

Technical Memo 2

Waste Generation Trends

Niagara Region // December, 2023



Executive Summary

This technical memorandum provides an overview of waste generation and diversion trends at a national and provincial level. The information is intended to help inform the development of the Regional Municipality of Niagara's (Niagara Region) Waste Management Strategic Plan.

Key Take Aways

Canadians still generate disproportionately large quantities of waste but their generation rate is declining by weight and diversion efforts are improving. Significant change continues to occur in the types and composition of waste being generated as plastics overtake the use of traditional materials such as wood, glass and steel in the production of packaging and durable goods.

Packaging composition, in particular, has and continues to undergo fundamental changes as pressures to make packaging meet a range of regulatory, environmental and consumer needs. Ongoing trends in light weighting and material substitution are expected to continue. Significant growth is also expected in the development of compostable and biodegradable packaging and its penetration into traditional packaging markets.

Significant increases are also expected in the generation of food waste, textiles, incontinence product waste and electronic waste as a result of shifting demographics. Continued monitoring of these trends is recommended to ensure Niagara Region continues to provide effective diversion programs to meet the needs of its residents and local businesses.

Birett & Associates

December, 2023

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List of Acronyms

CAGR: Compound Annual Growth Rate

C&D: Construction and Demolition

EPR: Extended Producer Responsibility

Electronic Waste: E-waste

GDP: Gross Domestic Product

HSP: Hazardous and Special Products

IC&I: Industrial, Commercial & Institutional

LFHW: Love Food Hate Waste

MRFs: Material Recycling Facilities

MHSW: Municipal Household and Special Waste

OECD: Organization for Economic Cooperation and Development

SO: Stewardship Ontario

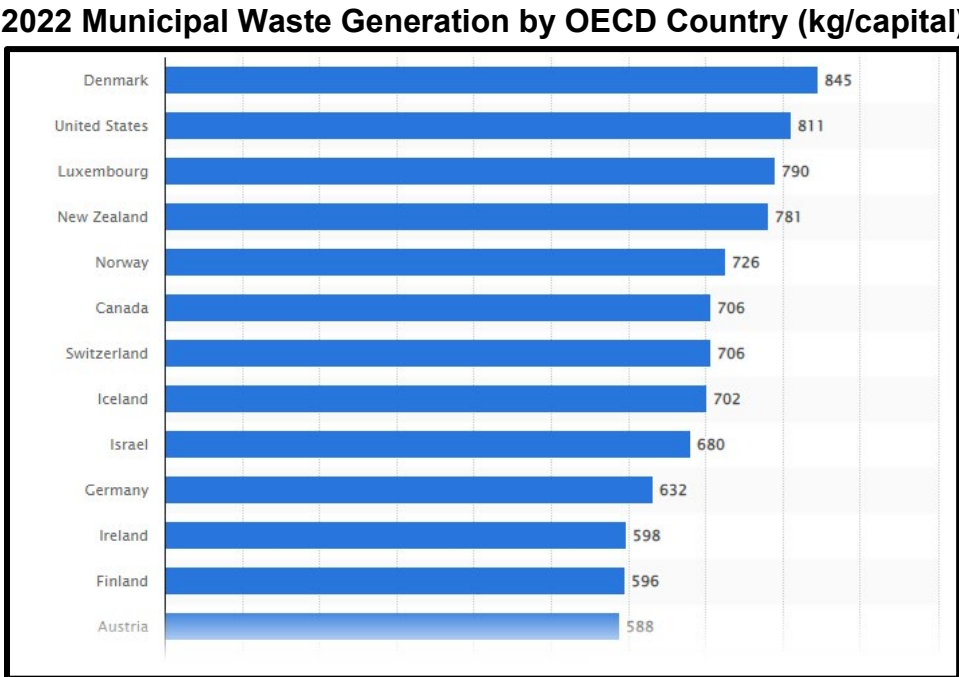
Table of Contents

Executive Summary	i
Key Take Aways	i
Disclaimer	ii
List of Acronyms	iii
Table of Contents	iv
1 Waste Generation Trends	1
Table 1: 2022 Municipal Waste Generation by OECD Country (kg/capital).....	1
Table 2: Solid Waste Diversion and Disposal in Canada by Year (kg/capita).....	2
Table 3: Solid Waste Diversion and Disposal by Province in 2018 (kg/capita).....	3
2 Waste Composition Trends	3
Table 4: National Residential Waste Composition (2016)	4
Table 5: National IC&I Waste Composition (2016)	5
Table 6: Year over Year Blue Box Program Performance in Ontario	6
Table 7: Diversion of Blue Box Recyclables in Ontario Over Time	6
Table 8: Changes in Blue Box Material Composition Over Time	7
3 Packaging Design is Constantly Evolving	8
4 Growing Interest in Biodegradable and Plant Based Packaging	10
Table 9: Projected Global Growth in Biodegradable Packaging Market (USD)	11
Table 10: Projected Growth in Biodegradable Packaging by Market Segment	12
5 Biodegradable vs Compostable Packaging.....	12
6 Food Waste Trends.....	13
Table 11: Material Diversion by Type Across Canada (2020)	15
7 Electronic and Electrical Waste Trends.....	15
8 Textiles Waste Trends.....	16
9 Municipal Household and Special Waste Trends	17
Table 12: 2021 MHSW Materials Collected.....	18
10 Biomedical and Diapers	19
11 Construction and Demolitions Waste Trends	20
12 Conclusions	21

1 Waste Generation Trends

In 2019, Canada was widely reported to be the world’s largest generator of waste per capita based on 2017 data collected by the World Bank.¹ Canada was estimated to have produced 1.33 billion metric tonnes of waste or 36.1 tonnes per person. Canada’s municipal waste disposal rate amongst its peer Organization for Economic Cooperation and Development (OECD) countries by comparison tells a distinctly different story.² As illustrated in Table 1, Canada’s municipal waste generation rate is comparable to, and in some cases significantly lower than, a number of its OECD peers. This marked difference highlights the significant impact industrial, commercial & institutional (IC&I) and agricultural waste generation has on Canada’s reported generation rates. This fact is worthy to keep in mind when setting waste diversion goals at a municipal level recognizing they have limited influence over IC&I waste diversion efforts.

Table 1: 2022 Municipal Waste Generation by OECD Country (kg/capital)



Source: Statista Inc.

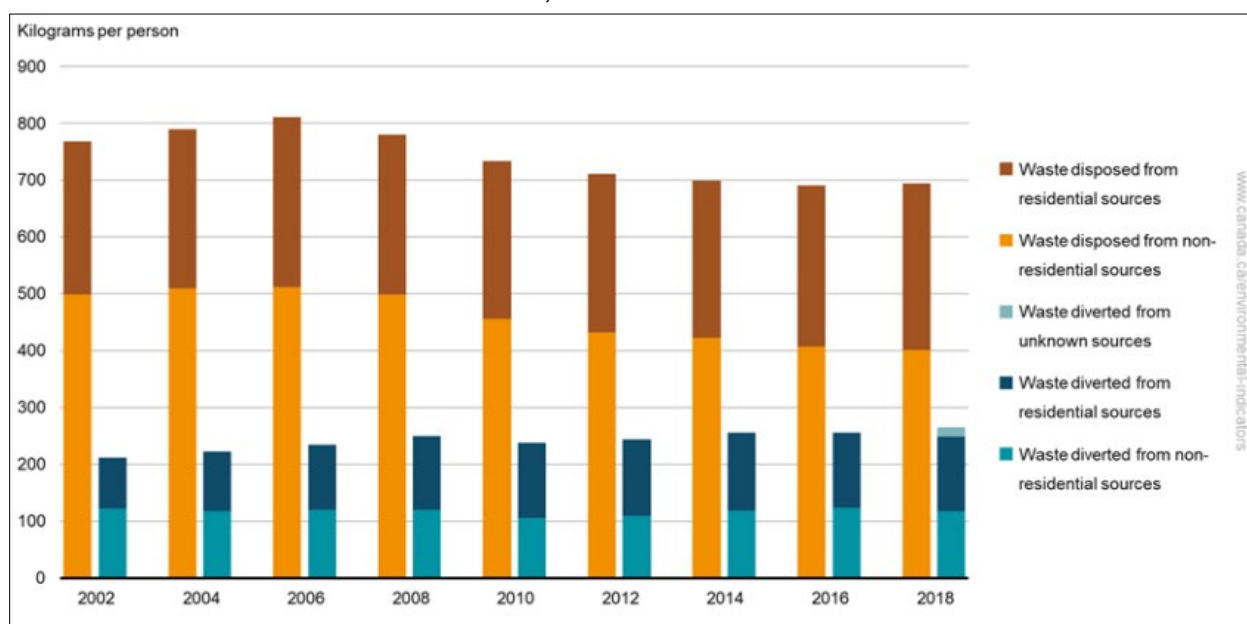
¹ [Canada produces the most waste in the world. The US ranks third](https://www.usatoday.com/story/money/2019/07/12/canada-united-states-worlds-biggest-producers-of-waste/39534923/)
(<https://www.usatoday.com/story/money/2019/07/12/canada-united-states-worlds-biggest-producers-of-waste/39534923/>)

