobic composting and anaerobic digestion systems;
- **Develop** stronger end-markets for flexible packaging; and
- **Develop** technologies to recycle laminated flexible plastic packaging with associated market capacity and demand for products/packaging made from laminates.

## 2 Background

The Canada Plastics Pact (CPP) launched in January 2021 bringing together participants from across the plastics value chain (e.g., leading brands, waste management, all levels of government) to collaborate and innovate with the ultimate goal of ending plastic waste and pollution. The partners agreed to achieve four ambitious targets by 2025:

- Define a list of plastic packaging that is to be designated as problematic or unnecessary and take measures to eliminate them.
- Support efforts towards 100% of plastic packaging being designed to be reusable, recyclable or compostable.
- Undertake ambitious actions to ensure that at least 50% of plastic packaging is effectively recycled or composted.
- Ensure an average of at least 30% recycled content across all plastic packaging (by weight).

One of CPP's first efforts is to create a roadmap to realise these bold targets. This roadmap is meant to delineate how the CPP and its signatories will deliver on the targets. However, to establish this roadmap it is important to start with an accurate understanding of the current landscape – plastic packaging generated in Canada and the portion currently being collected, sorted, and recycled or composted.

This report establishes that system-level view as an anchor point for the CPP to understand the current state as it sets in place an action plan against its targets. It also provides an overview of factors currently influencing the Canadian plastics packaging landscape, identifies potential solutions, and establishes where focus is necessary to achieve CPP's intended targets.

## 3 Objectives And Scope

The objectives of this report are to provide a foundational analysis for CPP and its signatory members that includes:

1. Visual representation of the current flow of plastics packaging in Canada.
2. Visual dashboard showing 'do well' and 'do better' for each material and format type, to illustrate key action areas for innovation, investment, and exploration to achieve stated CPP targets.
3. Integrated assessment report for each target area including material considerations, key challenges and opportunities.

This report includes all plastic packaging generated in Canada except for plastic packaging designed to contain hazardous or special products (e.g., paint, lubricating oil) and agricultural products (e.g., agricultural pesticides and fertilizers).

The data has been aggregated for presentation for Canada as a whole and by province or region. Many participants provided data for this work in confidence. As a result, none of the data will be released in any form other than this report.

## 4 Approach

The following section outlines the approach taken to assess Canada's current plastic packaging flows including:

- The key terms and points of measurement used;
- A broad overview of the data sources used and their reliability; and
- The methodology used to estimate current plastic packaging flows.

### 4.1 KEY TERMS AND POINTS OF MEASUREMENT

To measure the flow of plastic packaging, it is important to define the terminology related to the management of these materials. Table 1 provides a list of the key terminology used in this report.

Table 1: **Key Plastic Packaging Flow Terms**

Terms	Definition
<b>Anaerobic Digestion</b>	Means the breakdown of an organic chemical compound by micro-organisms in the absence of oxygen to carbon dioxide, methane, mineral salts and new biomass.
<b>Biodegradable Plastic Packaging</b>	Means plastic packaging that can be broken down by micro-organisms: <ul style="list-style-type: none"> <li>• in the presence of oxygen to carbon dioxide, water and mineral salts of any other elements present (mineralization) and new biomass; or</li> <li>• in the absence of oxygen to carbon dioxide, methane, mineral salts and new biomass.</li> </ul> This definition includes compostable and non-compostable biodegradable plastic packaging.
<b>Collected</b>	Means plastic packaging received from a consumer, whether residential, business or institutional, following the consumer's use. Referred to in the ECCC Plastic Study (2019) as collection of plastic waste or R1.
<b>Collection Rate</b>	Materials collected as a percentage of materials generated.
<b>Composted</b>	Means the breakdown of an organic chemical compound by micro-organisms in the presence of oxygen to carbon dioxide, water and mineral salts of any other elements present (mineralization) and new biomass.
<b>End-market</b>	Means a facility that receives sorted material as feedstock for the manufacture of products, packaging, materials or substances. Otherwise referred to as the secondary or downstream processor.
<b>Generated</b>	Means plastic packaging supplied to consumers and available for collection from consumers. Referred to in the ECCC Plastic Study (2019) as quantity of plastics discarded or QUANT.
<b>Inbound</b>	Means plastic packaging received by a processing facility.
<b>Marketed</b>	Has the same meaning as Sorted.
<b>MRF</b>	Means material recovery facility.
<b>Other Rigid Plastic Packaging</b>	Means non-bottle rigid plastic packaging made from resins other than PET and HDPE such as EPS, PP, PS, and PVC.
<b>Outbound</b>	Means plastic packaging as shipped from a processing facility.
<b>Plastic Packaging</b>	Means all products made of plastic used for the containment, protection, handling, delivery and presentation of goods, from raw materials to processed goods, from the producer to the user or the consumer <sup>1</sup> . For the purposes of this report, plastic packaging associated with hazardous or special products (e.g., paint and used oil containers) and agricultural plastic packaging has been excluded.
<b>Processor</b>	Includes both primary processors that sort plastic packaging (i.e., MRF) and secondary or downstream processors that recycle the sorted plastics. Note some materials may bypass the primary processor if they are already segregated.
<b>Recycled</b>	Means plastic packaging that is reprocessed into products, packaging, materials or substances whether for the original or other purposes but excluding energy recovery. Whether packaging was recycled in a closed or open loop was not assessed. Referred to in the ECCC Plastic Study (2019) as reprocessing yield or R3.
<b>Recycling Rate</b>	Materials recycled as a percentage of materials generated.
<b>Sorted</b>	Means plastic packaging that is sorted and prepared for shipment to an end-market. Note that shipments typically include a proportion of contamination. Referred to in the ECCC Plastic Study (2019) as the sorting yield or R2.
<b>Sorting Rate</b>	Materials sorted as a percentage of materials collected.
<b>Supplied</b>	Means plastic packaging that is sold, leased, donated, disposed of, used, transferred the possession of or title of, or otherwise made available to a consumer or distributed for use by a consumer. Producers report on packaging supplied as part of deposit return system and producer responsibility requirements. Note that the amount of materials generated may be different than supplied due to regulatory exemptions (e.g., de minimis), failure of obligated producers to report (e.g., free-riders) or producer reporting errors.
<b>Unclassified Rigid/Flexible Plastic Packaging</b>	Means plastic packaging for which data by resin was not available.

<sup>1</sup> Adapted from <https://wrap.org.uk/sites/default/files/2020-12/European-Plastics-Pact-Roadmap.pdf>.

## 4.2 DATA SOURCES

Multiple sources were used for the purposes of compiling data on plastic packaging flows in Canada. Data was gathered from provincially/territorially regulated systems (i.e., deposit return systems, producer responsibility programs); municipal recycling programs; waste composition studies; direct information from producers, processors, and haulers; and government and industry studies. Multiple datasets were reviewed and used to address data gaps and inconsistencies in how data is collected or published (i.e., degree of detail).

The following sections provide an overview of the data sources that were used and an assessment of data reliability based on three distinct plastic packaging flows:

- Plastic packaging (from residences, businesses and institutions) managed under deposit return systems.
- Residential plastic packaging, including packaging that is managed under provincially regulated producer responsibility systems and municipally managed systems.
- Plastic packaging generated by business and institutions.

The assessment approach for each plastic packaging flow was unique due to the nature of the data available and the attributes associated with each in the plastic packaging flows.

Data sources are listed in Section 10.0 References.

List of Abbreviations	
Abbreviation	Meaning
EPS	Expanded polystyrene
HDPE	High-density polyethylene
LDPE	Low-density polyethylene
PE	Polyethylene
PET	Polyethylene terephthalate
PP	Polypropylene
PS	Polystyrene
PVC	Polyvinyl chloride

### 4.2.1 Plastic Packaging Under Deposit

Currently, all but two of the provinces and territories (e.g., Manitoba<sup>2</sup> and Nunavut) have deposit return systems in place to collect and manage plastic beverage containers. Data related to plastic packaging for supplied<sup>3</sup>, collected and sorted were generally available through the provincial and territorial systems. Most of the programs report publicly, however, to obtain more detailed information (e.g., conversion factors for beverage container units to weight) the program operator in each jurisdiction was contacted.

Supplied data is reported as number of containers. As a result, conversion factors were applied to convert the total number of containers supplied by format and resin into weight. The categories of beverage containers and the level of detail available for each resin type (e.g., PET, HDPE, Laminates) varies by province (see Table 2 below).

Table 2: **Comparison of Resins Reported by Provinces/Territories with Deposit Return Systems**

Province/Region	Resins Reported
British Columbia	PET, Other Rigid Plastic by size, Plastic Laminates
Alberta	PET, HDPE, Plastic Laminates, Other Plastics
Saskatchewan	PET, HDPE, Other Plastics, Caps
Ontario	PET
Quebec	PET
New Brunswick	PET, HDPE
Nova Scotia	PET, HDPE
Prince Edward Island	PET, HDPE, Other Plastics, Pouches
Newfoundland & Labrador	PET, HDPE, Other Plastics
Northwest Territories	PET, HDPE
Yukon	PET, HDPE

<sup>2</sup> In Manitoba, beverage containers are collected through the residential producer responsibility program and through recycling collections from businesses and institutions, rather than through a deposit system.

<sup>3</sup> Generated is equivalent to supplied in deposit return programs as the quantity reported as supplied is the same as the amount of the obligated plastic packaging generated.

The quantity collected and sorted for each of the provinces and territories is reported and generally reliable as these materials are individually counted (to return deposits) and source separated at collection depots into market-ready bales or totes. The bales or totes may include mixed resin types (e.g., labelled as 'other plastics'). Deposit return systems do not measure or report the quantity recycled with the exception of Alberta and British Columbia. As a result, additional interviews were conducted with processing facilities that manage Canada's deposit return materials to gain an understanding of the final recycling rate for deposit return materials based on format and resin.

#### 4.2.2 Other Plastic Packaging from Residential Sources

Information on other plastic packaging from residential sources was derived from two main sources:

- 1. Regulated producer responsibility programs for packaging** that operate in British Columbia, Saskatchewan, Manitoba<sup>4</sup>, Ontario, and Quebec. Data related to plastic packaging for supplied, collected and

sorted was available through published annual reports. The level of detail provided for supplied, collected and sorted varies significantly (see Table 3). The categories and methodologies used to measure components of collected commingled materials and outbound sorted materials appear inconsistent.

To address these gaps, the project team also assessed the following additional sources:

- CPP signatory producer surveys<sup>5</sup>, which provided a better understanding of the formats and resin types supplied into each province by specific producers; and
- Private sector and municipal or provincial inbound and outbound materials audits and shipped to market reports to better understand materials collected and sorted.

Similar to deposit return systems, producer responsibility programs do not report the quantity of materials recycled. As a result, additional interviews were conducted with processing facilities to gain an understanding of the recycling rate (i.e., yield) for materials based on format and resin.

Table 3: **Comparison of Resins Reported by Provinces/Territories with Producer Responsibility Programs**

Province/Region	Supplied	Collected	Sorted	Recycled
British Columbia	Rigid, Flexible	Rigid, Flexible	No reporting	No reporting
Saskatchewan	All materials (no disaggregation)	All materials (no disaggregation)	No reporting	No reporting
Manitoba	PET, HDPE, Plastic Film, Plastic Laminates, Polystyrene, Other Resins	PET, HDPE, Plastic Film, Plastic Laminates, Polystyrene, Other Resins	No reporting	No reporting
Ontario	PET Bottles, HDPE Bottles, PE Film, Plastic Laminates, PS, Other Plastic Packaging	No reporting	PET, HDPE, Plastic Film, Tubs and lids, Polystyrene, Mixed Resins	No reporting
Quebec	PET Bottle, HDPE Bottle, Plastic Laminates, HDPE & LDPE Plastic film, HDPE & LDPE Plastic Shopping Bag, Expanded PS Food, Expanded PS Protection, Non-Expanded PS, PET Containers, PLA and Other Degradable, Other Resins	PET Bottle, HDPE Bottle, Plastic Laminates, HDPE & LDPE Plastic film, HDPE & LDPE Plastic Shopping Bag, Expanded PS Food, Expanded PS Protection, Non-Expanded PS, PET Containers, PLA and Other Degradable, Other Resins	No reporting	No reporting

<sup>4</sup> As Manitoba does not have a deposit system, beverage containers from households are collected through the residential producer responsibility program and are included in the program's published data.

<sup>5</sup> CPP signatory producer surveys sought information on the amounts of plastic packaging by format and resin type supplied into British Columbia, Saskatchewan, Manitoba, Ontario and Quebec. It also sought information on the amount of plastic packaging by format and resin type supplied to businesses and institutions.

As all producer responsibility programs include a de minimis provision<sup>6</sup>, waste composition audits were used to assess the amount of designated material generated to account for the quantity supplied by exempt producers. However, there are significant differences in how waste composition studies are undertaken such as the audit frequency (e.g., seasonal audits or one audit per year) and categories of material included in audit reports. Table 4 provides an overview of the most aggregated and most disaggregated plastic categories used in waste composition audits although there were many variations within this low to high detail range. Wherever possible, seasonal audits with more detailed categories were used.

Table 4: **Comparison of Detail Provided on Plastic in Waste Composition Studies**

Low Detail	High Detail
<p><b>Plastic Packaging</b> (i.e. single category for all of the subcategories to the right)</p>	<p><b>Film</b></p> <ul style="list-style-type: none"> <li>• Re-Used Retail &amp; Grocery Bags</li> <li>• Empty Retail &amp; Grocery Bags</li> <li>• Consumables Packaging Bags and Film</li> <li>• Garbage Bags</li> <li>• Sandwich / Freezer Bags</li> <li>• Deposit-Bearing Beverage Pouches</li> <li>• Other Plastic Film</li> </ul> <p><b>Rigid Beverage Containers - Dairy or Dairy Substitute</b></p> <ul style="list-style-type: none"> <li>• Deposit Containers – Water</li> <li>• Deposit Containers –Other</li> <li>• Single Serving Cups</li> <li>• Other</li> </ul> <p><b>Rigid (non-beverage)</b></p> <ul style="list-style-type: none"> <li>• #1 PET – Bottles and Jars</li> <li>• #1 PET – Other Packaging</li> <li>• #2 HDPE – Bottles and Jugs</li> <li>• #2 HDPE – Tubs and Lids</li> <li>• #3 PVC</li> <li>• #4 LDPE</li> <li>• #5 PP</li> <li>• #6 PS – Non-Foam</li> <li>• #6 PS – Foam</li> <li>• #7 Mixed Resin Plastic</li> <li>• Uncoded Packaging / Containers</li> </ul> <p><b>Other Resins</b></p> <ul style="list-style-type: none"> <li>• Other/Mixed Plastics</li> </ul>

**2. Municipal government waste management data** was collected from each province and territory. This includes data related to:

- Residential waste disposal rates;
- Waste composition studies;
- Recycling inbound and outbound studies; and
- Recycling collected and sorted tonnes.

