



RECYCLEBC™

Compostable Packaging and Paper Product

2019 Research
Summary Report

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Introduction

Recycle BC continues its research into understanding how much packaging and paper product (PPP) enters into the residential source-separated organics collection system in keeping with commitments made in the [Program Plan](#). Research began in 2018 by conducting audits from curbside and multi-family residential source-separated organics (SSO) systems, and continues with this report summarizing research completed in 2019 investigating forms of compostable packaging that are becoming present in organics recycling streams and their end-of-life management.

The compostable packaging materials being focused on are separated into two categories: food-soiled paper, and packaging containing or made entirely from compostable plastics. Food-soiled paper has been widely accepted and encouraged as a compost material¹, however compostable plastics and coated paper are not consistently accepted into compost programs with acceptance varying by region. BC's provincial government is currently working on an update to its [Organic Matter Recycling Regulation](#) (OMRR) and the results of this work will assist in further development of stewardship standards for these materials.

Recycle BC oversees the management of all residential paper and packaging at end of life, as designated under Schedule 5 of the [Recycling Regulation](#), including plastic composed of compostable materials. Recycle BC is researching the amount of PPP present in the residential organics collection stream. It is of interest to Recycle BC to understand the composition of PPP categories which are present in these residential organics collection systems, the quantity present, and the current management of those materials once they arrive at a commercial compost facility for processing in order to consider it for inclusion in the Pollution Prevention Hierarchy² as part of its end-of-life disposition report. If so, then Recycle BC would look to propose, through consultation, a financial incentive for the management of appropriate types of PPP through this means of collection. Recycle BC will be looking to the revision of the provincial Organic Matter Recycling Regulation (OMRR) for guidance on what PPP are deemed appropriate to be managed for organic recycling through residential SSO collection and commercial compost facility processing, namely in the category of food-soiled paper and compostable plastic packaging.

Recycle BC's research is also intended to act as a resource for stewards when considering the design of their PPP.

Background

2018 Study

Recycle BC completed a baseline study quantifying the amount of PPP collected in a residential municipal SSO collection sample set at the end of 2018.

The objective of this study was to quantify the amount of PPP found in residential SSO collection systems operating in British Columbia. All types of PPP observed were quantified, including PPP that is accepted in a specific municipal residential SSO system (e.g. soiled old corrugated cardboard (OCC), old boxboard (OBB), and paper cups and plates in some programs) as well as other PPP material not accepted in a specific municipal SSO system (e.g. other paper, bio-plastics, plastics, glass, aluminum and steel packaging formats).

Both curbside and multi-family residential SSO collection systems were sampled, with average results from a total sample set of five participating municipalities concluding on average that paper and packaging made up 3% of the total SSO material stream by weight for curbside, and 7% for multi-family. Of that, 80% was acceptable material through the specific municipal residential SSO system and 90-95% of it was paper. The full [2018 Municipal Organics Study report](#) can be found on the Recycle BC [website](#).

¹ See Metro Vancouver Integrated Solid Waste and Resource Management Plan (July 2010); Goal 2, Strategy 2.5

² See Section 5(3) of the Recycling Regulation for description of Pollution Prevention Hierarchy

Provincial Regulation

OMRR governs the operation of compost facilities in the province which receive residential SSO material for processing. It also provides guidance to local governments on what is considered organic matter. In Fall 2018, the BC Ministry of Environment and Climate Change Strategy (“The Ministry”) sought feedback and comments on their [2018 Intentions Paper](#) in preparation for revisions to OMRR. Recycle BC participated in that consultation, providing feedback with focus on the topics of food-soiled paper and compostable plastics.

The applicable proposed revisions to the regulation intend to expand the definition of organic matter suitable for composting to include “*non-recyclable paper material*”³ and “*compostable plastic*”. Compostable plastic is an emerging material in the market, with no previous provisions in OMRR for the composting of it. In addition to proposing it as an acceptable feedstock, the Ministry is also seeking to establish a definition of what compostable plastic is based on industry standards. Interested compost facilities would then be required to meet the time and temperature conditions set in those standards⁴ in order to accept compostable plastic for processing.