² [Average annual per capita municipal waste generated by OECD countries as of 2022](https://www.statista.com/statistics/478928/leading-countries-by-per-capita-generated-municipal-waste/)
(<https://www.statista.com/statistics/478928/leading-countries-by-per-capita-generated-municipal-waste/>)

Despite Canada’s waste generation challenges, Statistics Canada reported Canadian waste disposal only increased by approximately three per cent during the five-year period of 2011 to 2018.³ During that same timeframe, the population increased by nine per cent suggesting that national disposal rates were decreasing. Statistics Canada noted that by 2018 it was estimated that 28 per cent of Canada’s solid waste was being diverted with the remainder being disposed. Of significance, residential sources were estimated to be responsible for 53 per cent of the reported diversion efforts.

Table 2: Solid Waste Diversion and Disposal in Canada by Year (kg/capita)

This bar chart displays waste disposed from residential and non-residential sources and waste diverted from unknown sources, residential sources and non-residential sources.



Source: Statistics Canada⁴

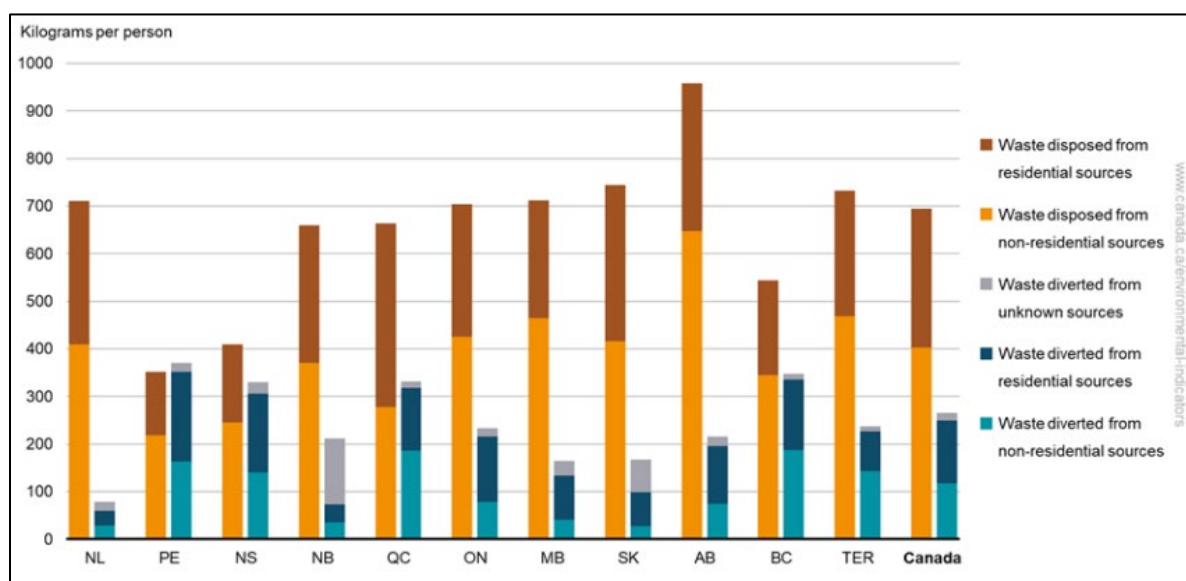
In 2018, Statistics Canada reported the national solid waste diversion rate to be 265 kilograms per person. Prince Edward Island, British Columbia, Quebec and Nova Scotia were all reported to divert more waste per person than the national average. Ontario’s diversion rate by comparison was estimated to be 233 kilograms per person. Caution is, however, warranted in comparing results between provinces because of differences in reporting structures and accounting for factors such as post diversion disposal (i.e.,

³ [Solid waste diversion and disposal](https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/solid-waste-diversion-disposal.html) (https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/solid-waste-diversion-disposal.html)

⁴ [Solid waste diversion and disposal](https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/solid-waste-diversion-disposal.html) (https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/solid-waste-diversion-disposal.html)

disposal of waste from processing of recyclables).

Table 3: Solid Waste Diversion and Disposal by Province in 2018 (kg/capita)



Source: Statistics Canada⁵

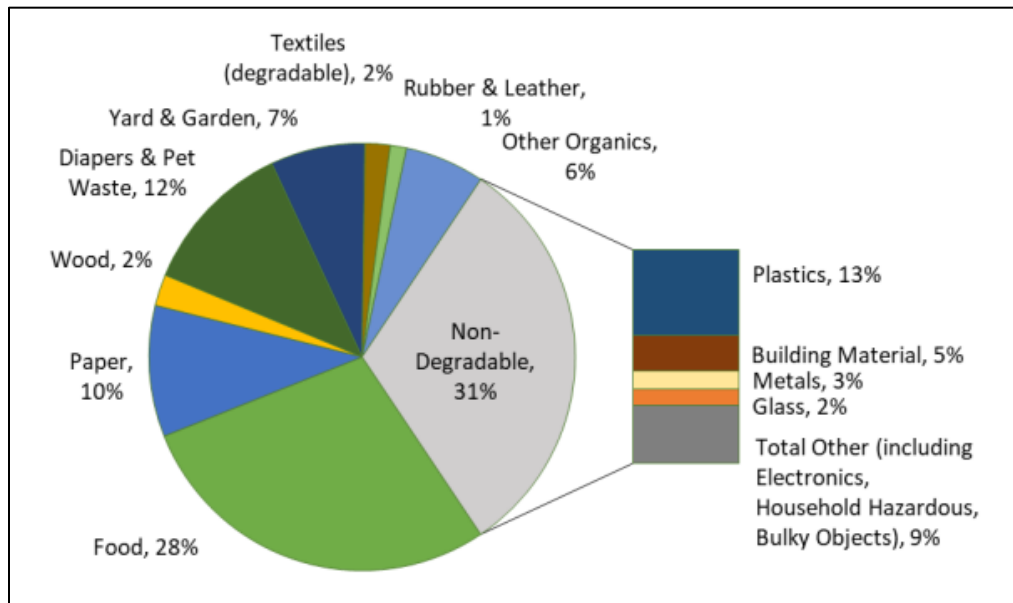
2 Waste Composition Trends

The 2020 National Waste Characterization Report published by Environment and Climate Change Canada characterized the national residential waste stream as shown in Table 4.⁶ Key components of the overall waste stream include food waste and other organics (i.e., yard waste, pet waste and diapers), paper and packaging, building materials (i.e., construction and demolition) and textiles.