There is very little consistency in how municipal waste data is collected across the country with very limited data available in many of the above areas. Inbound and bale (outbound) composition studies are highly variable primarily because the audits themselves are an administrative contract tool and used to measure actual contract performance against contract performance requirements. Additional interviews were conducted with processing facilities to better understand recycling rates for materials based on format and resin.

#### 4.2.3 Plastic Packaging from Businesses and Institutions

There are very few sources available for the quantity of plastic packaging generated, collected, sorted and recycled from businesses and institutions. The following sources were used:

- Industrial, Commercial and Institutional (ICI) waste composition audits undertaken by a number of municipalities across the country.
- Statistics Canada’s Waste Management Industry Survey, which includes data on total ICI waste disposed and diverted by province. The waste diversion data includes the amount of ICI plastic recycled but is not specific to plastic packaging.
- Government and industry association reports (e.g., Economic Study of the Canadian Plastic Industry, Markets and Waste).
- Discussion with collectors and processors.
- CPP signatory producer surveys, where they included data on the amount of ICI plastic packaging (by format and type) supplied by province.

It should be noted that the data presented in this report for plastic packaging from businesses and institutions is modelled from limited actual data and is therefore not considered reliable. To reflect the data uncertainty, a variance margin was utilized.<sup>7</sup>

<sup>6</sup> Exemption for small producers. The material produced by these exempt producers would not be included in supplied data.

<sup>7</sup> The variance margin accounts for limited data sources and anomalies among jurisdictions such as the collection of beverage containers from businesses and institutions through a deposit system in all jurisdictions except Manitoba and Nunavut.

### 4.3 METHODOLOGY

Plastic packaging flows were estimated using a bottom-up approach, drawing from a variety of data sources for plastic packaging generated by and collected from consumers combined with data and estimates from industry for plastic packaging sorted and recycled. The results of this method have been cross-checked against other studies including Environment and Climate Change Canada’s recent report entitled Economic Study of the Canadian Plastic Industry, Markets and Waste<sup>8</sup> and annual reports from deposit systems and producer responsibility programs. Data from 2019 was used where available, and where not available, the most recent available data was used.

Data were consolidated for the provinces of New Brunswick, Newfoundland and Labrador, Nova Scotia, and Prince Edward Island into a category titled Atlantic Canada to respect concerns raised that presenting data by province would reveal commercially sensitive information given the number of recyclers in each province, and to more accurately reflect performance in this region given the scarcity of available data from one province to another. Similarly, the Northwest Territories, Nunavut, and the Yukon’s data was consolidated into a category titled Territories. Confidence intervals for provinces and territories differ based on the availability and quality of data as noted in Appendix A.

Note that, while some compostable plastic packaging is being processed at compost facilities, the amount is not measured, and most facilities indicated that compostable plastic packaging is typically removed from the feedstock or finished compost because the retention time is not adequate to fully degrade the packaging. With the exemption of compostable plastic film, most programs discourage collection. As a result, the collection, sorting and composting of this packaging was not measured.

#### 4.3.1 Plastic Packaging Under Deposit

The methodology used for plastic packaging managed under deposit return systems is outlined for all provinces and regions in Table 5.

Factors to convert quantity in units to quantity in metric tonnes were usually provided by the program operators. In some cases, conversion factors from one province were applied to another where province-specific conversion factors were not available. The yield factor applied to the sorted quantities to estimate the amount of material recycled are presented in Table 6 and are based on discussions with downstream processors accepting deposit plastic packaging across Canada.

Plastic laminate packaging (e.g., pouches, bag-in-box) was given a 0% yield, with the exception of BC. In the case of BC, a yield of 70% – 80% was used based on information from downstream processors.

Table 5: Methodology for Plastic Packaging Under Deposit

Province/Region	Supplied	Generated	Collected	Sorted	Recycled
All (except Manitoba and Nunavut which do not have a deposit program for plastic beverage containers)	Based on provincial annual report (2019)	Same as supplied	Based on provincial annual report (2019)	Based on provincial annual report (2019)	Based on a yield factor

Table 6: Applicable Yield to Estimate Quantity Recycled

Category	Yield (Low)	Yield (High)
PET	80%	85%
HDPE	80%	85%

<sup>8</sup> Environment and Climate Change Canada. Economic Study of the Canadian Plastic Industry, Markets and Waste, 2019. Available at [http://publications.gc.ca/collections/collection\\_2019/eccc/En4-366-1-2019-eng.pdf](http://publications.gc.ca/collections/collection_2019/eccc/En4-366-1-2019-eng.pdf).

Table 7: **Methodology for other Plastic Packaging from Residential Sources by Province/Region**

Province/Region	Generated	Supplied	Collected	Sorted	Recycled
<b>British Columbia</b>	Calculation and extrapolation based on composition studies	Based on Recycle BC Annual Report (2019)	Based on Recycle BC Annual Report (2019)	Estimated marketed tonnes and calculation based on post-collection contract obligation and collected tonnage	Yield factor ranges developed based on discussions with the downstream processors for each province/region and plastic packaging flow
<b>Alberta</b>	Calculation and extrapolation based on waste composition studies from two municipalities (garbage) and inbound composition from two MRFs (collected) and inbound quantity based on ACES Report <sup>9</sup>	N/A	Calculation and extrapolation based on inbound composition studies from two MRFs (collected) and inbound quantity based on ACES Report	Calculation and extrapolation based on sorted tonnes provided by four MRFs representing 60% of province (including urban and rural)	Yield factor ranges developed based on discussions with the downstream processors for each province/region and plastic packaging flow
<b>Saskatchewan</b>	Calculation and extrapolation based on Saskatoon 2016 waste composition study (waste and recycling)	N/A	Calculation and extrapolation based on Saskatoon 2016 waste composition study (waste and recycling)	Calculation and extrapolation based on sorted tonnes from Saskatoon and Regina MRFs	Yield factor ranges developed based on discussions with the downstream processors for each province/region and plastic packaging flow
<b>Manitoba</b>	Calculation and extrapolation based on municipal waste composition studies (waste and recycling)	Based on Multi-Material Stewardship Manitoba <sup>10</sup> Annual Report (2019)	Calculation and extrapolation based on municipal waste composition studies (waste and recycling)	Calculation and extrapolation based on sorted tonnes from Winnipeg MRF	Based on a yield factor range
<b>Ontario</b>	Calculation and extrapolation based on waste composition studies (waste and recycling)	Based on Stewardship Ontario (SO) PIM <sup>11</sup> Data	Calculation based on CIF <sup>12</sup> -SO Waste Composition Study and RPRA <sup>13</sup> Datacall (2019)	RPRA Datacall (2019) for sorted tonnes	Yield factor ranges developed based on discussions with the downstream processors for each province/region and plastic packaging flow
<b>Quebec</b>	2015 - 2017 Province-wide Waste composition study (Garbage and Recycling)	2020 Schedule of Contribution calculation (based on 2019 supplied data adjusted by EEQ for growth by material category)	2015-2017 Province-wide Waste Composition Study (Recycling)	Calculation based on 2019 price index and marketed tonnes from RECYC-QUEBEC	Yield factor ranges developed based on discussions with the downstream processors for each province/packaging flow
<b>Atlantic Canada</b>	Calculation and extrapolation based NB Province-Wide Waste composition study and collected composition studies from some NB Regional Services Commission	N/A	Calculation and extrapolation based collected composition studies from some NB Regional Services Commission	Calculation and extrapolation based on NS & PEI marketed tons (province-wide) and Central NF MRF	Yield factor ranges developed based on discussions with the downstream processors for each province/region and plastic packaging flow
<b>Territories</b>	No data available for the residential sector	N/A	No data available for the residential sector	No data available for the residential sector	No data available for the residential sector



### 4.3.2 Other Plastic Packaging from Residences

The methodology used to assess plastic packaging from residences for each province and region is outlined in Table 7.

Where multiple data sets were available within the same province, a confidence interval of 90% was used for each of the categories, and high and low ranges were determined. If the confidence interval showed a high variability, subcategories (e.g., PET, HDPE, etc.) were collapsed and data was calculated based on rigid and flexible categories.

The factors applied to the sorted quantities to yield an estimate of the amount of material recycled are presented in Table 8 and are based on discussions with downstream processors accepting non-deposit packaging from residences across Canada. For clarity, the yield factor is inclusive of high value commercial use (e.g. ‘bottle to bottle’ applications) through to no value commercial uses.

Table 8: **Applicable Yield to Estimate Quantity Recycled**

Category	Yield (Low)	Yield (High)
PET	70%	85%
HDPE, PP, Tubs & lids, PS	75%	85%
Mixed plastics	50%	67%
Film plastic	50%	75%

### 4.3.3 Other Plastic Packaging from Businesses and Institutions

The methodology used for other plastic packaging from businesses and institutions for all provinces and regions is outlined in Table 9.

Data from the plastic packaging flows from businesses and Institutions is scarce. As the most detailed information on plastic packaging flows from this sector was available through RECYC-QUEBEC, the data from Quebec was used to model results for the rest of the country. RECYC-QUEBEC has published various reports that examine the differences in generation and collected between residences and businesses and institutions. They are based on:

- Total inbound in MRFs from residential and ICI sources (2018 State of the Waste Management);
- Conversations with ICI dedicated MRFs;
- Differences between residential characterization studies (residential only) and MRFs’ inbound composition studies (residential and business and institutional); and
- Data on plastic landfilled (2021 report) and quantity of disposed material from residential and ICI sources.

Working from Quebec’s published reports on the management of packaging generated by businesses and institutions, the quantity of plastic packaging generated in Quebec was calculated on a per employee basis<sup>14</sup> and then extrapolated for the other provinces and regions based on the number of employees in each jurisdiction. The quantity of plastic packaging collected from businesses and institutions in each jurisdiction was calculated using the relative performance of the jurisdiction’s residential collection system compared to Quebec’s residential collection system.<sup>15,16</sup> Given the significant uncertainty related to the data, a range of 15% was applied to the estimates of plastic packaging generated by businesses and institutions in all jurisdictions.

Table 9: **Methodology for other Plastic Packaging from Business and Institutions**

Province/Region	Supplied	Generated	Collected	Sorted	Recycled
All	N/A	Extrapolation based on Quebec calculation	Extrapolation based on Quebec calculation	Based on a yield factor range	Based on a yield factor

<sup>9</sup> Alberta Collaborative Extended Producer Responsibility Report (ACES)

<sup>10</sup> Multi-Material Stewardship Manitoba (MMSM)

<sup>11</sup> Pay-in-Model (PIM)

<sup>12</sup> Continuous Improvement Fund (CIF)

<sup>13</sup> Resource Recovery and Productivity Authority (RPRA)

<sup>14</sup> Using Statistics Canada employment by industry data adjusted to remove resource-based employment which does not occur uniformly across all jurisdictions.

<sup>15</sup> Quebec’s collection rate for plastic packaging from businesses and institutions is calculated as 9%. A jurisdiction’s residential collection rate was compared to Quebec’s residential collection rate and the difference was used to adjust Quebec’s 9% business and institutional collection rate.

<sup>16</sup> The quantity of plastic packaging collected from businesses and institutions in Manitoba was calculated using the performance of Manitoba’s residential collection system which includes beverage containers. As such, the quantity of plastic packaging collected from businesses and institutions in Manitoba, calculated using the residential collection system performance, includes beverage containers.

In the absence of data regarding sorted and recycled quantities specific to businesses and institutions, the sorted and recycled rates from each province for each category were applied to the estimated collected tonnage. Here as well, a range of 15% was applied given uncertainty related to the data. Since the quantity generated and collected include a 15% variance and sorted and recycled are calculated by applying yield factors that include an additional 15% variance, sorted and recycling include a total variance of 30%.

#### **4.3.4 Presentation**

The data for plastic packaging flows has been presented in several ways to draw attention to the factors that might be influencing plastic packaging flows. Specifically, the data is presented as follows:

- By system i.e., deposit return systems and systems that service residences and businesses and institutions for non-deposit plastic packaging;
- By regulated and non-regulated systems; and
- By the stages of packaging flow: generated, collected, sorted and recycled.

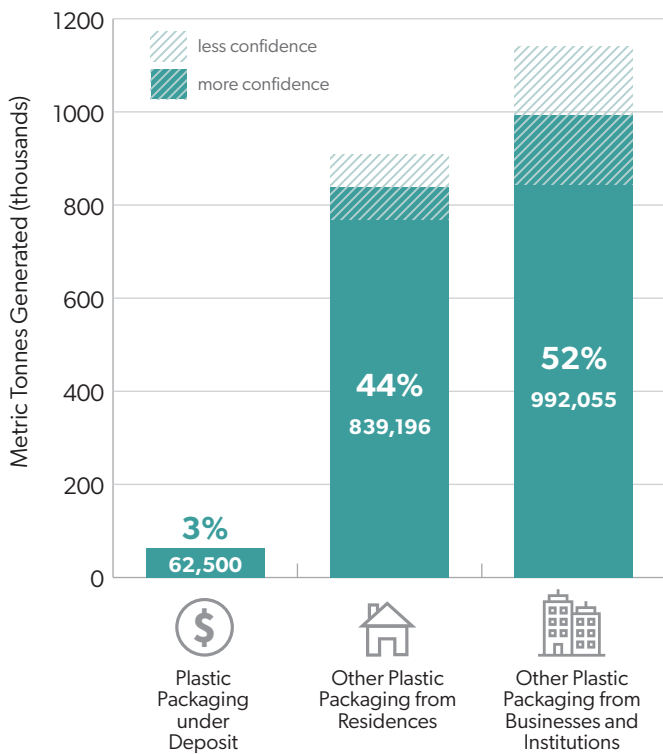
Note that for the presentation of the data by stages of packaging flow, the same level of detail is not available for each stage from generated to recycled. In some cases, detailed information is available for how much packaging is generated by resin format (e.g., rigid and flexible) and by type (e.g., PET, HDPE) at one stage and not another. We have provided the detail where it is available. Where data gaps exist, the information is presented in an unclassified category to provide transparency on the plastic packaging flows where limited data is available.