Recycle BC Commitments

Recycle BC’s Program Plan outlines its commitment⁵ to better understand what and how much PPP is being collected in municipal residential SSO systems and getting recycled through compost. The majority of PPP diverted from the waste stream is managed by Recycle BC’s curbside, multi-family and depot collection systems for management by recycling and shipping to end markets to be made into new product. However, many municipalities accept specific materials considered to be PPP as part of their residential curbside or multi-family SSO systems. It is of interest to Recycle BC to understand the composition of PPP categories which are present in these residential organics collection systems, the quantity present, and the current management of those materials once they arrive at a commercial compost facility for processing in order to consider it within the context of the Pollution Prevention Hierarchy.

Food Soiled Paper

While there is no clear information available on the level of food residue or soiling that deems paper no longer recyclable through the blue box program, based on the Pollution Prevention Hierarchy, recycling of paper is preferred over recovery and landfill. Whether recycling occurs through the traditional recycling of the fibres to make new paper product or organics recycling to make beneficial soil, both are considered recycling if the revisions to OMRR are adopted. Should paper be destined for the compost bin, it is widely accepted that non-coated, food soiled or non-recyclable paper material can be included. As concerns are raised around the problem of single-use plastic, the use of paper-based packaging is growing, particularly as molded fibre containers and coated paper containers.

Molded Pulp Containers

Molded fibre packaging has seen long term use with egg cartons and take-out beverage trays as well as a replacement for polystyrene packing, and more recent use in take-out containers. With a consumer and regulatory push to reduce and eliminate single use plastics, molded pulp or molded fibre containers have seen increased use due to their compostability. These containers have shown to contain perfluoroalkyl and polyfluoroalkyl substances (PFAS), chemicals which contribute properties to help the container repel water and oil, making these containers well suited for take-out and other food related applications. However, research shows that PFAS do not biodegrade

³ Non-recyclable paper material is defined as “*paper material contaminated with organic matter that cannot be reasonably recycled into a paper product, and is not contaminated with any substance harmful to humans, animals, plants or the environment*”

⁴ The Intentions Paper states that “*compostable plastic would be required to meet the BNQ 9011-911/2007 or BPI-ASTM D6400 and/or ASTM D6868 standards in order to be defined as compostable plastic*”

⁵ See section 5.1 Managing Environmental Impacts (pg. 21-22) of the Recycle BC [Program Plan](#) for the full commitment

naturally in the environment⁶, and can leach from compostable food containers into compost with study results showing a larger concentration of PFAS in soil at compost facilities which accept compostable food containers versus those that do not⁷. The risk implications to human health still remain unclear.

PFAS have been banned or have a proposed ban in many regions. The Biodegradable Products Institute (BPI) implemented a new standard as of January 1, 2020, requiring no intentionally added fluorinated chemicals to a product's packaging or marketing materials, and a test report showing less than 100ppm total fluorine in order for a product to be BPI Certified⁸.



Alternative materials such as bagasse (sugarcane) and wheat straw are currently being used to replace molded pulp containers. Bagasse containers are being made of a renewable bi-product to sugar production and can be composted in a commercial compost facility. In a review of studies surrounding this material there do not appear to be any contradictions in using it in a food-based application for the consumer or the compost facility.

Identification of Issues

Recycling Food Soiled Paper Potential Issues

1. Businesses are being encouraged to use compostable packaging though may not be aware of options available, different standards or certifications or what is happening with their waste.
2. Consumers without access to compost facilities (64.2% of BC population with organic diversion programs in place⁹).
3. Identification by both consumers and processing facilities of these different types of containers.
4. Pace of packaging innovation is outpacing regulations and consumer understanding.
5. Chemicals, plastic coatings and inks used in packaging could have health impacts and impacts on compost material output.