⁵ [Solid waste diversion and disposal](https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/solid-waste-diversion-disposal.html) (https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/solid-waste-diversion-disposal.html)

⁶ [National Waste Characterization Report](https://publications.gc.ca/collections/collection_2020/eccc/en14/En14-405-2020-eng.pdf) (https://publications.gc.ca/collections/collection_2020/eccc/en14/En14-405-2020-eng.pdf)

Table 4: National Residential Waste Composition (2016)



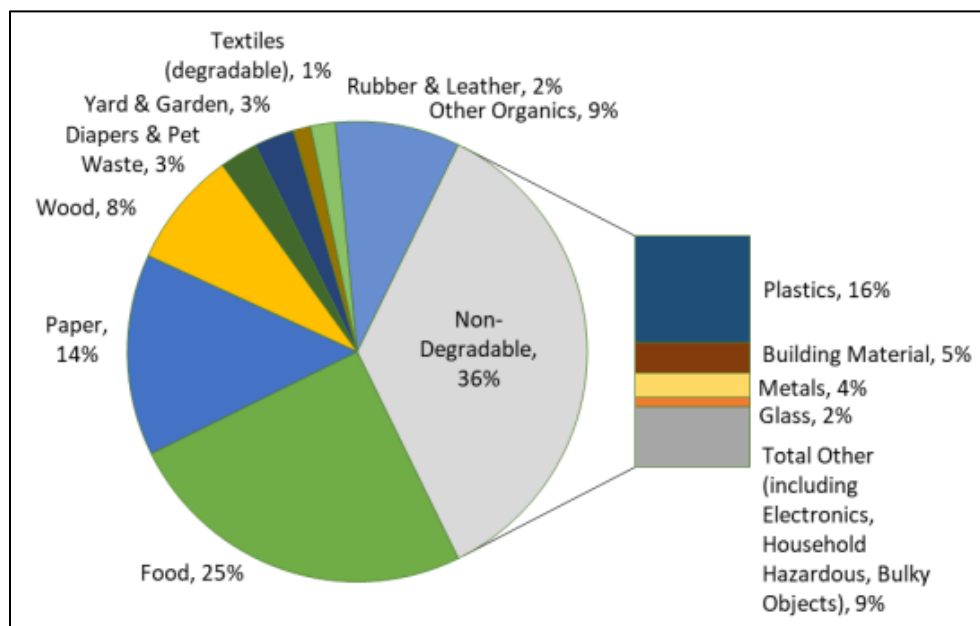
Source: Environment and Climate Change Canada⁷

By comparison, residual waste from the IC&I sector contains many of the same materials, albeit in different percentages. As shown in Table 5, food waste remains a major portion of IC&I residual waste. Paper and plastics and building materials are also present in significant quantities.

⁷ [National Waste Characterization Report](https://publications.gc.ca/collections/collection_2020/eccc/en14/En14-405-2020-eng.pdf)

(https://publications.gc.ca/collections/collection_2020/eccc/en14/En14-405-2020-eng.pdf)

Table 5: National IC&I Waste Composition (2016)



Source: Environment and Climate Change Canada⁸

In its 2021 Annual Report⁹, Stewardship Ontario (SO) reported that Ontario’s Blue Box Program had narrowly missed its regulatory obligation to achieve 60 per cent diversion of packaging waste for calendar year 2020 despite a 3.7 per cent increase in diversion compared to 2019.

⁸ [National Waste Characterization Report](https://publications.gc.ca/collections/collection_2020/eccc/en14/En14-405-2020-eng.pdf)
(https://publications.gc.ca/collections/collection_2020/eccc/en14/En14-405-2020-eng.pdf)

⁹ [2021 Stewardship Ontario Annual Report](https://stewardshipontario.ca/downloads/2021-annual-report/)
(<https://stewardshipontario.ca/downloads/2021-annual-report/>)

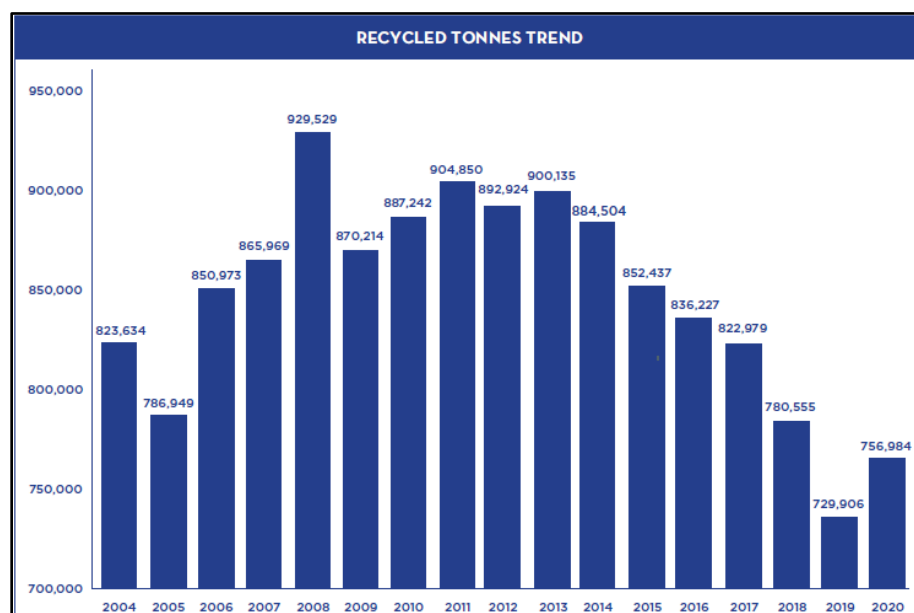
Table 6: Year over Year Blue Box Program Performance in Ontario

RECYCLING PERFORMANCE			
METRIC	2020	2019	YOY VARIANCE %
Recycled Tonnes	756,984	729,906	3.7%
Generated Tonnes	1,263,401	1,274,310	-0.9%
Recycling Rate	59.9%	57.3%	2.6%
Provincial Recycling Target	60.0%	60.0%	--
Population Served by Program	13,412,332	13,205,235	1.6%
Recycled kg per Capita	56.4	55.3	2.1%
# of Households Served	5,374,308	5,333,161	0.8%
% of Households with Access to Program	94.8%	94.0%	0.7%

Source: Stewardship Ontario¹⁰

Year over year data published in the 2021 Annual Report highlighted the dramatic decrease in the quantities of packaging and paper products being diverted across the province despite a 21 per cent increase in the province’s population over the same period.

Table 7: Diversion of Blue Box Recyclables in Ontario Over Time

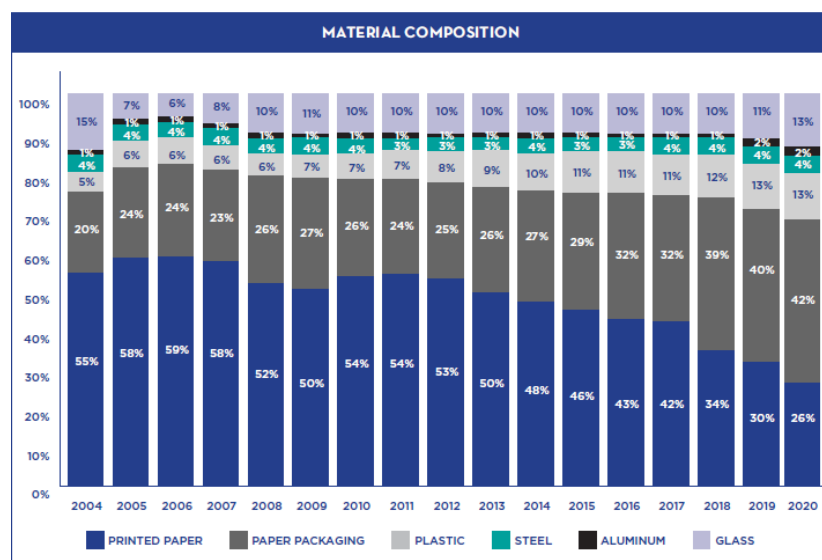


¹⁰ [2021 Stewardship Ontario Annual Report](https://stewardshipontario.ca/downloads/2021-annual-report/)
(<https://stewardshipontario.ca/downloads/2021-annual-report/>)

Source: Stewardship Ontario¹¹

There are, however, several underlying factors driving the observed change in the program's performance. The most significant of these factors has undoubtedly been changes over time with the composition of packaging and printed paper.