# 5 Plastic Packaging Generated and Available for Collection

## 5.1 BY SYSTEM

Figure 1 provides a breakdown of the amount of plastic packaging generated by system. Based on the average tonnes generated, 52.4% is generated from business and institutions (non-deposit), 44.3% from residences (non-deposit) and 3.4% under deposit return systems.

Figure 1: Plastic Packaging Generated by System

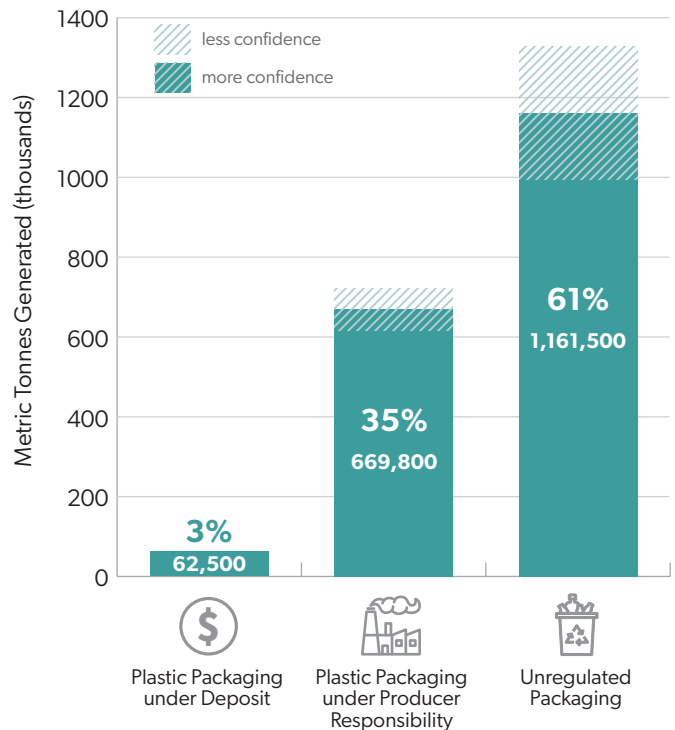


\* Numbers may not add up to 100 due to rounding.

## 5.2 UNDER REGULATED SYSTEMS AND NON-REGULATED SYSTEMS

Figure 2 provides a breakdown of the amount of plastic packaging generated under regulated systems (e.g., producer responsibility and deposit return systems) and non-regulated systems (e.g., residences, businesses and institutional systems that are not part of producer responsibility or deposit return systems). Based on the average tonnes generated across Canada, 61.3% is unregulated plastic packaging (i.e., no requirements related to producer responsibility or deposit return systems), 35.4% is plastic packaging regulated by producer responsibility requirements, and 3.3% is plastic packaging under a deposit return system.

Figure 2: Plastic Packaging Generated under Regulated and Unregulated Systems



# 6 Collection and Management of Plastic Packaging

## 6.1 BY SYSTEMS

### 6.1.1 Plastic Packaging Under Deposit

Figure 3 and Table 10 provide a summary of the current plastic packaging flow under deposit return systems.

**Data Reliability:**

Plastic packaging under deposit return systems has the most robust data for how different formats and resin types are managed from generation through to recycled. As a result, data are presented by format and type and use of the unclassified category was not required. Given the strength in reporting, a high to low range was only applied to the amount of materials recycled as this is not consistently reported across the country.

**Performance:**

Plastic packaging under deposit return programs significantly outperforms other residential or business and institutional systems with an overall recycling rate of 63%. This reflects, in part, the dominance of PET and HDPE bottles in deposit return systems.

Rigid plastics have an average collection rate of 76% with HDPE outperforming PET by over 20%. HDPE packaging similarly achieves a greater recycling yield compared to PET, likely due to the homogeneity of the packaging. The overall recycling rate for rigid plastic is 63%.

Flexible packaging contributes under 1% of all plastic packaging managed under deposit return systems. Its collection rate is substantially lower at 37% with a recycling rate of only 6%.

Figure 3: Deposit Plastic Packaging Flow

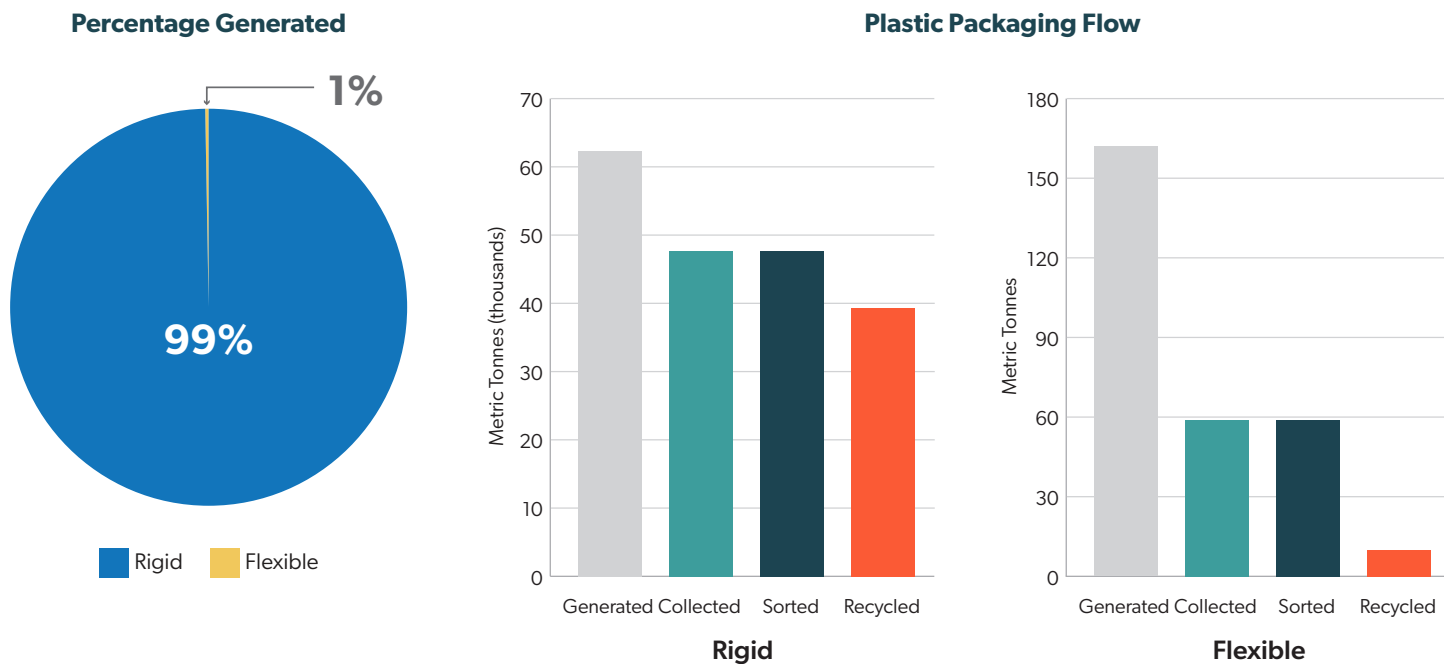


Table 10: Deposit Plastic Packaging Flow

Categories	Generated (M.T.)	Collected (M.T.)	Collected rate (%)	Sorted (M.T.)	Sorted rate (%)	Recycled (M.T.)			Recycled rate (%)
						Low	High	Average	
<b>Rigid plastic packaging</b>	<b>62,302</b>	<b>47,637</b>	<b>76%</b>	<b>47,637</b>	<b>100%</b>	<b>38,109</b>	<b>40,491</b>	<b>39,300</b>	<b>63%</b>
PET	50,156	36,845	73%	36,845	100%	29,476	31,318	30,397	61%
HDPE	8,533	8,179	96%	8,179	100%	6,543	6,952	6,748	79%
PET/HDPE <sup>17</sup>	3,399	2,502	74%	2,502	100%	2,002	2,127	2,064	61%
Other	214	111	52%	111	100%	88	94	91	43%
<b>Flexible plastic packaging</b>	<b>162</b>	<b>59</b>	<b>37%</b>	<b>59</b>	<b>100%</b>	<b>9</b>	<b>10</b>	<b>10</b>	<b>6%</b>
Film	0	0	0%	0	0%	0	0	0	0%
Laminates	162	59	37%	59	100%	9	10	10	6%
<b>TOTAL</b>	<b>62,464</b>	<b>47,696</b>	<b>76%</b>	<b>47,637</b>	<b>100%</b>	<b>38,118</b>	<b>40,502</b>	<b>39,310</b>	<b>63%</b>

<sup>17</sup> New Brunswick and the Northwest Territories did not separately report the two resins.

Figure 4: **Other Plastic Packaging from Residences Flow**

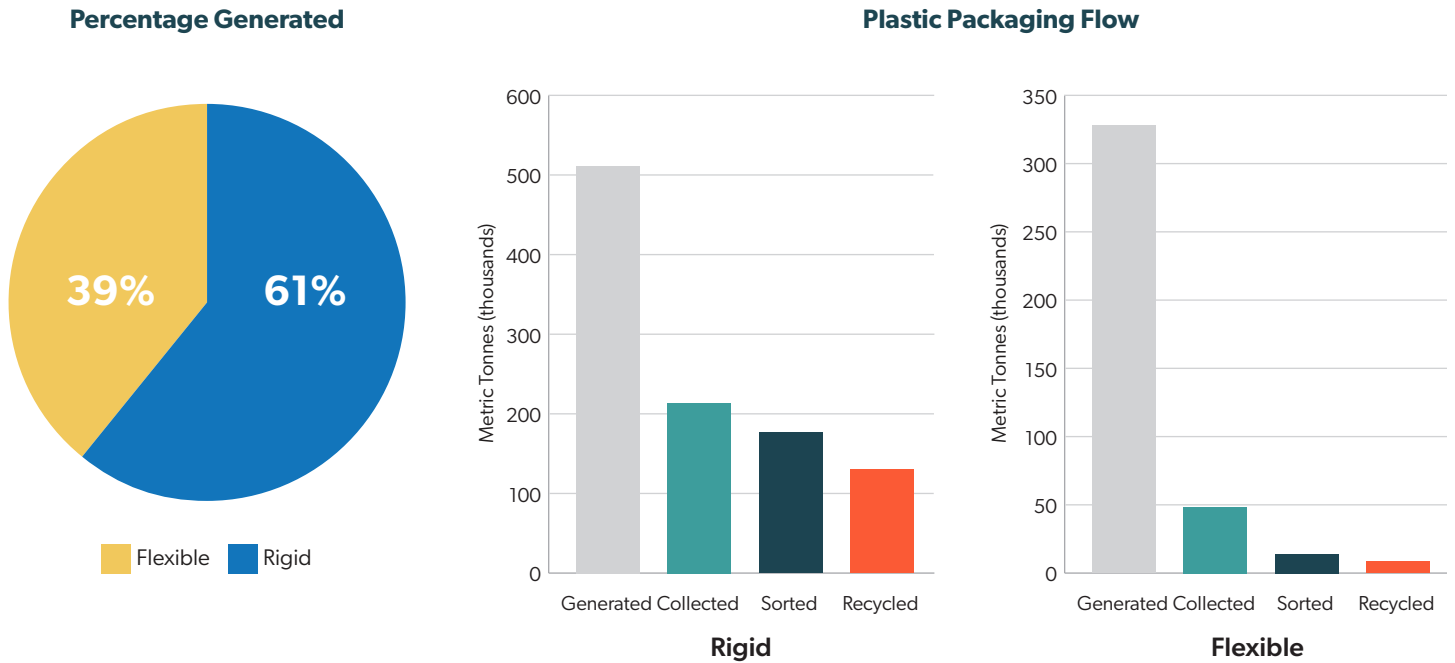


Table 11: **Other Plastic Packaging from Residences Flow**

Categories	Generated (M.T.)			Collected (M.T.)			Collected rate (%)	Sorted (M.T.)	
	Low	High	Average	Low	High	Average		Low	High
<b>Rigid plastic packaging</b>	<b>467,946</b>	<b>554,472</b>	<b>511,209</b>	<b>193,695</b>	<b>233,599</b>	<b>213,647</b>	<b>42%</b>	<b>159,844</b>	<b>192,774</b>
PET	147,245	176,775	162,010	82,761	101,538	92,150	57%	78,638	96,479
HDPE	61,639	71,018	66,329	34,560	40,270	37,415	56%	38,066	44,356
Other	143,095	168,385	155,740	40,489	51,191	45,840	29%	41,990	53,089
Unclassified	115,966	138,295	127,130	35,885	40,600	38,242	30%	0*	0*
<b>Flexible plastic packaging</b>	<b>301,266</b>	<b>354,708</b>	<b>327,987</b>	<b>43,361</b>	<b>53,413</b>	<b>48,387</b>	<b>15%</b>	<b>12,511</b>	<b>15,411</b>
Film	122,207	139,006	130,607	22,538	28,321	25,430	19%	12,373	15,548
Laminates	75,801	84,170	79,985	9,762	11,465	10,613	13%	0	0
Unclassified	103,258	131,532	117,395	11,062	13,627	12,345	11%	0*	0*
<b>TOTAL</b>	<b>769,211</b>	<b>909,180</b>	<b>839,196</b>	<b>237,057</b>	<b>287,013</b>	<b>262,035</b>	<b>31%</b>	<b>172,133</b>	<b>208,407</b>

\* Where collected unclassified material was sorted and recycled, the quantity is included in the resins above.