Compostable Plastic Packaging

The other rapidly growing sector of compostable PPP includes compostable plastic. This category of material is in the spotlight as many companies are adopting the Ellen MacArthur Foundation's New Plastics Economy [Global](#)

⁶ The Counter, 2019. <https://thecounter.org/pfas-forever-chemicals-sweetgreen-chipotle-compostable-biodegradable-bowls/>

⁷ Science News, June 4 2019. Chemicals in biodegradable food containers can leach into compost. <https://www.sciencenews.org/article/pfas-chemicals-biodegradable-food-containers-compost>

⁸ Biodegradable Products Institute. <https://bpiworld.org/Fluorinated-Chemicals>

⁹ <https://www2.gov.bc.ca/gov/content/environment/waste-management/food-and-organic-waste/organic-waste-diversion#how>

[Commitment](#), which focuses on innovative design and ways for plastic to be either safely reused, recycled or composted. Consumer demand for green alternatives is growing and compostable plastic products have been presented as an alternative solution to conventional plastic options for uses such as foodservice packaging, disposable tableware and bags, and as popular replacements for other single-use items. Consumers are driven towards these products as they appear more environmentally friendly, however are often unsure about what happens next with these materials.

The pace of new packaging has exceeded the pace by which regulatory standards can keep up, and consumers in turn are confused about proper disposal. Plastic packaging labels claiming compostability do not match commercial composting facility capabilities. There are a wide range of plastics being deposited into the compostable category, including some that can be recycled and some that cannot. There are many issues facing this group of materials from confusion with terminology, identification compared to conventional plastics, and what to do with the material at end of life.

The BC Ministry released their [CleanBC Plastics Action Plan](#) in 2019 seeking feedback from the public. In it, compostable plastics were not differentiated from general plastic waste. There is also concern that compostable plastics could add to the marine plastic pollution problem with no infrastructure in place to deal with these new alternative forms of compostable packaging¹⁰.

Terminology

The term bio-plastics refers to a broad group of materials with different properties and applications, all of which are derived from natural sources, biomass or plant-derived, such as corn, sugarcane (bagasse), or cellulose. Differing properties within this group of materials means that they can be conventionally recycled or recycled via composting at end of life depending on the property and application. The terms bio-plastics and biodegradable plastics are often used interchangeably; however, these terms do not mean the same thing. Bioplastic refers to a material’s source composition, whereas biodegradable refers to the way a material breaks down.

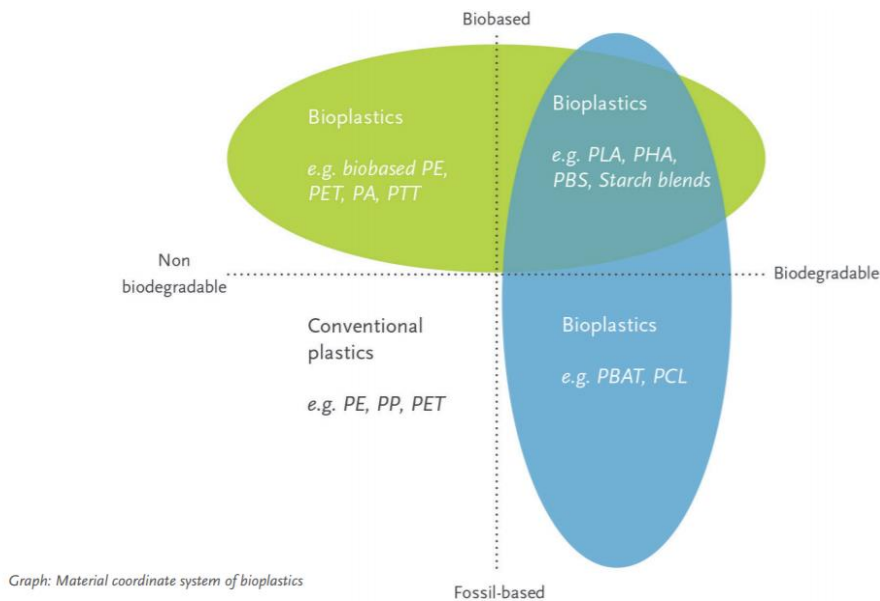


Figure 4- Material coordinate system of bioplastics¹¹

¹⁰ The Guardian, 12 Sep 2019. Plastic alternatives may worsen marine pollution, MPs warn.