Table 8: Changes in Blue Box Material Composition Over Time



Source: Stewardship Ontario¹²

With the advent of social media and electronic communications, there has been a global shift away from reliance on printed paper. Newspaper volumes have declined by over 50 per cent in the past decade and are projected to continue this trend with time. The United States Census Bureau's Service Annual Survey¹³ reported the drop in revenue between 2002 and 2020 for these industries as follows:

- Newspaper Publishers revenue dropped by an estimated 52.0 per cent;
- Periodical Publishing (including magazines) revenue fell by approximately 40.5 per cent; and
- Video Tape and Disc Rental revenue decreased by an estimated 88.5 per cent.

¹¹ [2021 Stewardship Ontario Annual Report](https://stewardshipontario.ca/downloads/2021-annual-report/)
(<https://stewardshipontario.ca/downloads/2021-annual-report/>)

¹² [2021 Stewardship Ontario Annual Report](https://stewardshipontario.ca/downloads/2021-annual-report/)
(<https://stewardshipontario.ca/downloads/2021-annual-report/>)

¹³ [Internet Crushes Traditional Media: From Print to Digital](https://www.census.gov/library/stories/2022/06/internet-crushes-traditional-media.html)
(<https://www.census.gov/library/stories/2022/06/internet-crushes-traditional-media.html>)

By comparison, quantities of paper packaging have seen sustained growth during this same period driven in part by the growing reliance on online shopping and home delivery services. Record quantities of corrugated cardboard and boxboard were reported to have been received by material recycling facilities (MRFs) across Ontario during the Covid 19 pandemic.¹⁴ In fact, it is likely Ontario would have missed its Blue Box recycling target in 2020 had it not been for the fact that residents were forced to stay home and as a consequence generated more residential recycling.

In addition to the dramatic changes in paper consumption, packaging design is constantly evolving to meet changing consumer demand and regulatory requirements and supply chain needs. Light weighting and other changes to packaging design have been a dominant factor contributing to the observed decline in weight-based recovery.

3 Packaging Design is Constantly Evolving

Over the past 30 years packaging designers have undertaken concerted efforts to reduce production and shipping costs for packaging through three primary options including:

- Lightweighting;
- Material substitution; and
- Packaging redesign.

Lightweighting packaging is a common approach undertaken by most packaging designers and brand owners to reduce production and shipping costs. Coca Cola, for example, reported that since 2008 they have reduced the weight of their 500 millilitre pop bottle by 31 per cent and had plans to reduce it by a further 3 per cent by 2024.¹⁵ In some instances, container weights have been cut by over 50 per cent. Lightweighting can take several forms including thin walling (i.e., effectively making a container's cross section thinner using lighter weight materials (e.g., replacing a glass bottle with a plastic equivalent) or reducing the size of packaging components. An example of the latter option would be the gradual reduction in the size of water bottle caps over time.

Material substitution has also been a key factor in packaging design trends. Materials like glass and steel have gradually been replaced by plastic packaging as producers

¹⁴ MRF Transition Options Analysis August 2024 & Beyond, Birett & Associates, 2022

¹⁵ [We're saving 6,800 tonnes of plastic per year by introducing new lighter weight necks for carbonated soft drinks bottles](https://www.cocacolaep.com/media/news/2022/were-saving-6800-tonnes-of-plastic-per-year-by-introducing-new-lighter-weight-necks-for-carbonated-soft-drinks-bottles/)
(<https://www.cocacolaep.com/media/news/2022/were-saving-6800-tonnes-of-plastic-per-year-by-introducing-new-lighter-weight-necks-for-carbonated-soft-drinks-bottles/>)

seek to reduce shipping weights and associated transportation costs of delivering goods to consumers. Packaging producers may also elect to change the material used to produce a package in response to fluctuations in raw material costs. A producer might, for instance, switch between polystyrene and polyethylene for the production of pre-formed packaging for their electronics components depending on the price of the respective resin in any given month. Similarly, a bread company might also switch back and forth between a plastic or cardboard bread bag clip depending on raw material pricing. Many companies have also substituted pulp based packing peanuts for the traditional Styrofoam (i.e., polystyrene) packing material. Others have moved to pulp molded packing materials to replace the polystyrene or polyethylene packing materials.

Producers of packaging have also made other changes that are less obvious. As designers worked to reduce container weights through thin walling, they began to encounter various performance issues with the most obvious being the loss of structural strength in their containers. Loss of carbonation, bleed through of printing inks and other issues also began appearing. As a result, in the late 1990's they began creating multilaminate (i.e., multi-layered) packaging. One of the most common examples of this trend is aseptic packaging like Tetra Pak containers which can include up to six layers of polyethylene film, cellulosic fibre and aluminium. Less obvious changes have also occurred with common packaging such as production of six layer ketchup bottles and multi laminate potato chip and zip lock pouches. Each of these layers serves an important function in the performance of that package's design. It is common to include layers for printing, structural strength, adhesion, oxygen and light barriers, carbonation and moisture loss and even chemical resistance for acidic products like tomato sauce. These packages are ubiquitous in the average household and extremely efficient in reducing raw material usage, shipping costs and food loss. They are, however, extremely challenging to recycle.

Consumer preferences also have a dramatic affect on the types and composition of packaging discarded every year. Convenience continues to dominate packaging decisions. Aluminum cans have, for example, replaced glass as the consumer package of choice for beer, not because of improved storage or shipping costs but largely in response to public demand. By 2018, cans made up 62 per cent of beer volume in the United States and had gained market share for six years in a row.¹⁶ Plastic pour spouts in gable top containers and resealable adhesive closures for packaging holding meats and cheeses also highlight the ongoing evolution of packaging design to meet consumer designs at the expense of recyclability of packaging. Combined, these trends have resulted in stagnation of packaging waste diversion efforts and an overall drop in the total weight of material being diverted as illustrated in Table 7.

¹⁶ [Trends in Beer Packaging](https://www.beerinstitute.org/trends-beer-packaging/) (https://www.beerinstitute.org/trends-beer-packaging/)