† Percentage includes unclassified collected material that was sorted.

‡ Percentage includes unclassified collected material that was sorted and recycled.

### 6.1.2 Other Plastic Packaging from Residences

Figure 4 and Table 11 provide a summary of the current plastic packaging flow from residences (non-deposit).

#### Data Reliability:

Data availability varies across the provinces. In some cases, data was available by packaging type and format and in other cases, data was categorized as unclassified. Given the absence of reporting obligations and province-wide waste characterization studies in Alberta and the Atlantic provinces, data for these parts of Canada is less reliable and a high and low range of +/- 8% was applied to generated quantities and a high and low range of +/- 10% was applied to collected quantities.

#### Performance:

Rigid plastics have an average collection rate of 42% with a relatively high sorting efficiency of over 80%. HDPE outperforms PET in both sorted and recycled yield with a recycling rate of 42% for PET and 50% for HDPE. The overall recycling rate for rigid plastic is 25%, reflecting the low collection, sorting and recycling rates for other rigid resin types of 19%.

Flexible packaging represents 39% of the total non-deposit plastic packaging from residents. Flexible packaging generation reflects a move within the packaging sector to formats such as stand-up pouches. These formats pose a number of challenges. The collection rate for flexible packaging is substantially lower at 15%, as is the sorting rate at 29%. The overall recycling rate of only 3% for film plastics reflects the lack of recycling markets.

Average	Sorted rate (%)	Recycled (M.T.)			Recycled rate (%)
		Low	High	Average	
176,309	83%	117,191	142,185	129,688	25%
87,559	95%*	61,291	74,425	67,858	42%†
41,211	110%*	30,908	35,029	32,969	50%†
47,539	104%*	24,991	32,731	28,861	19%†
0*	0%*	0*	0*	0*	0%*
13,961	29%	6,980	10,471	8,726	3%
13,961	55%*	6,980	10,471	8,726	7%†
0	0%	0	0	0	0%
0*	0%*	0*	0*	0*	0%*
190,270	73%	124,171	152,656	138,414	16%

Figure 5: **Other Plastic Packaging from Businesses and Institutions Flow**

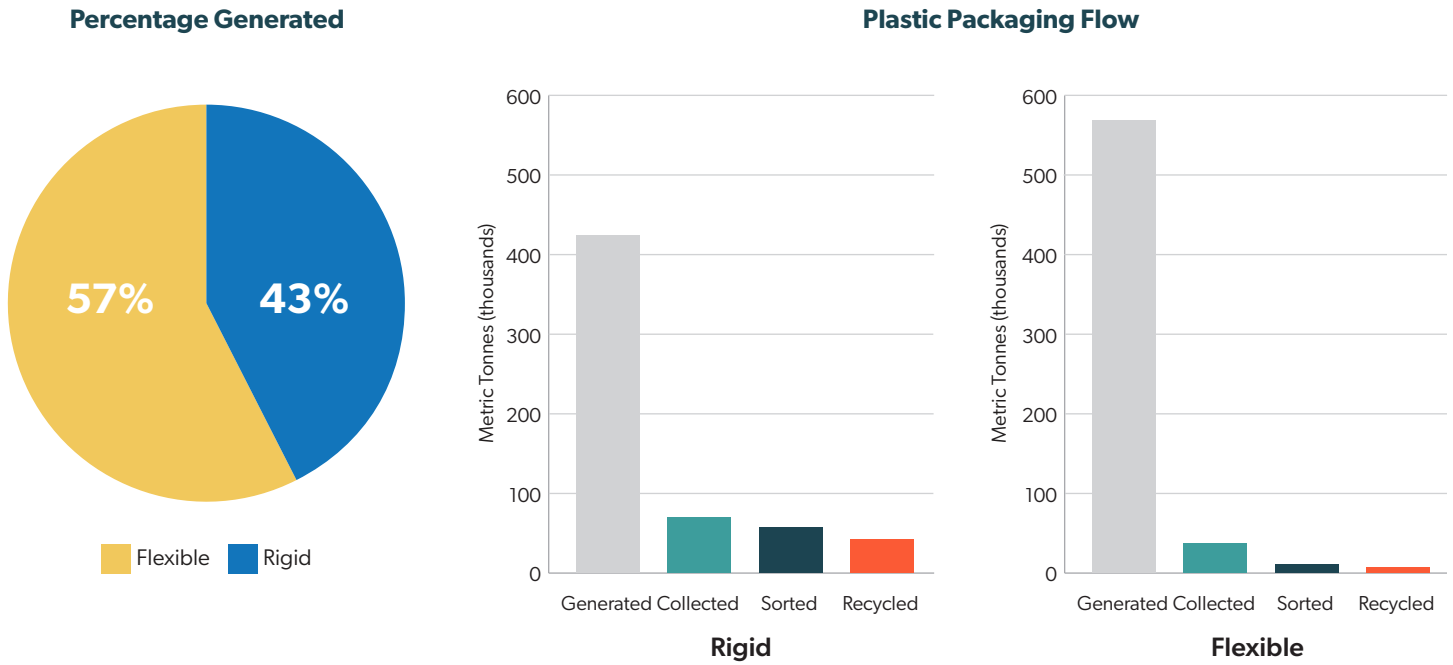


Table 12: **Other Plastic Packaging from Businesses and Institutions Flow**

Categories	Generated (M.T.)			Collected (M.T.)			Collected rate (%)	Sorted (M.T.)	
	Low	High	Average	Low	High	Average		Low	High
<b>Rigid plastic packaging</b>	<b>360,432</b>	<b>487,643</b>	<b>424,038</b>	<b>59,441</b>	<b>80,421</b>	<b>69,931</b>	<b>16%</b>	<b>48,586</b>	<b>65,734</b>
PET	0	0	0	0	0	0	0%	0	0
HDPE	0	0	0	0	0	0	0%	0	0
Other	0	0	0	0	0	0	0%	0	0
Unclassified	360,432	487,643	424,038	59,441	80,421	69,931	16%	48,586	65,734
<b>Flexible plastic packaging</b>	<b>482,815</b>	<b>653,220</b>	<b>568,018</b>	<b>31,329</b>	<b>42,386</b>	<b>36,858</b>	<b>6%</b>	<b>9,422</b>	<b>12,747</b>
Film	0	0	0	0	0	0	0%	0	0
Laminates	0	0	0	0	0	0	0%	0	0
Unclassified	482,815	653,220	568,018	31,329	42,386	36,858	6%	9,422	12,747
<b>TOTAL</b>	<b>843,247</b>	<b>1,140,863</b>	<b>992,055</b>	<b>90,770</b>	<b>122,807</b>	<b>106,788</b>	<b>11%</b>	<b>58,007</b>	<b>78,480</b>



### 6.1.3 Other Plastic Packaging from Businesses and Institutions

Figure 5 and Table 12 provide a summary of the current plastic packaging flow from businesses and institutions (non-deposit).

#### Data Reliability:

Data for plastic packaging from businesses and institutions is extremely limited. As a result, all data for rigid and flexible packaging is categorized as unclassified resins. The high and low ranges are estimated at +/-15%. Even with this range applied, the data presented in this report for other plastic packaging from businesses and institutions should be used with caution. Actual data, once it is available, may present a substantially different picture of generation, collection, sorting and recycling in this sector.

The data does not take into account material collected but not processed in MRFs, for example stretch film plastic collected in industrial facilities and shipped directly to downstream processors as this material would not be captured in ICI waste composition audits.

#### Performance:

Both rigid and flexible show poor collection, sorting and recycling rates.

Rigid plastic packaging has a 16% collection rate with a relatively high sorting efficiency of over 82%. Approximately 10% of rigid plastics from businesses and institutions is recycled.

Flexible plastic packaging has a 6% collection rate with a low sorting efficiency of 30%. Only 1% of flexible plastics from businesses and institutions is recycled.

Overall, the national recycling performance of plastic packaging from businesses and institutions is low at 5%.

Collection capacity for plastics from businesses and institutions appears particularly low in certain regions.

Processors have reported that, because there are limited markets for certain plastics, such as stretch film plastic, these materials are being managed as waste rather than as secondary resources. The value of recovered plastics (rigid and film) has been well below historical levels for the past five years.

Average	Sorted rate (%)	Recycled (M.T.)			Recycled rate (%)
		Low	High	Average	
57,160	82%	35,683	48,277	41,980	10%
0	0%	0	0	0	0%
0	0%	0	0	0	0%
0	0%	0	0	0	0%
57,160	82%	35,683	48,277	41,980	10%
11,084	30%	5,888	7,967	6,928	1%
0	0%	0	0	0	0%
0	0%	0	0	0	0%
11,084	30%	5,888	7,967	6,928	1%
68,244	64%	41,572	56,244	48,908	5%

## 6.2 BY RESIN AND FORMAT

### 6.2.1 Rigid Packaging

Figure 6 and Table 13 provide a summary of the current plastic packaging flow for rigid plastics.

#### Data Reliability:

Data for plastic packaging from businesses and institutions is extremely limited. As a result, a significant amount of the data for rigid packaging is categorized as unclassified resins. The high and low ranges for generated are estimated at +/-11% and collected are +/-9%.

#### Performance:

Rigid plastic packaging makes up just over half of the plastic packaging generated in Canada. Based on available data,

HDPE and PET have similar collection rates (at 61%) while HDPE slightly outperforms PET in its recycling rate (53% to 46%). Overall rigid plastics have a collection rate of 33%, a sorting efficiency rate of 85% and a recycling rate of 21% in Canada.

### 6.2.2 Flexible Packaging

Figure 7 and Table 14 provide a summary of the current plastic packaging flow for flexible packaging.

#### Data Reliability:

Data for plastic packaging from businesses and institutions is extremely limited. As a result, a significant amount of the data for flexible packaging is categorized as unclassified resins. The high and low ranges for generated and collected are estimated at +/-12%.

Table 13: **Rigid Plastic Packaging Flow**

Categories	Generated (M.T.)			Collected (M.T.)			Collected rate (%)	Sorted (M.T.)	
	Low	High	Average	Low	High	Average		Low	High
<b>Rigid plastic packaging</b>	<b>890,680</b>	<b>1,104,417</b>	<b>997,548</b>	<b>300,773</b>	<b>361,657</b>	<b>331,215</b>	<b>33%</b>	<b>255,269</b>	<b>306,941</b>
PET	197,402	226,931	212,166	119,606	138,383	128,995	61%	115,350	133,458
HDPE	70,172	79,551	74,862	42,739	48,449	45,594	61%	46,297	52,483
PET/HDPE	3,399	3,399	3,399	2,502	2,502	2,502	74%	2,502	2,502
Other	143,309	168,599	155,954	40,600	51,302	45,951	29%	42,101	53,199
Unclassified	476,398	625,938	551,168	95,326	121,021	108,173	20%	50,371	63,948

Table 14: **Flexible Plastic Packaging Flow**

Categories	Generated (M.T.)			Collected (M.T.)			Collected rate (%)	Sorted (M.T.)	
	Low	High	Average	Low	High	Average		Low	High
<b>Flexible plastic packaging</b>	<b>784,242</b>	<b>1,008,090</b>	<b>896,166</b>	<b>74,749</b>	<b>95,859</b>	<b>85,304</b>	<b>10%</b>	<b>21,998</b>	<b>28,210</b>
Film	122,207	139,006	130,607	22,538	28,321	25,430	19%	12,373	15,548
Laminates	75,962	84,332	80,147	9,821	11,524	10,672	13%	54	64
Unclassified	586,073	784,752	685,412	42,391	56,013	49,202	7%	9,550	12,619

**Performance:**

Flexible plastic packaging makes up just under half of the plastic packaging generated in Canada. Based on available data, Film outperforms Laminates with a collection rate of 19% compared to 13%. Approximately 55% of collected Film is sorted while virtually none of the Laminates is sorted due to a lack of market demand. The recycling rate for Film is 7% while the recycling rate for Laminates is under 0.5%. Overall Flexible plastics have a collection rate of 10% and a recycling rate of 1% in Canada.

**Percentage Generated**

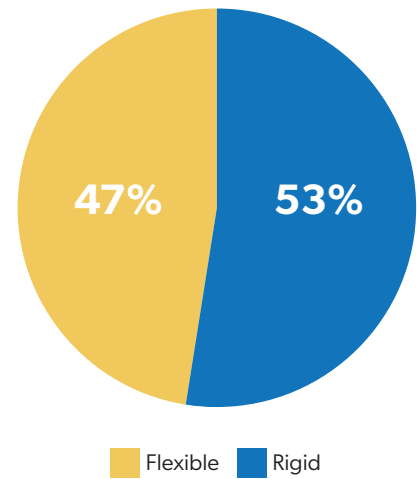


Figure 6: **Rigid Plastic Packaging Flow**

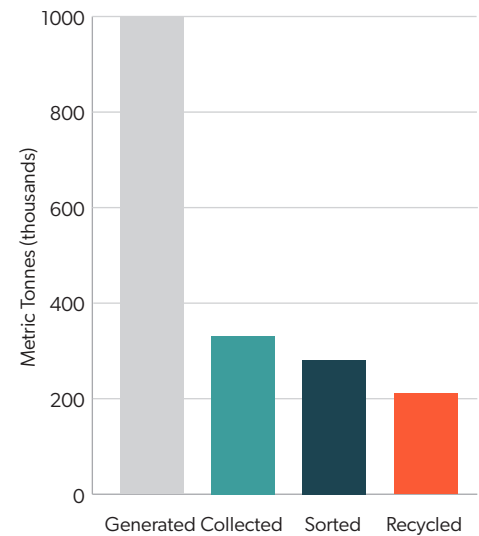
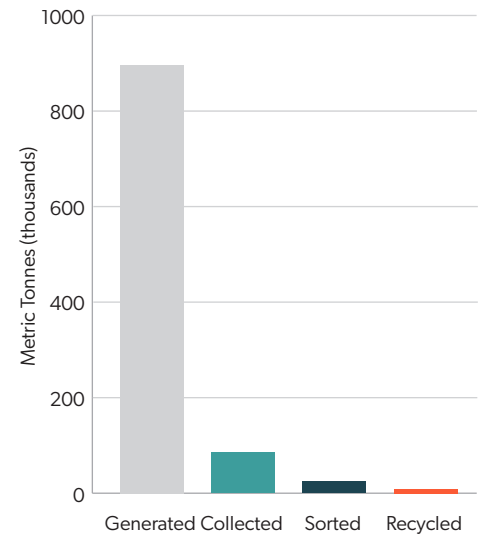


Figure 7: **Flexible Plastic Packaging Flow**



Average	Sorted rate (%)	Recycled (M.T.)			Recycled rate (%)
		Low	High	Average	
281,105	85%	190,983	230,954	210,969	21%
124,404	96%	90,767	105,743	98,255	46%
49,390	108%	37,451	41,981	39,716	53%
2,502	100%	2,002	2,127	2,064	61%
47,650	104%	25,080	32,825	28,952	19%
57,160	53%	35,683	48,277	41,980	8%

Average	Sorted rate (%)	Recycled (M.T.)			Recycled rate (%)
		Low	High	Average	
25,104	29%	6,990	10,481	8,735	1%
13,961	55%	6,980	10,471	8,726	7%
59	1%	9	10	10	0%
11,084	23%	5,888	7,967	6,928	1%

## 7 Comparison to Other Studies

Table 15 provides a comparison of the data in this report to three other recent national reports.