<https://www.theguardian.com/environment/2019/sep/12/plastic-alternatives-may-worsen-marine-pollution-mps-warn>

¹¹ European Bioplastics, January 2016. What are bioplastics? Fact sheet. <https://www.european-bioplastics.org/bioplastics/>

Biodegradable and compostable materials are also often mistakenly given the same meaning. Both refer to the break down of a material into its biological components – carbon dioxide, water and biomass. However, compostable materials must break down within a standardized set of industrial conditions to be certified as compostable. All compostable materials are biodegradable but not all biodegradable materials are necessarily compostable¹². Composting of plastics requires specialized industrial processing facilities to maintain the proper consistent controlled heat, agitation and aeration. These conditions are all set within an industry standard against which the material is tested for certification.

Polyhydroxyalkanoates (PHAs) make up around 5% of biodegradable plastics worldwide, while Polylactic Acid (PLA) makes up another 25% of biodegradable plastic currently¹³.





Identification & Certification

Many clear compostable containers are consistent in appearance to each other as well as to the conventional non-compostable version of the container. Some manufacturers add labels or markings such as a green stripe¹⁴ to differentiate containers though there is not a consistent labeling practice.



Figure 5 Eco-Products Inc GreenStripe® Cold Cup

If a product is BPI-certified it must carry the BPI logo. The BPI logo has recently been modified to fit onto smaller products.

 <p>OTHER</p>	 <p>PLA</p>		
<p>#7 - Other plastics = difficult to recycle</p>	<p>Compostable plastic PLA is #7 though may be compostable</p>	<p>BPI logo Certified Compostable</p>	<p>BNQ Logo Certified Compostable</p>

Some compostable plastics are coded with a “#7 – Other” resin code on the item. The resin code #7 ‘Other’ serves as a catch-all category, and can indicate that the container is biodegradable, compostable, a composite of multiple

¹² OMRR Intentions Paper, 2018. (pg.23). https://www2.gov.bc.ca/assets/gov/environment/waste-management/organic-waste/reports-and-papers/2018_omrr_intentions_paper.pdf

¹³ BBC, 5 Nov 2019. Why biodegradables won’t solve the plastic crisis. <https://www.bbc.com/future/article/20191030-why-biodegradables-wont-solve-the-plastic-crisis>

¹⁴Eco-Products Inc “GreenStripe” https://www.ecoproducts.com/greenstripe_cold_cups.html

resins, a laminated plastic, or any other plastic that is not represented in resin codes #1 to #6. Any packaging made from bio-derived materials such as PHA/PHB/PLA would be marked with a #7 resin code and likely labelled with the BPI certification logo.

BPI allows companies to use their logo once companies show proof that their product conforms to requirements set out in the ASTM 6400 or ASTM6868 industry standard¹⁵. Some companies have made their own logo stating something is compostable though it may not have been tested against an industry standard such as ASTM 6400 or ASTM 6868 in North America, or the EN 13432, the European standard for compostable packaging.

Additives to Compostable Plastics

Most compostable container manufacturers have their own proprietary blend of additives that can change the properties of their material. These additives can change the way the plastic behaves in compost as well as what is left as a by-product. This reduces consistency between manufacturers and will be challenging for compost facilities and recyclers.