4 Growing Interest in Biodegradable and Plant Based Packaging

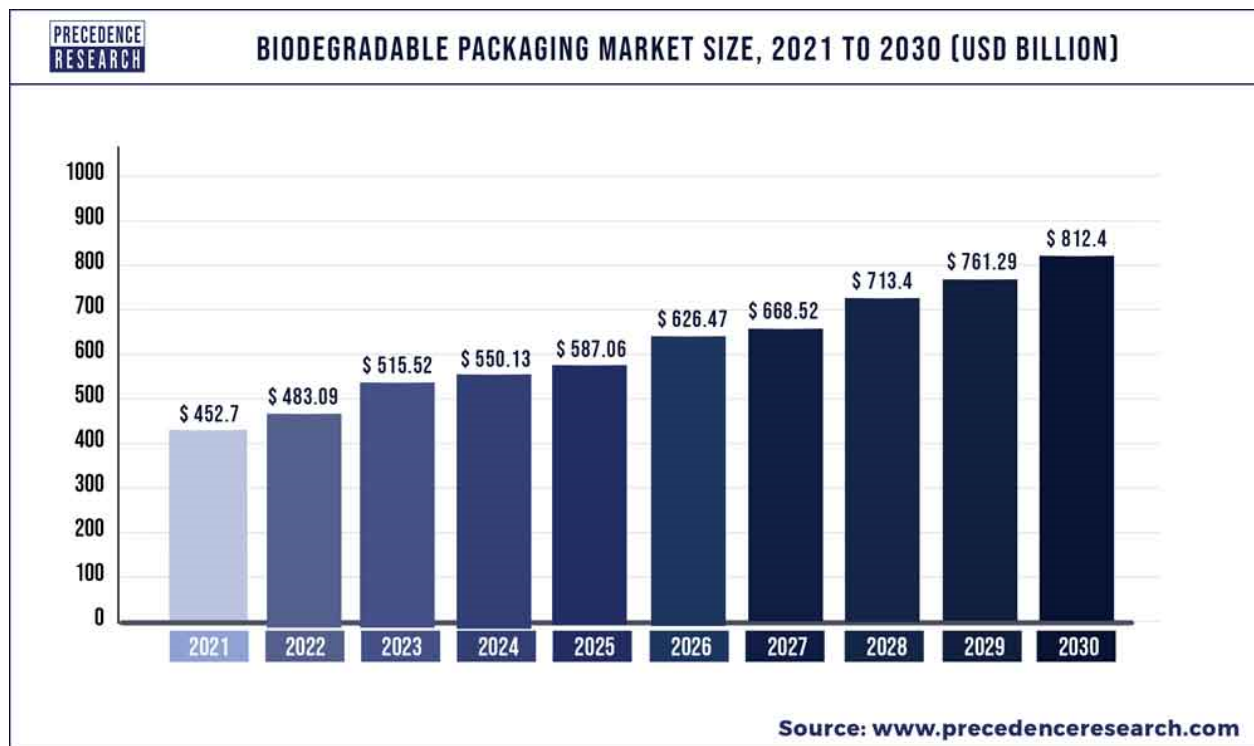
With the introduction of Extended Producer Responsibility (EPR) legislation and continued pressure on brand owners to reduce the environmental footprint of their packaging, it is expected that many will consider shifting from fossil fuel based to paper fibre or plant based packaging. EPR legislation tends to drive packaging design to materials that are less costly to recycle or those that are not part of the regulatory regime. Paper products and packaging are often cheaper to recycle than plastic based equivalents and compostable packaging has, to date, typically been exempted from EPR programs. In other words, brand owners that shift from recyclable packaging to compostable alternatives can advocate to have their materials included in residential composting or Green Bin collection systems and, if successful, effectively avoid the cost of diversion.

These factors and further regulatory action to ban or restrict the production of single serve plastic packaging is expected to accelerate this trend. To put it into perspective, the global biodegradable packaging market size was estimated at 452.7 billion USD in 2021 and it is expected to reach over 812 billion USD by 2030.¹⁷

¹⁷ [Biodegradable Packaging Market](https://www.precedenceresearch.com/biodegradable-packaging-market#:~:text=Theper cent20globalper cent20biodegradableper cent20packagingper cent20marketper cent20sizeper cent20wasper cent20accountedper cent20atper cent20USD,USDper cent20812.4per cent20billionper cent20byper cent202030)

(<https://www.precedenceresearch.com/biodegradable-packaging-market#:~:text=Theper cent20globalper cent20biodegradableper cent20packagingper cent20marketper cent20sizeper cent20wasper cent20accountedper cent20atper cent20USD,USDper cent20812.4per cent20billionper cent20byper cent202030>)

Table 9: Projected Global Growth in Biodegradable Packaging Market (USD)



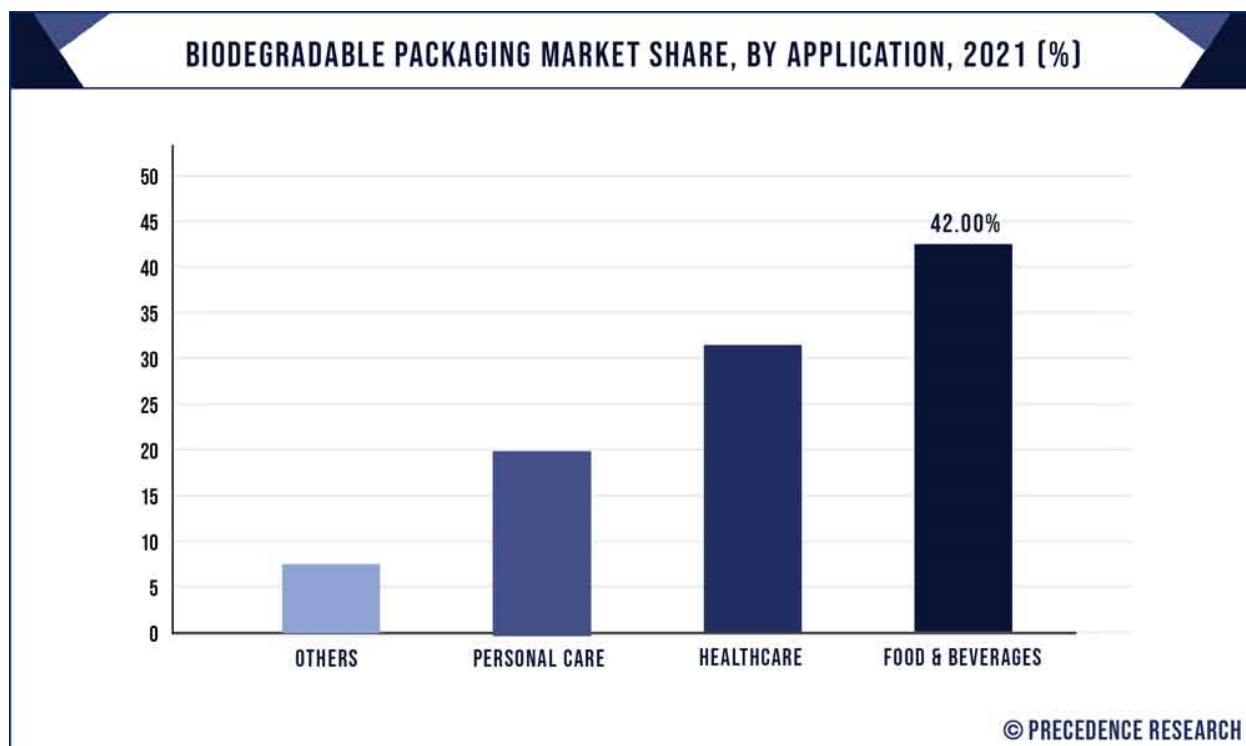
Source: Precedence Research¹⁸

Not surprisingly, growth in the food and beverage sectors is expected to be the dominant growth areas for these types of packaging. Other consumer markets such as healthcare and personal care are also expected to be significant growth areas. By comparison, compostable packaging is expected to grow at a CAGR (Compound annual growth rate) of 15.3 per cent between 2021 and 2028 according to Resource Label.¹⁹

¹⁸ Ibid.

¹⁹ [Innovative sustainable packaging solutions](https://www.resource-label.com/sustainable-labels-old/sustainable-packaging-solutions/)
(<https://www.resource-label.com/sustainable-labels-old/sustainable-packaging-solutions/>)

Table 10: Projected Growth in Biodegradable Packaging by Market Segment



Source: Precedence Research²⁰

5 Biodegradable vs Compostable Packaging

The development of plant based and biodegradable packaging tends to follow two distinctly different paths. As noted in Section 3, some brand owners are seeking to substitute fossil fuel based plastic packaging with plant based materials that can still be recycled but at a potentially lower cost under an EPR program. The other major trend has been to replace fossil fuel based plastic packaging with the production of biodegradable and compostable packaging materials.

There are, however, a number of challenges with these types of packaging materials. The term biodegradable loosely encompasses a broad range of materials that may or may not break down completely under different environmental conditions such as municipal composting systems. Some biodegradable plastics, for example, require exposure to sunlight to break the polymeric structure of the packaging which is not necessarily possible in typical composting and digestion systems and can lead to the production of micro plastic contamination. These sorts of terms, when used on

²⁰ Ibid.

packaging labels, have led to confusion of the public and contamination of municipal composting operations.