When comparing the data in this report to other reports, it is important to note methodology differences, in particular data year (2016, 2018 and 2019) and the scope of what is being measured (i.e., plastic packaging vs all post-consumer plastics).

The quantity of plastic packaging generated ranges from a low of 1.55 million tonnes to a high of 1.89 million tonnes. This range reflects differences in the methodologies used. The Environment and Climate Change Canada's (ECCC) report took a top-down approach in calculating plastic packaging generation (i.e., by extrapolating based on product sales), while this report takes a bottom-up approach (i.e., by extrapolating based on waste composition data, data published by regulated programs, and service provider data).

Both methodologies have inherent challenges. The bottom-up approach used in this report has challenges with the lack of data on plastic packaging generated by businesses and institutions (non-deposit) and inconsistencies in measurement and tracking systems used by the various sources. The top-down approach has challenges in applying assumptions about the proportion and type of plastics

to model based on product sales. Notwithstanding the differences in methodologies and data years (2016 vs 2019), the two approaches can be viewed as corroborating since they provide a generally similar picture of the amount of plastic packaging generated and sorted in Canada.

## 8 Recyclability Assessment

### 8.1 BY RESIN AND FORMAT

#### 8.1.1 Rigid Plastic Packaging

Collection systems servicing residences, businesses and institutions are typically designed to accept commingled containers<sup>21</sup> or fully commingled containers and papers<sup>22</sup>. Certain types of rigid plastic packaging – PET, HDPE and PP bottles, and PE, PP and PS thermoform packaging, can be reasonably accommodated in commingled collection systems as processing technologies are available to mechanically sort these packaging types by resin. Most sorting facilities deploy optical sorting technologies for plastic containers followed by a manual quality control sort, although smaller, remote facilities may rely entirely on manual sorting techniques.

Rigid plastic sorting challenges include:

- Rigid plastic packaging above a certain size (typically 4 litres) and below a certain size (e.g. typically < 200ml in volume or < 60mm by 60mm in size);

Table 15: Comparison of Plastic Generation and Management Reports

Report	Data Year	Materials Measured	Total Generated (M.T.)	Total Collected (M.T.)	Total Sorted (M.T.)	% of materials Recycled	Total Recycled (M.T.)
CPP Foundation Report	2019	Plastic packaging	1,893,800	416,519	306,209	12%	219,704
ECCC Plastic Study <sup>18</sup>	2016	Plastic packaging	1,553,000	346,000	295,000	15%	233,000
Post-Consumer Plastics Recycling in Canada <sup>19</sup>	2018	Post-consumer plastics	N/A	306,600	N/A	N/A	N/A
Statistics Canada Waste Management Industry Survey <sup>20</sup>	2018	Post-consumer plastics	N/A	N/A	354,559	N/A	N/A

<sup>18</sup> Environment and Climate Change Canada. Economic Study of the Canadian Plastic Industry, Markets and Waste, 2019. Available at [http://publications.gc.ca/collections/collection\\_2019/eccc/En4-366-1-2019-eng.pdf](http://publications.gc.ca/collections/collection_2019/eccc/En4-366-1-2019-eng.pdf).

<sup>19</sup> More Recycling. 2018 Post-Consumer Plastics Recycling in Canada, 2020. Available at [https://www.plasticsmarkets.org/jsfcontent/CanadaReport18\\_jsf\\_1.pdf](https://www.plasticsmarkets.org/jsfcontent/CanadaReport18_jsf_1.pdf).

<sup>20</sup> Statistics Canada. Waste Management Industry Survey, 2021. Available at <https://www150.statcan.gc.ca/t1/tb1/en/tv.action?pid=3810013801>.

<sup>21</sup> These systems are typically described as two-stream systems because commingled containers are collected in one stream and commingled papers are collected in a separate stream.

<sup>22</sup> These systems are typically described as single-stream systems because containers and papers are collected in one stream.

<sup>23</sup> Float-sink separation.

- Failure of automated systems to scan and accurately identify the resin where:
  - PET and HDPE bottles have full wrap labels and sleeves;
  - Rigid plastic packaging is heavily pigmented (e.g., black, dark brown, dark green, etc.);
  - Rigid plastic packaging is made from multiple resins and composite materials;
  - Biodegradable rigid plastic packaging cannot be readily distinguished from non-biodegradable rigid plastic packaging;
- Rigid plastic packaging with components (e.g. handles, enclosures) that are made from a different resin than the remainder of the packaging;
- Rigid plastic packaging of similar design made from different resins;
- Rigid plastic packaging containing residue from the original products (e.g., water remaining in PET bottles, food remaining in HDPE jars);
- The increasingly common practice of pigmenting packaging to match the colour of the product; and
- Lightweighting of rigid packaging as optical sorters cannot consistently and reliably identify the resin type based on a thin layer of plastic.

The following represent rigid plastic packaging resins in order of ease of sorting:

- PET, PE, PP bottles and jars greater than 200ml and less than 4l in size;
- PET, PE, PP, PS, PVC non-bottle rigid packaging (#1-7) greater than 200ml and less than 4l in size;
- Expanded PS (EPS); and
- Biodegradable plastics.

Recycling technologies are available to mechanically wash the shredded or flaked PET, PP and HDPE bottles, and PE, PP and PS thermoform plastic packaging in preparation for remanufacturing. The following factors reduce the effectiveness of the recycling process for rigid plastic packaging, reducing yields and creating operational challenges:

- Multi-layer plastic packaging with barrier layers to protect the contents from air, light or moisture (e.g. nylon or other barriers);
- Labels that are incongruent with the packaging resin type including labels made from PVC or paper;
- Adhesives;
- Inks that bleed;
- Additives that impact the recycling process<sup>23</sup> (e.g., precipitated calcium carbonate); and
- Packaging with components made of a different material, (e.g., handles, pump enclosures with metal springs and silicon seals, metal closures and neck rings).

Because Expanded PS (EPS) packaging is particularly susceptible to breakage and cross-contamination, commingled collection systems contribute to processing losses of EPS and may compromise quality to the extent that collected and sorted EPS will not meet recycling market specifications. Processing technologies are not available to effectively mechanically sort EPS by resin without significant losses to residue. Because EPS is typically densified before shipment, the established recycling technologies for EPS struggle to remove dirt and other cross-contamination in preparation for remanufacturing.

PVC packaging can be mechanically sorted from commingled collection systems. However, because PVC is considered a serious contaminant if present in any quantity in a shipment of other types of plastic packaging, its presence in commingled materials represents a risk of cross-contamination as a result of sorting errors.

Biodegradable rigid plastic packaging can be mechanically sorted from commingled collection systems. However, because biodegradable rigid plastic packaging is considered a serious contaminant if present in any quantity in a shipment of other types of plastic packaging, its presence in commingled materials represents a risk of cross-contamination as a result of sorting errors. Biodegradable rigid plastic packaging is not commonly accepted in collection systems designed to collect segregated materials for aerobic composting or anaerobic digestion systems, in part because these systems do not consistently fully degrade the Biodegradable rigid plastic packaging within the allotted time that materials remain in the systems.

The following represent rigid plastic packaging resins ordered by ease of recycling:

- Reasonable market capacity, demand and commodity price
  - PET, PE, PP bottles and jars
    - › Unpigmented packaging
    - › Pigmented packaging (including black, dark brown & dark green)
  - PET, PE, PP, non-bottle rigid packaging (i.e., tubs & lids, thermoforms)
    - › Clear packaging
    - › Pigmented packaging (including black, dark brown & dark green)
- Lower market capacity, demand and price
  - Rigid PS
  - EPS
- No market capacity, demand and price
  - PVC
  - Biodegradable rigid plastics

### 8.1.2 Flexible Plastic Packaging

Because Film plastic packaging is particularly susceptible to cross-contamination, collecting Film in commingled collection systems contributes to processing losses and may compromise quality to the extent that collected and sorted Film plastic packaging will not meet recycling market specifications. Film plastic packaging is also prone to wrapping around moving parts of processing systems, contributing to system down-time and increasing equipment maintenance. The range of resins used in flexible package (e.g. PE, PP, PVC, LLDPE, etc.) also makes it difficult for recyclers to produce quality products.

Biodegradable flexible plastic packaging is a serious contaminant if present in any shipment of non-biodegradable plastic packaging, its collection with non-biodegradable flexible packaging creates risk of cross-contamination as a result of sorting errors. Biodegradable flexible plastic packaging is not commonly accepted in collection systems designed to collect segregated materials for aerobic composting or anaerobic digestion systems, in part because these systems do not consistently fully degrade the Biodegradable flexible plastic packaging within the allotted time that materials remain in the systems.

Laminated flexible plastic packaging is not accepted in most collection systems, as recycling technologies for these materials are not yet generally available. As such, where it is collected, laminated flexible plastic packaging is typically processed to meet specifications as fuel in industrial processes.

Flexible plastic sorting challenges include:

- Flexible plastic packaging is heavily pigmented (e.g., black, dark brown, dark green, etc.);
- Flexible plastic packaging is made from multiple resins and composite materials;
- Biodegradable flexible plastic packaging cannot be readily distinguished from non-biodegradable plastic packaging;
- Flexible plastic packaging with components (e.g., handles, enclosures) that are made from a different resin than the remainder of the packaging;
- Flexible plastic packaging of similar design made from different resins;
- Flexible plastic packaging containing non-plastic residue (e.g., cash register receipts);

- Because of its lightweight nature, flexible packaging:
  - Involves a great deal of handling to produce a tonne of useful material;
  - Covers other material on conveyors, making sorting more difficult;
  - Requires greater effort in manual pre-sort stations; and
  - Travels with cardboard through disc screens contributing to contamination of cardboard bales.

The following factors reduce the effectiveness of the recycling process for flexible plastic packaging, reducing yields and creating operational challenges:

- Multi-layer plastic packaging of different resins and/or with barrier layers to protect the contents from air, light or moisture (e.g. nylon or other barriers);
- Labels that are incongruent with the packaging resin type including labels made from PVC or paper;
- Adhesives;
- Non-bleeding inks;
- Additives that impact the recycling process<sup>24</sup> (e.g., degradable additives – oxo, photo or bio); and
- Packaging with components made of a different material, (e.g., handles, enclosures).

The following represent flexible plastic packaging resins in order of ease of sorting:

- Moderate market capacity, demand and price
  - PE film
- Lower market capacity, demand and price
  - PP film
  - Laminated flexible plastic packaging
  - Biodegradable flexible plastic packaging

## 8.2 DASHBOARD

The dashboard below provides visual assessments of:

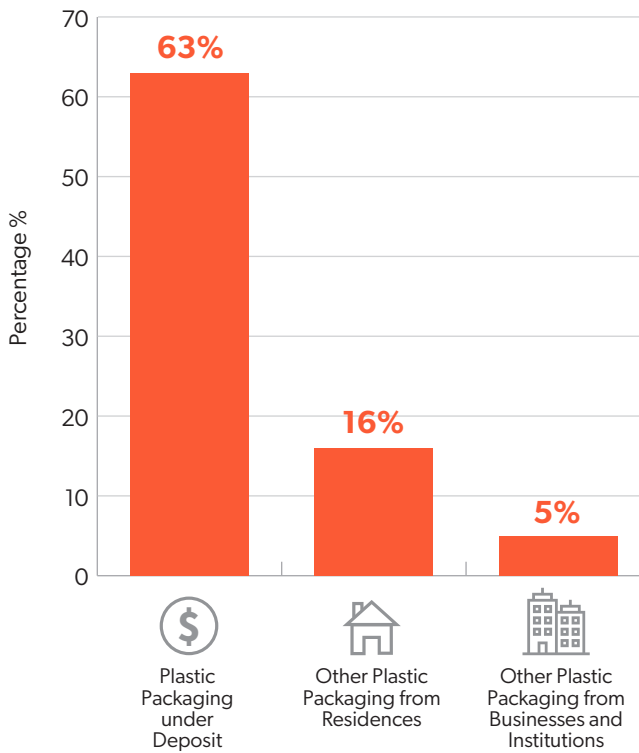
- The recycling rate for each of the three systems, Plastic Packaging under Deposit, Other Plastic Packaging from Residences and Other Plastic Packaging from Businesses and Institutions;
- Recycling rate for Rigid and Flexible plastic packaging, by material and format; and
- Performance of the collection, sorting, and recycling steps of the management system by packaging formats and materials.

The relative performance of the three systems, the assessments of good, reasonable, limited or poor recycling performance and the relative proportion of generated that is recycled illustrates key action areas for attention, innovation and investment to achieve CPP targets.