Management of Compostable Plastic by Processors

Most residential SSO programs do not accept compostable plastic for collection, such as in Metro Vancouver, where residents are asked to put compostable containers in the garbage¹⁶. This is due to how differently each private compost facility operates, most of which cannot accept every certified compostable product for processing.

If compostable plastic does end up in the organics bin, it is very often considered as contamination and removed by the compost facility. Recycling and compost providers in other areas such as San Francisco and Portland also highlight that sorters are not able to distinguish between conventional and compostable plastic, and so as a necessary precaution they pull out unmarked, plastic-looking items to avoid contamination¹⁷. The City of Toronto utilizes a hydro pulper to remove contaminants – light materials such as compostable plastic float to the top of the pulper to be skimmed away and shredded, heavier contaminants sink, and the remaining organic material is processed¹⁸.

Identification of Issues

Compostable Plastics in Organics Stream Potential Issues

There are a number of potential issues or barriers to managing compostable plastic in the organics stream, outlined in National Zero Waste Council's report¹⁹, as follows:

1. Compostable plastics often look the same as conventional plastic material, creating challenges to properly identify the composition of each piece of plastic. Inconsistent or lack of labeling further adds to the challenge of identification.

¹⁵ More information on BPI's certification scheme is available here:

https://bpiworld.org/resources/Documents/BPI_Certification_scheme_2019.pdf

¹⁶ CTV News Vancouver, 7 Jan 2020. "It's incredibly disheartening": Compostable food containers still can't go in curbside green bins. <https://bc.ctvnews.ca/it-s-incredibly-disheartening-compostable-food-containers-still-can-t-go-in-curbside-green-bins-1.4757505>

¹⁷ San Francisco Examiner, 17 Sept 2019. Compostable containers don't end up where you think they do. [https://www.sfexaminer.com/news-columnists/compostable-containers-dont-end-up-where-you-think-they-do/?utm_source=Sailthru&utm_medium=email&utm_campaign=Issue:2019-09-18WasteDiveNewsletter\[issue:23068\]&utm_term=WasteDive](https://www.sfexaminer.com/news-columnists/compostable-containers-dont-end-up-where-you-think-they-do/?utm_source=Sailthru&utm_medium=email&utm_campaign=Issue:2019-09-18WasteDiveNewsletter[issue:23068]&utm_term=WasteDive)

¹⁸ CBC News, 1 Oct 2019. What really happens to the organic waste you put in your compost bin.

<https://www.cbc.ca/news/technology/organic-waste-composting-1.5291132>

¹⁹ National Zero Waste Council (NZWC), March 2018. Packaging and the Circular Economy: A Case Study on Compostables in Canada. http://www.nzwc.ca/focus/design/Documents/NZWC_CaseStudyCompostablesCanada.pdf

2. Large discrepancy between what packaging manufacturers are communicating is compostable, versus what commercial compost facilities are actually able to accept from residential SSO programs.
3. Length of time to break down plastic-based materials does not match the time frame of current operating conditions.
4. The ability of a compost facility to process compostable plastic packaging is outpaced by the volume of food waste being received and the wide variety of compostable plastic packaging types.

Compostable Plastic in Recycling Stream Potential Issues

Issues that may arise if these materials enter the recycling stream:

1. Recycling facilities are not currently equipped to handle them. A Material Recovery Facility (MRF) without an optical scanner is not able to sort these materials, and manual sorters cannot easily distinguish between plastics such as PLA and PET.
2. Materials are often contaminated with food waste.
3. Currently they represent a small quantity of material and these streams of recycling may not have the investment required to recycle and market these items.
4. These materials are manufactured to be recycled through commercial compost facilities, not as a material destined for recycling.
5. Quality of material output due to incompatibility of materials.