Other products such as starch based polymers can have shelf life issues and moisture contact problems which lead to consumer acceptance challenges. Broader sustainability issues have also arisen with the production of plant based resins. Corn and sugar cane, for example, are commonly grown to produce ethanol for alternative fuels and plant based resins. There are, however, ethical debates about the negative impact corn production can have on soil sustainability over time and the potential for corn production as a food stuff to be displaced by plant based resin production.

At present, compostable packaging is not a significant proportion of the municipal waste stream. The City of Ottawa reported compostable packaging represented less than 0.5 per cent of their waste stream according to a 2018 to 2019 waste composition study.²¹ None the less, plant based packaging is expected to become a major trend as brand owners endeavor to reduce their reliance of fossil fuel based resins particularly for the development of single serve or carry out applications. According to Resource Label, plant based packaging is expected to grow at a CAGR of 8.8 per cent between 2021 and 2028.²²

This trend is a significant concern to municipalities because of the potential damage it may do to municipal composting programs. Much of the packaging labeled as biodegradable and compostable does not break down effectively in standard composting and digestion operations. Consequently, there is significant potential for public confusion leading to possible contamination of municipal organic waste diversion programs. Municipalities will need to continue to monitor these trends carefully and consider the need to engage in advocacy initiatives through industry associations and potentially the need to develop local public education campaigns.

6 Food Waste Trends

In 2013, the Food and Agriculture Organization of the United Nations estimated that 1.3 gigatons of edible food is wasted each year resulting in the release of an estimated 3.3

²¹ [Most compostable packaging still doomed to landfill](https://www.cbc.ca/news/canada/ottawa/compostable-products-ottawa-standards-provincial-federal-policy-1.6613508)
(<https://www.cbc.ca/news/canada/ottawa/compostable-products-ottawa-standards-provincial-federal-policy-1.6613508>)

²² [Innovative sustainable packaging solutions](https://www.resource-label.com/sustainable-labels-old/sustainable-packaging-solutions/)
(<https://www.resource-label.com/sustainable-labels-old/sustainable-packaging-solutions/>)

gigatons of CO² equivalent.²³ That amount represents an estimated 17 per cent of total global food production with households being the major source of the loss (i.e., 11 per cent from households; five per cent from food services and two per cent from retail).²⁴ Unfortunately, Canadian, like much of North America and Europe, is amongst the highest generators of food waste per capita.

Canadians create over 50 million tonnes of food waste per annum with the average Canadian household producing 79 kilograms of food waste per year according to the UN Food Waste Index.²⁵ By comparison, households in the United States and United Kingdom were estimated to generate 59 kilograms and 77 kilograms per annum respectively.

Significantly, portions of Canada have robust food and organic waste diversion programs. According to Statistics Canada, food waste diversion accounted for approximately 32 per cent of overall waste diversion efforts in 2020.²⁶ Despite this success, Made in Canada reported that 60 per cent of Canadian household food waste is avoidable.²⁷ According to the Love Food Hate Waste (LFHW) campaign, that amounts to 2.3 million tonnes of avoidable household food waste (equivalent to 6.9 million tonnes of CO²) and costs the households over \$1,300 per year.²⁸ For Canada as a whole, LFHW estimated this cost is over \$20 billion and totals over 2.3 million tonnes of edible food thrown away every year. These statistics highlight the need for further efforts to reduce food loss at a municipal level.

²³ [Global Food Waste in 2024](https://greenly.earth/en-us/blog/ecology-news/global-food-waste-in-2022) (https://greenly.earth/en-us/blog/ecology-news/global-food-waste-in-2022)

²⁴ [International Day of Awareness on Food Loss and Waste Reduction 29 September](https://www.un.org/en/observances/end-food-waste-day) (https://www.un.org/en/observances/end-food-waste-day)

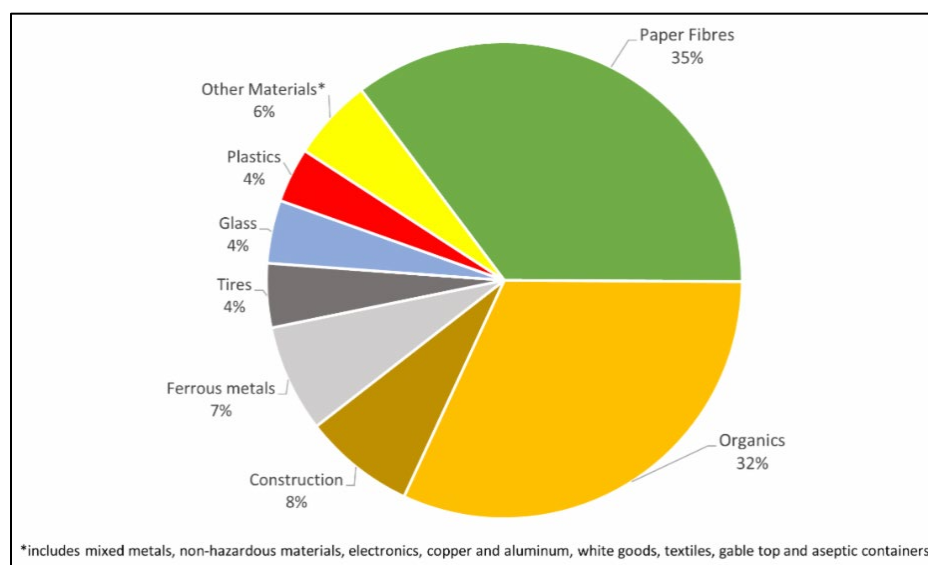
²⁵ [Food Waste Statistics In Canada](https://madeinca.ca/food-waste-canada-statistics/) (https://madeinca.ca/food-waste-canada-statistics/)

²⁶ [Waste materials diverted, by type and by source](https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3810013801) (https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3810013801)

²⁷ [Food Waste Statistics In Canada](https://madeinca.ca/food-waste-canada-statistics/) (https://madeinca.ca/food-waste-canada-statistics/)

²⁸ [Food Waste in the Home](https://lovefoodhatewaste.ca/about/food-waste/) (https://lovefoodhatewaste.ca/about/food-waste/)

Table 11: Material Diversion by Type Across Canada (2020)



Source: Statistics Canada²⁹

7 Electronic and Electrical Waste Trends

According to the Global E-Waste Monitor 2020 report, a record 53.6 million tonnes of electronic waste (e-waste) was discarded globally in 2019 representing a 21 per cent increase over five years and 83 per cent increase since 2010.³⁰ In 2019, the Brussels-based Bureau of International Recycling estimates that Canada and the United States will cumulatively generate 9.25 million tonnes of electronic waste scrap in 2025.³¹ To put this into perspective, more than five billion cell phones were projected to be thrown away in 2022, which would be more than enough to stretch all the way around the equator, according to research undertaken by members of the Waste Electrical and Electronic Equipment Forum (WEEE). The WEEE is a not-for-profit association of 50 WEEE producer responsibility organisations across the world and was founded in April 2002. The authors noted that, if stacked flat on top of each other, the phones would make a tower over 30,000 miles tall (i.e., 120 times higher than the orbit of the International Space Station and reaching an eighth of the way to the Moon).³² By

²⁹ [Waste materials diverted, by type and by source](https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3810013801) (https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3810013801)

³⁰ [SURGE IN GLOBAL E-WASTE, UP 21 PER CENT IN 5 YEARS](https://globalewaste.org/news/surge-global-waste/) https://globalewaste.org/news/surge-global-waste/

³¹ [E-waste, tech's big dirty secret](https://www.itworldcanada.com/article/e-waste-techs-big-dirty-secret/481142_) https://www.itworldcanada.com/article/e-waste-techs-big-dirty-secret/481142_

³² [5.3 billion mobile phones will become waste in 2022; a small fraction will be properly disposed](https://www.eurekalert.org/news-releases/967282) (https://www.eurekalert.org/news-releases/967282)

comparison, the Global E-Waste Monitor 2020 report estimated that just 17.4 per cent of e-waste is currently being recycled worldwide. Put into context, they estimated that \$57 billion (USD) worth of gold, silver, copper, platinum, and other high value recoverable materials were discarded in 2019 alone. While there is an EPR program for designated wastes (i.e. IIT/AV and lighting), other non-designated wastes (i.e. cameras, speakers, phones, etc.), are currently accepted at Niagara Region depots to be properly disposed of instead of ending up in garbage stream.