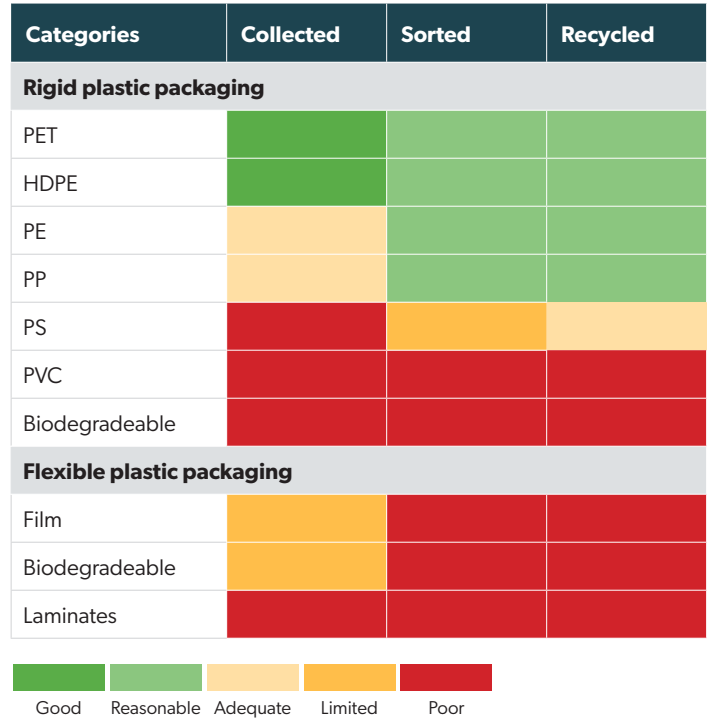
<sup>24</sup> Float-sink separation.

Figure 8: **Plastic Packaging Performance Dashboard**

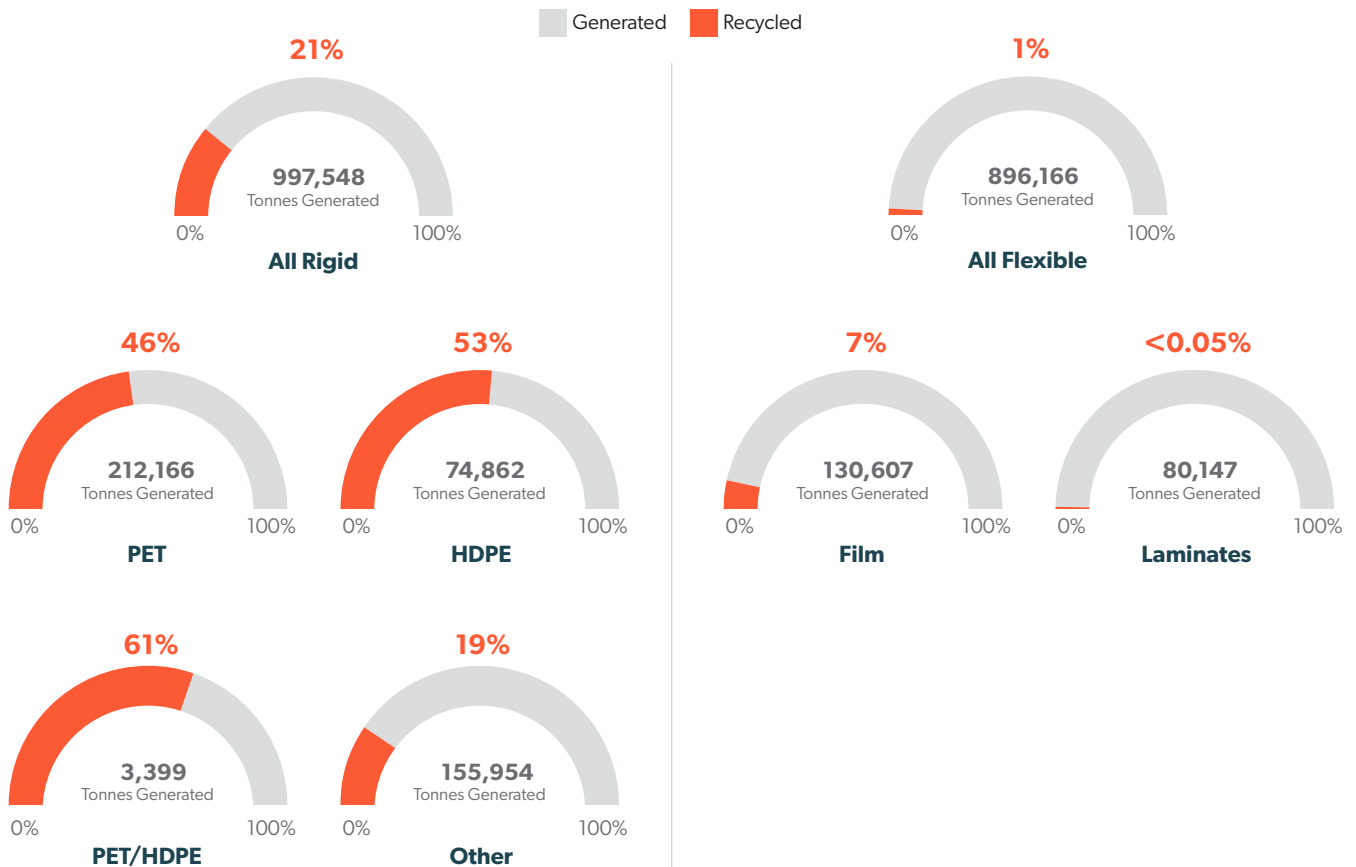
**Recycling Performance By System**



**Recycling Performance By Material Format/Type**



**Recycling Rate by Format/Type**



# 9 Strengths and Weaknesses, Challenges and Opportunities

## 9.1 DATA RELIABILITY

The following table graphically displays an assessment of the availability and reliability of the data presented in previous sections of this report. The tables in subsections 8.1.1 Plastic Packaging under Deposit, 8.1.2 Other Plastic Packaging from Residences and 8.1.3 Other Plastic Packaging from Businesses and Institutions provide the basis for the assessments of higher, medium-high, medium-low, lower.

In summary:

- As there is minimal tracking of the use of sorted material in remanufacturing, data on the portion of the sorted material that is actually recycled is limited.
- Data for plastic packaging managed under regulated deposit systems and regulated producer responsibility systems is generally more available, with more detailed and comprehensive reporting occurring in deposit systems.
- There is minimal data available on Other Plastic Packaging from Businesses and Institutions.
- There tends to be less data available in jurisdictions with non-regulated residential systems to estimate plastic packaging generation and collection (e.g., waste composition and bale audits, producer supplied data).

Table 16: National Data Reliability

Categories	Generated	Collected	Sorted	Recycled
Plastic Packaging under Deposit	Higher	Higher	Higher	Medium-High
Other Plastic Packaging from Residences				
Producer responsibility	Medium-High	Medium-High	Medium-High	Medium-High
Non-Producer responsibility	Medium-Low	Medium-Low	Medium-High	Medium-High
Other Plastic Packaging from Businesses and Institutions	Lower	Lower	Lower	Lower

Higher
  Medium-High
  Medium-Low
  Lower



### 9.1.1 Plastic Packaging Under Deposit

The following table sets out the data sources and limitations for plastic packaging under deposit, together with potential solutions.

Table 17: **Plastic Packaging under Deposit**

	<b>Generated Data (Generated = Supplied)<sup>25</sup></b>	<b>Supplied Data</b>	<b>Collected Data</b>	<b>Sorted Data</b>	<b>Recycled Data</b>
<b>Data Sources Available</b>	N/A	Provincial DRS <sup>26</sup> systems	Provincial DRS systems	Provincial DRS systems	Processor discussions
<b>Current Data Limitations</b>	N/A	Categories publicly reported vary by P/T <sup>27</sup>  Level of data publicly reported varies by P/T  Data not publicly available in all P/T	Categories publicly reported vary by P/T  Level of data publicly reported varies by P/T  Data not publicly available in all P/T	Categories publicly reported vary by P/T  Level of data publicly reported varies by P/T  Data not publicly available in all P/T	Not currently reported by any DRS except high-level in AB  No requirement for programs to measure and report  No requirement for processors to measure and report
<b>Potential Solutions</b>	N/A	National standard for publicly reporting aggregated supplied data developed/implemented by industry or government	National standard for measuring and reporting collected data developed/implemented by industry or government	National standard for measuring and reporting sorted data developed/implemented by industry or government	National standard for measuring and reporting recycled data developed/implemented by industry or government  Obligated processors to measure and report through industry contracts or government requirements

<sup>25</sup> Because there is no de minimis threshold in deposit systems, the quantity reported as supplied is the same as the amount of the obligated plastic packaging generated.

<sup>26</sup> DRS – Deposit Return System

<sup>27</sup> P/T – Provinces and territories

## 9.1.2 Other Plastic Packaging from Residential Sources

The following tables set out the data sources and limitations, together with potential solutions, for other plastic packaging from residences, segregated for data on producer responsibility programs and data for residential plastic packaging not managed under producer responsibility.

Table 18: **Other Plastic Packaging from Residences (Producer responsibility)**

	Generated Data <sup>24</sup>	Supplied Data	Collected Data	Sorted Data	Recycled Data
<b>Data Sources Available</b>	Municipal waste composition studies (waste and recycling streams)  CPP signatory producer reported data	Producer reported data published by provincial programs  CPP signatory producer reported data	In-bound MRF audits  Program reporting  Curbside composition studies	Program reporting  Processor discussions and shipped to market reports	Outbound bale audits  Processor discussions
<b>Current Data Limitations</b>	Lack of consistency in waste composition audit categories, frequency, factors such as moisture	Categories publicly reported vary by P/T  Level of data publicly reported varies by P/T	Categories publicly reported vary by P/T  Level of data publicly reported varies by P/T  Inbound audit methodology not consistent  Municipal waste composition study methodology not consistent	Categories publicly reported vary by P/T  Level of data publicly reported varies by P/T  Bale audit methodology not consistent	No requirement for programs to measure and report  No requirement for processors to measure and report  Lack of consistency in outbound bale audit categories, frequency, factors such as moisture  Bale composition audits limited
<b>Potential Solutions</b>	Work with municipalities to standardize waste composition audit methodology  Incent more waste composition audits to be completed  Data sharing agreement between producers and processors to produce national data on an annual basis through a third-party	National standard for publicly reporting aggregated supplied data developed/implemented by industry or government	National standard for measuring and reporting collected data developed/implemented by industry or government  Establish an industry standard for inbound audit requirements and apply to CPP signatory contracts with corporate recycling service providers	National standard for measuring and reporting sorted data developed/implemented by industry or government  Establish an industry standard for bale audits requirements and apply to CPP signatory contracts with corporate recycling service providers	National standard for measuring and reporting recycled data developed/implemented by industry or government  Obligate processors to measure and report through industry contracts or government requirements  Data sharing agreement between producers and processors to produce national data on an annual basis through a third-party

<sup>28</sup> Generated is higher than supplied due to the de minimis thresholds in producer responsibility programs.

Table 19: **Other Plastic Packaging from Residences (Non-Extended Producer Responsibility)**

	<b>Generated Data</b>	<b>Supplied Data</b>	<b>Collected Data</b>	<b>Sorted Data</b>	<b>Recycled Data</b>
<b>Data Sources Available</b>	<p>Municipal waste composition studies (waste and recycling streams)</p> <p>Municipal reporting on diversion performance</p>	N/A	<p>Processor discussions and facility receiving reports</p> <p>Provincial/municipal reporting on diversion performance</p>	<p>Processor discussions and shipped to market reports</p> <p>Provincial/municipal reporting on diversion performance</p>	<p>Processor discussions and outbound bale audits (very limited)</p>
<b>Current Data Limitations</b>	<p>Lack of consistency in waste composition audit categories, frequency, factors such as moisture</p> <p>Provincial waste characterization studies unavailable leading to 'modeling' localized data to province wide data</p>	N/A	<p>Minimal data reporting</p> <p>Categories vary where reporting is available</p>	<p>Minimal data reporting</p> <p>Lack of consistency in outbound bale audit categories, frequency, factors such as moisture</p>	<p>No data reporting</p> <p>Lack of consistency in outbound bale audit categories, frequency, factors such as moisture</p>
<b>Potential Solutions</b>	<p>Work with municipalities to standardize waste composition audit methodology</p> <p>Incent more waste composition audits to be completed</p> <p>Data sharing agreement between producers and processors to produce national data on an annual basis through a third-party</p>	N/A	<p>Standardized municipal measurement and reporting</p> <p>Standardized inbound audit methodology</p> <p>Expand regulated programs to remaining jurisdictions and ensure broad and consistent definitions of obligated plastic packaging (e.g., EPR or DRS)</p> <p>Compensate municipalities to provide collected data</p>	<p>National standard for measuring and reporting sorted data developed / implemented by industry or government</p> <p>Standardized bale audit methodology</p> <p>Expand regulated programs to remaining jurisdictions and ensure broad and consistent definitions of obligated plastic packaging (e.g., EPR or DRS)</p> <p>Compensate processors to provide sorted data</p>	<p>Obligate processors to measure and report through industry contracts or government requirements</p> <p>Expand regulated programs to remaining jurisdictions and ensure broad and consistent definitions of obligated plastic packaging (e.g., EPR or DRS)</p> <p>Standardized bale audit methodology Compensate processors to provide recycling data</p> <p>Data sharing agreement between producers and processors to produce national data on an annual basis through a third-party</p>

### 9.1.3 Other Plastic Packaging from Businesses and Institutions

The following table sets out the data sources and limitations for plastic packaging from businesses and institutions together with potential solutions.