Recycle BC Management of Plastic Packaging

According to experts, bio-plastics (derived from natural sources, biomass or plant-derived) currently account for 1 per cent of the total plastics market²⁰. Based on this worldwide data²¹ related to the composition of bio-plastics category, two thirds of those currently on the market would be acceptable in the Recycle BC blue box program for conventional recycling. Recycle BC can recycle bio-PET, bio-PE and bio-PP (polyethylene terephthalate, polyethylene, polypropylene), all of which are intended for recycling alongside other plastic packaging. Bio-based plastics such as PET and PE are sorted to their respective resin type much like conventional fossil fuel-based PET and PE. For the remaining bioplastics of this type, which are not recycled, the majority are turned into engineered fuel.

Recycle BC does not currently target to collect compostable plastic packaging such as PLA-based clamshells or other PLA-based packaging formats because it is not an effective use of resources at this time (this material represents a very small percentage of the overall materials in the Recycle BC supply chain). All mixed containers collected in Recycle BC's program are optically sorted based on resin type and, in some cases, colour. Packaging made of resins not accepted in our program, such as PLA, are turned into an engineered fuel with other non-recyclable plastics to be used as a replacement for coal in industrial processes. PLA can feasibly be optically sorted, but the quantity of this material type is not sufficiently at scale to warrant the investment of a dedicated optical sorter.

Recycle BC accepts paper products for recycling as long as the material is dry and clean from any food residue or grease. Hot beverage cups are accepted through the mixed containers stream, while molded fibre packaging such as egg cartons and take-out trays, as well as pizza boxes, paper cup sleeves, and brown kraft paper containers are accepted in the mixed paper stream for recycling.

²⁰ Smithers Pira, 2018. Future Lifecycles of Packaging Recycling to 2023. <https://www.smithers.com/services/market-reports/packaging/lifecycles-of-packaging-recycling-to-2023>

²¹ ibid

Conclusion

Recycle BC seeks to continue growing our knowledge base on the topic of compostable PPP as the market evolves. We are monitoring the production of compostable plastic as, at this time, the volume of material is very low. Our interest is in determining the best method to recover these materials on behalf of our stewards. We also continue to develop education resources to assist our residents in discerning between blue box vs green bin for paper packaging and products, whether it be pizza boxes, paper containers, paper wrappers, etc.

We are working with the provincial government and supportive of national standards for compostable materials. This is essential to allow us to devise our strategy to respond to these materials. Recycle BC also looks forward to seeing the results of the work being done by the BC provincial government to update the Organic Matter Recycling Regulation (OMRR). This is critical to have standards for both producers and facilities on compostable plastics in order to advise on packaging, advise on guaranteed end of life, and plan for program evolution.

Glossary of Terms

Biodegradable – Materials that breakdown under environmental exposure and metabolic action of microbes into carbon dioxide, water and biomass.

Bio-plastics – Materials that are (partly) derived from natural materials or biomass, e.g. sugarcane (bagasse), corn starch, cellulose.

Compostable – Materials that can be broken down in an accelerated natural biodegradation process, stimulated through artificially applied and controlled heat, agitation and aeration.

Foodservice packaging – Includes single-use products such as cups (beverage and portion), plates, platters, bowls, trays, beverage carriers, bags (single portion and carry-out), containers, lids and domes, wraps, straws, cutlery and utensils for the service and/or packaging of prepared foods and beverages in foodservice establishments²²

Material Recovery Facility (MRF) – A specialized plant that receives, separates and prepares recyclable materials for marketing to end-use manufacturers.

Oxo-degradable – Materials that when exposed to sunlight break down into much smaller fragments of exactly what it was before.

Per- and polyfluoroalkyl substances (PFAS) – Fluorinated compounds that do not biodegrade naturally in the environment; colloquially called "forever chemicals".

Polylactic Acid (PLA) – a thermoplastic polyester, produced from renewable resources.

Residential Source-Separated Organics (SSO) – System of segregating compostable materials from other waste streams at the source (home) for separate collection; could include food waste, yard trimmings, paper fibres, wood waste (as applicable).

²²Foodservice Packaging Institute. <https://www.fpi.org/About-Foodservice-Packaging>



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