In Canada, total annual e-waste generation is calculated to have risen from 252,000 tonnes in 2000 to 954,000 tonnes in 2020 and is expected to reach 1.2 million tonnes by 2030. By comparison, Statistics Canada reported that in 2018, 105,270 tonnes of textiles were diverted nationally.³³ In Ontario, Ontario Electronic Stewardship reported in their 2020 annual report they had collected 43,084 tonnes of e-waste representing 3.20 kilograms/capita.³⁴ Under the province's new e-waste regulation (i.e., O. Reg. 522/20: Electrical and Electronic Equipment), producers are required to initially achieve a goal of 55 per cent reuse, refurbishment or recycling of their designated materials. The targets increase each year and go up to 70 per cent in 2025. Given the current performance of e-waste diversion in Ontario and, indeed globally, it is expected that municipalities will continue to play a key role in managing this waste stream.

8 Textiles Waste Trends

Textiles recycling has been a mainstream practice undertaken by charities for over a century. While the shift from natural fabrics to synthetics has made textiles diversion more challenging, interest in this area of waste diversion continues to grow.

The fashion industry is a major economic driver representing close to 2.5 per cent of the world's Gross Domestic Product (GDP).³⁵ Fashion consumption reportedly doubled between 2000 to 2014 and is presently at an unparalleled high in history.³⁶ In Canada, the apparel market was valued at \$26.4 billion in 2021 and is set to grow past \$28 billion

³³ [Unravelling the story about household textile and e-waste disposal in Canada](https://www150.statcan.gc.ca/n1/pub/11-627-m/11-627-m2022015-eng.htm)
(<https://www150.statcan.gc.ca/n1/pub/11-627-m/11-627-m2022015-eng.htm>)

³⁴ <https://rpra.ca/wp-content/uploads/Appendix-E-Ontario-Electric-Stewardship.pdf>

³⁵ [The State of Fashion 2024: Finding pockets of growth as uncertainty reigns](https://www.mckinsey.com/industries/retail/our-insights/state-of-fashion)
(<https://www.mckinsey.com/industries/retail/our-insights/state-of-fashion>)

³⁶ [Textile waste in Ontario, Canada: Opportunities for reuse and recycling](https://www.sciencedirect.com/science/article/abs/pii/S092134492200667X?viapercent3Dihub)
(<https://www.sciencedirect.com/science/article/abs/pii/S092134492200667X?viapercent3Dihub>)

by 2024.³⁷ At the same time, fashion consumption is responsible for around 10 per cent of global greenhouse gas emissions.³⁸ Consequently, interest in making the fashion industry a true circular economy has improved the outlook for reuse and recycling options for this important waste stream. Growing consumer acceptance of used clothing has, in particular, created new opportunities to do more than just recycle textiles.

Textiles disposal is, however, sporadic throughout the year making it difficult to accurately assess generation and disposal rates. In a 2023 report published by The National Association for Charitable Textiles Recycling, it was estimated that 1.3 million tonnes of used/waste apparel are generated each year in Canada.³⁹ The report also stated that only 24 per cent is being diverted to reuse and/or downcycling, while the remaining 76 per cent is being sent to landfill.⁴⁰ Other researchers have recently estimated that as much as 65 per cent of the material could be reused and

21 per cent recycled.⁴¹ Globally, recycling rates for textiles are estimated to be only around 12 per cent. If true, that is equivalent to a loss of \$675 billion (CAD) in materials landfilled or otherwise discarded.⁴²

Local charities are expected to continue to be a primary mechanism for diversion of textile waste. However, it is anticipated that municipalities may need to become more involved in promoting diversion of this growing waste stream if they wish to obtain higher diversion rates than is currently being achieved.

9 Municipal Household and Special Waste Trends

Municipal Household and Special Waste (MHSW) encompasses a broad range of products ranging from toxic products such as fertilizers to relatively benign products such as latex paint. Historically, they represent less than one to two per cent of the

³⁷ [Canadian apparel market - statistics & facts](https://www.statista.com/topics/5125/apparel-market-in-canada/#topicHeader__wrapper)
(https://www.statista.com/topics/5125/apparel-market-in-canada/#topicHeader__wrapper)

³⁸ [How Much Do Our Wardrobes Cost to the Environment?](https://www.worldbank.org/en/news/feature/2019/09/23/costo-moda-medio-ambiente)
(<https://www.worldbank.org/en/news/feature/2019/09/23/costo-moda-medio-ambiente>)

³⁹ [The National Association for Charitable Textile Recycling](https://nactr.ca/wp-content/uploads/2023/02/NACTR-Reduce-Reuse-Rewear-1.pdf)
(<https://nactr.ca/wp-content/uploads/2023/02/NACTR-Reduce-Reuse-Rewear-1.pdf>)

⁴⁰ Ibid., 38

⁴¹ [A first comprehensive estimate of electronic waste in Canada](https://www.sciencedirect.com/science/article/abs/pii/S0304389423001474)
(<https://www.sciencedirect.com/science/article/abs/pii/S0304389423001474>)

⁴² [A New Textiles Economy: Redesigning fashion's future](https://ellenmacarthurfoundation.org/a-new-textiles-economy)
(<https://ellenmacarthurfoundation.org/a-new-textiles-economy>)

municipal waste stream but are of concern because of their potential to cause environmental damage if discarded improperly. Information on trends in generation and capture of these materials is limited at both a national and provincial level. Table 12 provides a snapshot of waste products collected by Stewardship Ontario's (SO) Orange Drop program in 2021. Between 2009 and 2019, SO reported a 10.7 per cent increase in capture of designated materials.⁴³ Similar trends have been reported by battery recycling programs which showed record capture rates in 2022. In Ontario specifically, 141,500 tonnes of batteries were reportedly collected.⁴⁴

Table 12: 2021 MHSW Materials Collected

Material	Actual Tonnes Collected	Target Collection (in tonnes)	% of Target Collected
Antifreeze	2,044.0	1,824.0	112 %
Fertilizers	4.5	N/A	N/A
Oil containers	3,196.0	2,151.0	149 %
Oil filters	6,020.0	6,245.0	96 %
Paints and coatings	6,820.0	6,426.0	106 %
Pesticides	23.6	11.0	215 %
Pressurized containers			
Non-refillable	406.0	245.0	166 %
Refillable	318.0	384.0	83 %
Single-use batteries	–	–	N/A
Solvents	147.6	492.0	30 %
Total	18,979.7	17,778.0	107 %

Source: Resource Productivity and Recovery Authority⁴⁵

With the introduction of new EPR legislation (O. Reg. 449/21: Hazardous and Special Products) in Ontario in 2020, it is hoped that efforts to capture these materials will improve. Currently however, most of the related collection infrastructure is owned and operated by municipalities in Ontario. In some cases, however, municipal participation is predicated on fair compensation from producers and, to date, this has not been forthcoming. If municipalities continue to offer HSP programs, they will do so at the

⁴³ [DATACALL REPORT 2019](https://rpra.ca/wp-content/uploads/Datacall_Report_2019_Web_FNL.pdf) (https://rpra.ca/wp-content/uploads/Datacall_Report_2019_Web_FNL.pdf)

⁴⁴ [Canadians recycled record numbers of batteries in 2022](https://www.wasterecyclingmag.ca/batteries/canadians-recycle-record-numbers-of-batteries-in-2022/1003288248/) (https://www.wasterecyclingmag.ca/batteries/canadians-recycle-record-numbers-of-batteries-in-2022/1003288248/)

⁴⁵ [Annual Report 2021](https://rpra.ca/wp-content/uploads/RPRA_Annual_Report_21_English_Web___FINAL-s.pdf) (https://rpra.ca/wp-content/uploads/RPRA_Annual_Report_21_English_Web___FINAL-s.pdf)

taxpayer expense as funding does not cover full costs.