Table 20: **Other Plastic Packaging from Businesses and Institutions**

	<b>Generated Data</b>	<b>Collected Data</b>	<b>Sorted Data</b>	<b>Recycled Data</b>
<b>Data Sources Available</b>	ICI waste composition audits Statistics Canada WMIS – waste generation CPP signatory producer data ECCC Deloitte analysis	Service provider discussions ICI waste composition audits Statistics Canada WMIS – waste diversion ECCC Deloitte analysis Difference between above 3 and total of DRS, producer responsibility and residential (non-EPR)	Processor discussions Statistics Canada WMIS – waste diversion ECCC Deloitte analysis Difference between above 3 and total of DRS, producer responsibility and residential (non-EPR) 2018 Post-Consumer Plastics Recycling in Canada	Processor discussions
<b>Current Data Limitations</b>	No data reporting Lack of consistency in waste composition audit categories, frequency, factors such as moisture	Little data reporting Limited inbound composition audits	Little data reporting Lack of consistency in out-bound bale audit categories, frequency, factors such as moisture	No data reporting Lack of consistency in out-bound bale audit categories, frequency, factors such as moisture
<b>Potential Solutions</b>	Standardized ICI waste composition audit methodology Collect data on the amount of plastic packaging supplied by CPP signatories into the ICI sectors Data sharing agreement between producers and processors to produce national data on an annual basis through a third-party	National standard for measuring and reporting collected data developed/implemented by industry or government Compensate collectors to provide ICI collected data Regulate collection and management of plastic packaging in ICI sector	National standard for measuring and reporting sorted data developed/implemented by industry or government Compensate processors to provide ICI sorted data Regulate collection and management of plastic packaging in ICI sector	Obligate processors to measure and report through industry contracts or government requirements Compensate processors to provide ICI recycling data Regulate collection and management of plastic packaging in ICI sector Data sharing agreement between producers and processors to produce national data on an annual basis through a third-party

## 9.2 STRENGTHS AND WEAKNESSES

To overcome the challenges and fully realize the opportunities described in the following sections, the strengths of Canada's existing plastic packaging collection and management industry will need to be leveraged. These strengths include:

- Established collection systems for plastic packaging under deposit in most parts of Canada;
- Established collection systems for plastic packaging from residences in most parts of Canada;
- Experienced, well-financed companies providing collection and sorting of plastic packaging;
- Innovative companies operating existing, and developing new, recycling systems for plastic packaging; and
- Well-established relationships among those sorting and recycling plastic packaging.

Similarly, it is important to recognize and, where possible, overcome the inherent weaknesses in Canada's existing plastic packaging collection and management systems. These weaknesses include:

- Inconsistencies in plastic packaging under deposit across Canada;
- Inconsistencies in plastic packaging accepted in residential collection systems within provinces (with the exception of BC) and territories across Canada;
- Lack of economy of scale in some parts of Canada to support capital investments in sorting and recycling systems;
- Limitations of current technologies to effectively sort certain types of plastics (e.g. expanded PS and flexible plastic packaging) from commingled materials; and
- Lack of transparency on plastic packaging generated, collected and managed by businesses and institutions.

## 9.3 RIGID PLASTIC PACKAGING

The sorting and recycling challenges described in section 8.1.1 can be summarized as:

### **Resulting from packaging design:**

- Rigid plastic packaging above a certain size (typically 4 litres) and below a certain size (e.g., typically < 200ml in volume or < 60mm by 60mm in size);
- Rigid plastic packaging heavier than 600 grams which is unlikely to be ejected by automated sorters;
- Rigid plastic packaging with components (e.g. handles, enclosures) that are made from a different resin than the remainder of the packaging;
- Packaging that includes multiple resins that cannot be sorted or managed as a single grade;

- Rigid plastic packaging of similar design made from different resins;
- Multi-layer plastic packaging with barrier layers to protect the contents from air, light or moisture (e.g. nylon or other barriers);
- Labels that are incongruent with the packaging resin type including labels made from PVC or paper;
- Adhesives;
- Non-bleeding inks;
- Metal closures and neck rings;
- Pump enclosures with metal springs and silicon seals;
- Additives that impact the recycling process;
- Pigmenting rigid packaging to match the colour of the product inside;
- Use of resins (e.g. PVC) that have no market demand;
- Limited post-consumer recycled content in rigid plastic packaging; and
- Consumer confusion caused by inconsistent or inaccurate labelling that contributes to low capture rates in collection systems and contamination in collected materials.

### **Resulting from collection system design:**

- Inconsistent access to recycling collection service by small and large businesses/institutions;
- Commingling EPS with other types of plastic packaging during collection increases losses to residue and compromises quality;
- Commingling PVC and Biodegradable rigid plastic packaging with other types of plastic packaging during collection introduces risk of cross-contamination; and
- Rigid plastic packaging containing residue from the original products (e.g. water remaining in PET bottles, food remaining in HDPE jars).

### **Resulting from sorting system design:**

- Inability of mechanical sorting systems to accurately identify resins in some packaging.

These challenges create the following opportunities:

- Packaging redesign to eliminate or minimize the sorting and recycling challenges listed above.
- Collection system redesign to:
  - Segregate collection of EPS;
  - Collect biodegradable rigid plastics in 'green waste' systems rather than in recycling systems; and
  - Standardize collection systems across jurisdictions to minimize consumer confusion.

- Sorting system improvements to:
  - Reduce processing losses during EPS sorting; and
  - Improve sorting technologies and efficiencies to ensure PVC and biodegradable rigid plastic packaging are not present in shipments of other types of plastic packaging.
- Recycling system improvements to:
  - Develop EPS recycling technologies that can remove contamination; and
  - Effectively degrade biodegradable rigid plastics in aerobic composting and anaerobic digestion systems.

## 9.4 FLEXIBLE PLASTICS PACKAGING

The sorting and recycling challenges described in section 8.1.2 can be summarized as:

### **Resulting from packaging design:**

- Flexible plastic packaging is heavily pigmented (e.g., black, dark brown, dark green, etc.);
- Flexible plastic packaging is made from multiple resins and composite materials;
- Biodegradable flexible plastic packaging cannot be readily distinguished from non-biodegradable plastic packaging;
- Flexible plastic packaging with components (e.g. handles, enclosures) that are made from a different resin than the remainder of the packaging;
- Flexible plastic packaging of similar design made from different resins;
- Multi-layer plastic packaging of different resins and/or with barrier layers to protect the contents from air, light or moisture (e.g. nylon or other barriers);
- Labels that are incongruent with the packaging resin type including labels made from PVC or paper;
- Adhesives;
- Non-bleeding inks;
- Additives that impact the recycling process;
- Limited post-consumer recycled content in flexible plastic packaging; and
- Consumer confusion caused by inconsistent or inaccurate labelling that contributes to low capture rates in collection systems and contamination in collected materials.

### **Resulting from collection system design:**

- Inconsistent access to recycling collection service by small and large businesses/institutions;
- Commingling Film with other types of plastic packaging during collection introduces risk of cross-contamination, increases losses to residue, compromises quality and contributes to processing system inefficiencies;
- Commingling Biodegradable flexible plastic packaging with non-biodegradable flexible plastic packaging during collection introduces risk of cross-contamination;
- Very limited collection of Laminated flexible plastic packaging; and
- Flexible plastic packaging containing non-plastic residue (e.g., cash register receipts).

### **Resulting from sorting system design:**

- Processing losses due to cross-contamination.

### **Resulting from recycling system design:**

- No recycling technologies available for Laminated flexible plastic packaging.

These challenges create the following opportunities:

- Packaging redesign to eliminate or minimize the sorting and recycling challenges listed above.
- Collection system redesign to:
  - Segregate collection of Film; and
  - Collect biodegradable flexible plastics in 'green waste' systems rather than in recycling systems;
- Sorting system improvements to:
  - Enhance film sorting in MRFs and downstream processing facilities; and
  - Advance sorting technologies and efficiencies to ensure biodegradable flexible plastic packaging is not present in shipments of other types of plastic packaging.
- Recycling system improvements to:
  - Effectively degrade biodegradable flexible plastics in aerobic composting and anaerobic digestion systems;
  - Develop stronger end-markets for flexible packaging; and
  - Develop technologies to recycle Laminated flexible plastic packaging with associated market capacity and demand for products/packaging made from Laminates.

# 10 References

- Alberta Beverage Container Recycling Corporation, 2019 Sustainability report. Available at <https://www.abcrc.com/assets/Uploads/ABCRC-2019-Sustainability-Report.pdf>
- Boissons Gazeuses Environnement, Statistiques de récupération. Available at <https://www.bge-quebec.com/la-consigne/>
- Continuous Improvement Fund, CIF/SO Terms of Reference Year 3 (2018/19) Residential Waste Composition Study
- Chamard Stratégies Environnementales, NB Provincial Waste Audit, Winter, Summer and Fall audit, 2019
- City of Calgary, Single Family and Multi Family Garbage Composition, 2019. Available at <https://data.calgary.ca/Help-and-Information/Single-Family-and-Multi-Family-Garbage-Composition/44h7-jkm5>
- City of Saskatoon, Waste Audit Program 2016
- Encorp Pacific, Annual report 2019. Available at <https://www.return-it.ca/ar2019/>
- Eunomia, Alberta Collaborative Extended Producer Responsibility Study, 2019
- Environment and Climate Change Canada. Economic Study of the Canadian Plastic Industry, Markets and Waste, 2019. Available at [http://publications.gc.ca/collections/collection\\_2019/eccc/En4-366-1-2019-eng.pdf](http://publications.gc.ca/collections/collection_2019/eccc/En4-366-1-2019-eng.pdf)
- Éco Entreprises Québec, 2019 Schedule of contribution. Available at <https://www.eeq.ca/en/news/documents-and-publications/schedules-of-contributions/>
- Éco Entreprises Québec & RECYC-QUÉBEC, Caractérisation des matières résiduelles du secteur municipal 2015-2018. Available at <https://www.recyc-quebec.gouv.qc.ca/sites/default/files/documents/caracterisation-secteur-municipal-2015-2018.pdf>
- Éco Entreprises Québec & RECYC-QUÉBEC, Caractérisation à destination 2017-2018. Available at <https://www.recyc-quebec.gouv.qc.ca/sites/default/files/documents/caracterisation-destination-2017-2018.pdf>
- Éco Entreprises Québec & RECYC-QUÉBEC, Caractérisation des matières sortantes des centres de tri. Available at <https://www.recyc-quebec.gouv.qc.ca/sites/default/files/documents/caracterisation-matieres-sortantes-centres-de-tri-2018-2020.pdf>
- Environment and Climate Change Canada. Economic Study of the Canadian Plastic Industry, Markets and Waste, 2019. Available at [http://publications.gc.ca/collections/collection\\_2019/eccc/En4-366-1-2019-eng.pdf](http://publications.gc.ca/collections/collection_2019/eccc/En4-366-1-2019-eng.pdf)
- Environment and Climate Change Canada. National Waste Characterization Study, 2020. Available at <https://www.canada.ca/en/environment-climate-change/services/managing-reducing-waste/municipal-solid/statistics-trends.html>
- Metro Vancouver. 2014 ICI Waste Characterization Program, 2015. Available at <http://www.metrovancouver.org/services/solid-waste/SolidWastePublications/FinalReport-2014ICIWasteCharacterizationProgram3-Jun-15.pdf>
- More Recycling. 2018 Post-Consumer Plastics Recycling in Canada, 2020. Available at [https://www.plasticsmarkets.org/jsfcontent/CanadaReport18\\_jsf\\_1.pdf](https://www.plasticsmarkets.org/jsfcontent/CanadaReport18_jsf_1.pdf)
- Multi-Material Stewardship Manitoba, Annual report 2019. Available at <https://stewardshipmanitoba.org/wp-content/uploads/2020/06/205926-MMSM-2019-Annual-Report-WEB.pdf>
- Multi-Material Stewardship Manitoba, City of Brandon Residential Waste Composition Study 2019
- Multi-Material Stewardship Manitoba, City of Winnipeg Residential Waste Composition Study 2019
- New-Brunswick Regional Services Commissions, Annual reports
- RECYC-QUÉBEC, Indice des prix des matières 2019. Available at <https://www.recyc-quebec.gouv.qc.ca/municipalites/collecte-selective-municipale/indice-prix-matieres>
- Recycle BC, Annual report 2019. Available at <https://recyclebc.ca/wp-content/uploads/2020/06/RecycleBC2019-Final.pdf>
- Regional District of East Kootenay. Waste Composition Study, 2018. Available at <https://engage.rdek.bc.ca/6982/widgets/27076/documents/13338>
- Regional District of East Kootenay. Waste Composition Study, 2018. Available at <https://engage.rdek.bc.ca/6982/widgets/27076/documents/13338>
- Regional District of Fraser-Fort George. 2018 Waste Characterization Study. Available at <http://www.rdffg.bc.ca/uploads/2056/2018-Waste-Characterization-Study.pdf>
- Resource Productivity & Recovery Authority, Waste diversion rates by municipal program, 2019. Available at <https://rpra.ca/programs/about-the-datacall/>
- Resource Productivity & Recovery Authority, Blue box marketed tons, 2019. Available at <https://rpra.ca/programs/about-the-datacall/>
- SARCAN, Annual report 2019. Available at <https://www.sarcsarc.ca/publications/annual-report/>
- Statistics Canada. Waste Management Industry Survey, 2021. Available at <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3810013801>
- The Beer Store, 2019 Stewardship report. Available at <https://www.thebeerstore.ca/tbs-environmental-report/>

# Appendix A – Provincial, Territorial and Regional Summaries

## British Columbia

Categories	Generated (M.T.)			Collected (M.T.)			Sorted (M.T.)		
	Low	High	Average	Low	High	Average	Low	High	Average
<b>Rigid plastic packaging</b>	120,506	146,475	133,490	42,634	45,125	43,879	41,022	43,418	42,220
PET	13,924	13,924	13,924	10,694	10,694	10,694	18,184	18,184	18,184
HDPE	0	0	0	0	0	0	0	0	8,249
Other	0	0	0	0	0	0	0	0	7,900
Unclassified	106,581	132,550	119,566	31,940	34,431	33,185	7,591	8,183	7,887
<b>Flexible plastic packaging</b>	111,259	149,959	130,609	8,048	9,361	8,705	1,844	2,145	1,995
Film	0	0	0	0	0	0	0	0	984
Laminates	49	49	49	13	13	13	13	13	13
Unclassified	111,209	149,910	130,560	8,035	9,348	8,692	922	1,073	998
<b>TOTAL</b>	<b>231,765</b>	<b>296,434</b>	<b>264,099</b>	<b>50,683</b>	<b>54,486</b>	<b>52,584</b>	<b>42,616</b>	<b>45,814</b>	<b>44,215</b>