Consideration should be given by municipalities to increasing their advocacy efforts on this matter. In the meantime, it can be expected that municipalities will need to continue to operate and subsidize producer programs for Hazardous and Special Products (HSP) in order to ensure this material is diverted.

10 Biomedical and Diapers

Incontinence products can be broken down into three basic categories including disposable diapers for babies, feminine hygiene products and diapers, shields and pads for adults. Depending on local demographics, disposable diapers alone typically constitute around four per cent of the total municipal solid waste stream.⁴⁶ Incontinence products in total can often represent over 10 per cent of the residual residential waste stream (i.e., after diversion of Blue Box and Green Bin materials).⁴⁷

The average baby will use around 6,000 diapers during their first two years of life.⁴⁸ According to Stats Canada, in 2016 there were 1.9 million diaper aged children in Canada. That equates to 2.4 billion individual diapers, or more than 3.4 million tonnes of waste, entering Canadian landfills in that year.⁴⁹ By comparison, urinary incontinence affects 15 per cent to 35 per cent of community-dwelling, older adults and more than

50 per cent of nursing home residents⁵⁰. An estimated 30 per cent to 63 per cent of women over 65 are living with some degree of urinary incontinence and prevalence of incontinence waste in the residential waste stream is growing as the population ages.⁵¹ The global incontinence products market is projected to reach \$16.2 billion (USD) by

⁴⁶ [Disposable Diaper](https://www.sciencedirect.com/topics/engineering/disposable-diaper) (https://www.sciencedirect.com/topics/engineering/disposable-diaper)

[Waste Composition Studies](https://thecif.ca/centre-of-excellence/policy/waste-composition-studies/) (https://thecif.ca/centre-of-excellence/policy/waste-composition-studies/ Year 4: 4-Season Residential Waste Composition Study Results (2019/20)

⁴⁸ [Diaper Facts & Statistics: Average Cost Of A Diaper](https://www.crossrivertherapy.com/research/diaper-facts-statistics#) (https://www.crossrivertherapy.com/research/diaper-facts-statistics#)

⁴⁹ [WE ARE TWO DADS ON AN ENVIRONMENTAL MISSION](https://soilediapers.ca/pages/about#) (https://soilediapers.ca/pages/about#)

⁵⁰ [Urine Incontinence](https://www.sciencedirect.com/topics/medicine-and-dentistry/urinary-incontinence) (https://www.sciencedirect.com/topics/medicine-and-dentistry/urinary-incontinence)

⁵¹ [Right now, more adult incontinence products than baby nappies go to landfill. By 2030, it could be ten times higher](https://theconversation.com/right-now-more-adult-incontinence-products-than-baby-nappies-go-to-landfill-by-2030-it-could-be-ten-times-higher-191585) (https://theconversation.com/right-now-more-adult-incontinence-products-than-baby-nappies-go-to-landfill-by-2030-it-could-be-ten-times-higher-191585)

2026, growing at a CAGR of 5 per cent.⁵²

Many municipalities in Ontario also report an increasing prevalence of medical waste being set out for disposal by householders because of increasing levels of out-patient care and post Covid 19 health concerns.⁵³ Waste haulers report encountering growing quantities of non-biomedical waste (as defined by Guideline C-4: The Management of Biomedical Waste In Ontario⁵⁴) as well as sharps and expired or otherwise discarded medicines.⁵⁵ Safe management of these wastes requires education of residents and provision of appropriate waste management services.

11 Construction and Demolitions Waste Trends

According to The Delphi Group, Canada's construction sector generates one third of total solid waste in Canada; equal to more than 4 million tonnes of waste per year.⁵⁶ In Statistics Canada Biennial Waste Management Survey, 2020 it was reported that only 750,525 tonnes of C&D waste was diverted suggesting approximately 80 per cent was landfilled or otherwise disposed.⁵⁷ By comparison, numerous pilot projects and studies have reported diversion levels of 50 to 90 per cent of construction and demolition (C&D) are possible.^{58,59} Given the significant quantities of waste involved and relative ease of diversion, it is expected that C&D waste diversion will continue to be a priority for all

⁵² [Global Incontinence Products Market to Reach US\\$16.2 Billion by the Year 2026](https://www.globenewswire.com/news-release/2022/05/11/2440587/0/en/Global-Incontinence-Products-Market-to-Reach-US-16-2-Billion-by-the-Year-2026.html) (https://www.globenewswire.com/news-release/2022/05/11/2440587/0/en/Global-Incontinence-Products-Market-to-Reach-US-16-2-Billion-by-the-Year-2026.html)

⁵³ Birett and Associates, interviews with municipal clients, 2022

⁵⁴ [C-4: The Management Of Biomedical Waste In Ontario](https://www.ontario.ca/page/c-4-management-biomedical-waste-ontario) (https://www.ontario.ca/page/c-4-management-biomedical-waste-ontario)

⁵⁵ [Birett and Associates, interviews with Waste Connections and Miller Waste Systems staff, 2022](#)

⁵⁶ [Circular Economy & The Built Environment Sector In Canada](https://delphi.ca/wp-content/uploads/2021/04/Circularity-in-Canadas-Built-Environment-Final-Report-April-14-2021.pdf) (https://delphi.ca/wp-content/uploads/2021/04/Circularity-in-Canadas-Built-Environment-Final-Report-April-14-2021.pdf)

⁵⁷ [Waste materials diverted, by type and by source](https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3810013801) (https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3810013801)

⁵⁸ [Construction Waste Best Practices Guide](https://www.rdn.bc.ca/sites/default/files/inline-files/FINAL_RDNper cent20Constructionper cent20Wasteper cent20Bestper cent20Practicesper cent20Guide_4.pdf) (https://www.rdn.bc.ca/sites/default/files/inline-files/FINAL_RDNper cent20Constructionper cent20Wasteper cent20Bestper cent20Practicesper cent20Guide_4.pdf)

⁵⁹ [Right now, more adult incontinence products than baby nappies go to landfill. By 2030, it could be ten times higher](https://theconversation.com/right-now-more-adult-incontinence-products-than-baby-nappies-go-to-landfill-by-2030-it-could-be-ten-times-higher-191585) (https://theconversation.com/right-now-more-adult-incontinence-products-than-baby-nappies-go-to-landfill-by-2030-it-could-be-ten-times-higher-191585)

levels of government.

12 Conclusions

Significant change has occurred in the types and quantities of waste being generated and diverted by residents and businesses both on a national and local level. In general, waste quantities are declining by weight but potentially increasing by volume due to changes in the design of durable and disposable goods. Increases in collection costs can be expected as a result of this gradual shift in composition and density. Quantities of disposable products and packaging continue to increase with no reduction in this trend anticipated in the foreseeable future. Increases are also expected in the generation of food waste, textiles, incontinence product waste and electronic waste because of shifting demographics.

These trends will need to be considered in the development of Niagara Region's new Waste Management Strategic Plan. Consideration should be given to reviewing current service levels for adequacy and future needs. Particular attention should be given to current capture rates for waste textiles, electronics and incontinence products as well as the development of broader educational efforts to reduce food wastage. Similarly, consideration should be given to reviewing Niagara Region's C&D diversion efforts to determine if further efforts to increase diversion levels are warranted. Finally, consideration should also be given to greater involvement by Niagara Region in advocacy activities to address known inadequacies with the current provincial EPR programs for HSP and to address the proliferation of bioplastics and compostable packaging.