## Alberta

Categories	Generated (M.T.)			Collected (M.T.)			Sorted (M.T.)		
	Low	High	Average	Low	High	Average	Low	High	Average
<b>Rigid plastic packaging</b>	113,228	138,563	125,895	32,232	37,643	34,938	24,899	29,079	26,989
PET	16,640	16,640	16,640	12,365	12,365	12,365	13,721	13,721	13,721
HDPE	7,275	7,275	7,275	7,081	7,081	7,081	8,486	8,486	8,486
Other	0	0	0	0	0	0	0	0	2,602
Unclassified	89,313	114,648	101,980	12,786	18,197	15,491	1,799	2,560	2,179
<b>Flexible plastic packaging</b>	104,668	134,671	119,781	8,017	11,084	9,597	1,174	1,623	1,405
Film	0	0	0	0	0	0	0	0	1,023
Laminates	0	0	112	0	0	46	0	0	46
Unclassified	104,668	134,671	119,669	8,017	11,084	9,551	282	389	336
<b>TOTAL</b>	<b>217,896</b>	<b>273,233</b>	<b>245,677</b>	<b>40,249</b>	<b>48,728</b>	<b>44,535</b>	<b>25,662</b>	<b>31,067</b>	<b>28,394</b>



Recycled (M.T.)		
Low	High	Average
30,000	35,338	32,669
13,799	15,457	14,628
6,187	7,012	6,599
4,944	6,008	5,476
5,071	6,861	5,966
1,031	1,465	1,248
492	738	615
9	10	10
530	717	624
<b>31,031</b>	<b>36,803</b>	<b>33,917</b>

Recycled (M.T.)		
Low	High	Average
20,138	22,347	21,243
10,841	11,663	11,252
6,719	7,213	6,966
1,301	1,744	1,522
1,277	1,728	1,502
690	1,009	849
512	767	639
0	0	0
178	241	210
<b>20,828</b>	<b>23,356</b>	<b>22,092</b>

# Appendix A – Provincial, Territorial and Regional Summaries

## Saskatchewan

Categories	Generated (M.T.)			Collected (M.T.)			Sorted (M.T.)		
	Low	High	Average	Low	High	Average	Low	High	Average
<b>Rigid plastic packaging</b>	22,036	27,343	24,689	7,812	9,047	8,430	7,010	8,118	7,564
PET	3,803	3,803	3,803	3,103	3,103	3,103	3,375	3,375	3,375
HDPE	1,025	1,025	1,025	991	991	991	1,831	1,831	1,831
Other	0	0	0	33	33	33	793	793	793
Unclassified	17,208	22,516	19,862	3,685	4,921	4,303	1,341	1,790	1,565
<b>Flexible plastic packaging</b>	20,897	27,591	24,244	1,612	2,127	1,870	0	0	0
Film	0	0	0	0	0	0	0	0	0
Laminates	0	0	0	0	0	0	0	0	0
Unclassified	20,897	27,591	24,244	1,612	2,127	1,870	0	0	0
<b>TOTAL</b>	<b>42,932</b>	<b>54,934</b>	<b>48,933</b>	<b>9,424</b>	<b>11,175</b>	<b>10,299</b>	<b>6,921</b>	<b>8,207</b>	<b>7,564</b>

## Manitoba

Categories	Generated (M.T.)			Collected (M.T.)			Sorted (M.T.)		
	Low	High	Average	Low	High	Average	Low	High	Average
<b>Rigid plastic packaging</b>	34,466	39,288	36,877	13,900	14,845	14,372	9,137	9,758	9,447
PET	8,994	8,994	8,994	5,764	5,764	5,764	3,971	3,971	3,971
HDPE	4,439	4,439	4,439	3,136	3,136	3,136	1,598	1,598	1,598
Other	7,370	7,370	7,370	2,322	2,322	2,322	1,807	1,807	1,807
Unclassified	13,663	18,485	16,074	2,678	3,623	3,150	1,760	2,381	2,071
<b>Flexible plastic packaging</b>	27,534	33,848	30,691	2,478	2,976	2,727	0	0	0
Film	5,112	5,112	5,112	651	651	651	0	0	0
Laminates	4,533	4,533	4,533	416	416	416	0	0	0
Unclassified	17,889	24,203	21,046	1,411	1,909	1,660	0	0	0
<b>TOTAL</b>	<b>62,000</b>	<b>73,136</b>	<b>67,568</b>	<b>16,377</b>	<b>17,820</b>	<b>17,099</b>	<b>9,049</b>	<b>9,846</b>	<b>9,447</b>

Recycled (M.T.)		
Low	High	Average
5,445	6,239	5,842
2,673	2,869	2,771
1,423	1,557	1,490
406	537	472
943	1,276	1,110
0	0	0
0	0	0
0	0	0
0	0	0
5,445	6,239	5,842

Recycled (M.T.)		
Low	High	Average
6,174	7,693	6,933
2,780	3,376	3,078
1,199	1,358	1,279
904	1,211	1,057
1,292	1,748	1,520
0	0	0
0	0	0
0	0	0
0	0	0
6,174	7,693	6,933

# Appendix A – Provincial, Territorial and Regional Summaries

## Ontario

Categories	Generated (M.T.)			Collected (M.T.)			Sorted (M.T.)		
	Low	High	Average	Low	High	Average	Low	High	Average
<b>Rigid plastic packaging</b>	<b>339,602</b>	<b>445,739</b>	<b>392,670</b>	<b>107,053</b>	<b>150,712</b>	<b>128,882</b>	<b>93,949</b>	<b>132,264</b>	<b>113,106</b>
PET	88,492	116,827	<b>102,660</b>	47,244	66,021	<b>56,632</b>	43,559	60,872	<b>52,216</b>
HDPE	30,762	37,591	<b>34,177</b>	15,451	21,160	<b>18,305</b>	13,209	18,091	<b>15,650</b>
Other	77,785	98,443	<b>88,114</b>	20,359	31,061	<b>25,710</b>	16,224	24,753	<b>20,488</b>
Unclassified	142,562	192,878	<b>167,720</b>	23,999	32,469	<b>28,234</b>	21,039	28,465	<b>24,752</b>
<b>Flexible plastic packaging</b>	<b>292,425</b>	<b>380,664</b>	<b>336,544</b>	<b>24,732</b>	<b>36,683</b>	<b>30,708</b>	<b>12,619</b>	<b>18,716</b>	<b>15,667</b>
Film	69,675	83,425	<b>76,550</b>	9,119	14,903	<b>12,011</b>	6,131	10,019	<b>8,075</b>
Laminates	32,257	39,513	<b>35,885</b>	2,964	4,667	<b>3,815</b>	0	0	<b>0</b>
Unclassified	190,493	257,726	<b>224,110</b>	12,649	17,113	<b>14,881</b>	6,454	8,731	<b>7,592</b>
<b>TOTAL</b>	<b>632,027</b>	<b>826,403</b>	<b>729,215</b>	<b>131,785</b>	<b>187,395</b>	<b>159,590</b>	<b>106,338</b>	<b>151,210</b>	<b>128,774</b>

## Quebec

Categories	Generated (M.T.)			Collected (M.T.)			Sorted (M.T.)		
	Low	High	Average	Low	High	Average	Low	High	Average
<b>Rigid plastic packaging</b>	<b>193,939</b>	<b>223,653</b>	<b>208,796</b>	<b>74,101</b>	<b>79,931</b>	<b>77,016</b>	<b>58,991</b>	<b>63,633</b>	<b>61,312</b>
PET	48,263	48,263	<b>48,263</b>	29,900	29,900	<b>29,900</b>	25,247	25,247	<b>25,247</b>
HDPE	18,208	18,208	<b>18,208</b>	12,448	12,448	<b>12,448</b>	9,920	9,920	<b>9,920</b>
Other	43,278	43,278	<b>43,278</b>	15,233	15,233	<b>15,233</b>	10,890	10,890	<b>10,890</b>
Unclassified	84,190	113,904	<b>99,047</b>	16,520	22,350	<b>19,435</b>	12,967	17,543	<b>15,255</b>
<b>Flexible plastic packaging</b>	<b>179,672</b>	<b>218,571</b>	<b>199,122</b>	<b>23,562</b>	<b>26,635</b>	<b>25,098</b>	<b>793</b>	<b>896</b>	<b>845</b>
Film	36,480	36,480	<b>36,480</b>	9,527	9,527	<b>9,527</b>	500	500	<b>500</b>
Laminates	32,980	32,980	<b>32,980</b>	5,328	5,328	<b>5,328</b>	0	0	<b>0</b>
Unclassified	110,212	149,111	<b>129,662</b>	8,707	11,780	<b>10,243</b>	293	396	<b>345</b>
<b>TOTAL</b>	<b>373,611</b>	<b>442,224</b>	<b>407,918</b>	<b>97,663</b>	<b>106,566</b>	<b>102,114</b>	<b>59,447</b>	<b>64,867</b>	<b>62,157</b>

Recycled (M.T.)		
Low	High	Average
74,367	92,560	83,464
36,648	44,383	40,516
11,738	13,303	12,520
10,472	13,891	12,181
15,509	20,983	18,246
8,071	11,513	9,792
4,037	6,056	5,047
0	0	0
4,034	5,457	4,745
<b>82,438</b>	<b>104,074</b>	<b>93,256</b>

Recycled (M.T.)		
Low	High	Average
40,446	50,025	45,235
18,073	21,460	19,766
7,440	8,432	7,936
5,445	7,296	6,371
9,488	12,836	11,162
433	623	528
250	375	313
0	0	0
183	248	215
<b>40,879</b>	<b>50,648</b>	<b>45,763</b>

# Appendix A – Provincial, Territorial and Regional Summaries

## Atlantic Provinces

Categories	Generated (M.T.)			Collected (M.T.)			Sorted (M.T.)		
	Low	High	Average	Low	High	Average	Low	High	Average
<b>Rigid plastic packaging</b>	<b>65,476</b>	<b>81,561</b>	<b>73,519</b>	<b>22,734</b>	<b>24,046</b>	<b>23,390</b>	<b>19,593</b>	<b>20,724</b>	<b>20,158</b>
PET	17,286	18,480	<b>17,883</b>	10,536	10,536	<b>10,536</b>	7,689	7,689	<b>7,689</b>
HDPE	8,463	11,013	<b>9,738</b>	3,632	3,632	<b>3,632</b>	3,655	3,655	<b>3,655</b>
PET/HDPE	3,011	3,011	<b>3,011</b>	2,195	2,195	<b>2,195</b>	2,195	2,195	<b>2,195</b>
Other	14,876	19,507	<b>17,191</b>	2,653	2,653	<b>2,653</b>	3,170	3,170	<b>3,170</b>
Unclassified	21,841	29,550	<b>25,695</b>	3,718	5,030	<b>4,374</b>	2,933	3,968	<b>3,450</b>
<b>Flexible plastic packaging</b>	<b>46,116</b>	<b>60,564</b>	<b>53,340</b>	<b>6,255</b>	<b>6,946</b>	<b>6,600</b>	<b>4,921</b>	<b>5,465</b>	<b>5,193</b>
PET/HDPE	10,941	13,989	<b>12,465</b>	3,241	3,241	<b>3,241</b>	3,379	3,379	<b>3,379</b>
Laminates	6,031	7,144	<b>6,587</b>	1,054	1,054	<b>1,054</b>	0	0	<b>0</b>
Unclassified	29,144	39,431	<b>34,287</b>	1,960	2,651	<b>2,305</b>	1,542	2,086	<b>1,814</b>
<b>TOTAL</b>	<b>111,592</b>	<b>142,125</b>	<b>126,858</b>	<b>28,988</b>	<b>30,992</b>	<b>29,990</b>	<b>24,504</b>	<b>26,198</b>	<b>25,351</b>

## Territories

Categories	Generated (M.T.)			Collected (M.T.)			Sorted (M.T.)		
	Low	High	Average	Low	High	Average	Low	High	Average
<b>Rigid plastic packaging</b>	<b>1,428</b>	<b>1,795</b>	<b>1,611</b>	<b>308</b>	<b>308</b>	<b>308</b>	<b>307</b>	<b>307</b>	<b>307</b>
PET	0	0	<b>0</b>	0	0	<b>0</b>	0	0	<b>0</b>
HDPE	0	0	<b>0</b>	0	0	<b>0</b>	0	0	<b>0</b>
PET/HDPE	388	388	<b>388</b>	307	307	<b>307</b>	307	307	<b>307</b>
Other	0	0	<b>0</b>	0	0	<b>0</b>	0	0	<b>0</b>
Unclassified	1,040	1,407	<b>1,223</b>	0	0	<b>0</b>	0	0	<b>0</b>
<b>Flexible plastic packaging</b>	<b>1,560</b>	<b>2,111</b>	<b>1,835</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Film	0	0	<b>0</b>	0	0	<b>0</b>	0	0	<b>0</b>
Laminates	0	0	<b>0</b>	0	0	<b>0</b>	0	0	<b>0</b>
Unclassified	1,560	2,111	<b>1,835</b>	0	0	<b>0</b>	0	0	<b>0</b>
<b>TOTAL</b>	<b>2,988</b>	<b>3,905</b>	<b>3,446</b>	<b>308</b>	<b>308</b>	<b>308</b>	<b>307</b>	<b>307</b>	<b>307</b>

Recycled (M.T.)		
Low	High	Average
14,167	16,491	15,329
5,954	6,536	6,245
2,747	3,107	2,927
1,756	1,866	1,811
1,608	2,138	1,873
2,103	2,845	2,474
2,653	3,838	3,245
1,689	2,534	2,112
0	0	0
964	1,304	1,134
<b>16,820</b>	<b>20,329</b>	<b>18,574</b>

Recycled (M.T.)		
Low	High	Average
246	261	253
0	0	0
0	0	0
246	261	253
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
<b>246</b>	<b>261</b>	<b>253</b>

