



DESIGNING FOR COMPOSTABILITY IN CANADA

Can I compost that? A Materials and Acceptance Guide

2015



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The National Zero Waste Council would like to thank its Product Design and Packaging Working Group for its contributions to this series: Alan Blake, Executive Director, PAC NEXT (Co-lead); Susanna Carson, CEO, BSI Biodegradable Solutions (Co-lead); Allen Jensen, Assistant Project Engineer, Solid Waste Services, Metro Vancouver; Laurie Lewis, Diversion Planning Coordinator, Halifax Regional Municipality; Colin Isaacs, CIAL Group; Julian Radlein, SymbiAudit Inc; Isaul Lopez, Sales and Business Development - Biopolymers, BASF; and Jeanette Hanna, Market Development - Biopolymers, BASF. Thanks also to Emily McGill, who prepared the documents in this series.

Photo credit: BSIbio

Introduction

More products and packaging on the shelf today are called *compostable*, and or *biodegradable*, than ever before. The Product Design & Packaging Working Group of Canada's National Zero Waste Council has identified compostable materials as both an innovation and a source of confusion in the world of products and packaging.

Why is design for composting so attractive? Composting is a type of *organics recycling* that takes *organic material* and transforms it into usable compost, a soil amendment that provides essential benefits¹ to farms, gardens, and landscapes.

As the world becomes more active on the issues around managing solid waste, designers and manufacturers are looking for products and material types which divert waste resources from landfill and incineration. Composting closes the loop on biological waste, and promotes the new vision of a zero waste *circular economy* where end products can be reused indefinitely.

Although composting has traditionally been used to process yard debris, farming by-products and food scraps only, the advent of commercial composting systems has enabled packaging made of natural materials to be composted. Composting is increasingly being seen as an alternative pathway for a product or package life cycle.

Innovative designers have responded to this by expanding the range of materials, products and packaging intended for composting. These new products and packaging made from compostable plastics and/or natural materials are making their way onto the shelf and into our organics bins. This is especially useful for items in contact with food, since food soiled items become difficult or impossible to recycle, due to the food contaminating an otherwise clean recycling stream.

In the Designing for Compostability in Canada series, the Working Group endeavours to answer some of the core questions for Canadians today on what, when and where to design for compostability. This report targets what product and packaging materials can or should be composted in Canada, and the best practices to apply when designing for compostability.

This is for product/packaging designers, brand owners, purchasers, and the general public to quickly and easily see what materials are definitely compostable and accepted in organics bins, those which are definitely not, and those which are compostable in only some areas. Although the information is written from a Canadian perspective, it may apply elsewhere in the world.

Complimentary publications in the Design for Compostability in Canada series include another report on *Can I Compost That? Certifications and Acceptance*, and a terminology package (including commonly confused definitions) which includes two decision trees on *Material Recovery in a Circular Economy*, and *Compostable Material Recovery in a Circular Economy*.

1 Compost Council of Canada, (n.d.) Successful Composting; The Benefits of Compost (PDF). Online at: www.compost.org/pdf/sheet_7.PDF

Key Terms

Organics/organic material: Natural materials, for example; food scraps, yard debris, grass clippings, paper (or soiled paper).

Organics bin: The system for carrying organics from a home or business to a compost facility.

Organics recycling: Also known as composting.

Compostable²: Material that degrades by biological processes during composting to yield CO₂, water, inorganic compounds and biomass at a rate consistent with known compostable materials, and leaves no visible or toxic residues.

Biodegradable³: Any material that degrades by biological processes under the right conditions, without a defined time limit or end product. Biodegradation can occur in many environments: compost, anaerobic digestion, soil, marine or freshwater. This term does not indicate anything about compostability or a material's acceptance in organics bins.

Circular economy⁴: A circular economy is an alternative to a traditional 'linear' economy (make, use, dispose) in which we keep resources in use for as long as possible, extract the maximum value from them whilst in use, then recover and regenerate products and materials at the end of each service life.

Closed-loop: Following the image of a circular economy, closed-loop describes products and materials that remain useful resources by maintaining a make/use/remake/reuse cycle, as opposed to the more common linear pathway of make/use/dispose.

Can I Compost That?

A lack of regulation and enforcement around the labeling of degradable, biodegradable and compostable products, makes it confusing for businesspeople, municipalities, compost facilities and the public confronted with the choice of disposal post use. Products and packaging making compostable claims frequently look the same as their conventional (non-compostable) counterparts. This raises the question - "Is it really compostable?" and "Can I compost that?".

This question means two things: first, is the product made from truly compostable materials that will break down during composting, as proven by third party testing; second, is this product able to be composted in the region it's being sold? Although the answer to the first question may be yes, that doesn't mean that the right facilities exist everywhere the product is sold or used.

Should I Compost That?

Many products are technically compostable, given enough time and under ideal composting conditions, but they may not be readily composted if the required facilities do not exist.

To effectively compost a product or package, it should be placed in the organics bin only if the licensed compost facility lists it as an acceptable item. In municipal organics bin programs, the region or municipality will list currently accepted materials based on what the receiving facility can receive. When designing a compostable product or package, finding the appropriate composting facilities largely depends on the material type/composition and compostability certification of the item.

2 ISO 170-88:2008(E), 2008. Specifications for compostable plastics.

3 Vert, M. et al. (2012). Terminology for biorelated polymers and applications (IUPAC Recommendations 2012). *Pure and Applied Chemistry*, 84(2), 377-410.

4 WRAP UK. (2015). WRAP and the Circular Economy. Online at: <http://www.wrap.org.uk/content/wrap-and-circular-economy>

What makes a material compostable?

According to the Canadian compostable product standard CAN/BNQ 0017-088, a product or package is certified compostable if it breaks down completely through biodegradation (microbial activity) to become a part of compost, in a specified time frame, under the proper composting conditions, and with no adverse effect on the final compost.

Both biobased and synthetic materials can be engineered for compostability in the design phase, pre-use. The critical point is whether it can be broken down by microbes under the right composting conditions and time frame. The composting environment determines how compostable products will perform in a given process, and the environment that is required for a specific product depends on the material type. These differences are summarized in Table 1.

A short time period would be two months or less, a moderate period from two-to-six months, and a long time six months or more. Fibrous materials take a long time to break down completely, with medium to low temperatures to degrade. Compostable plastics on their own need high temperature and high moisture, with short to long times depending on the exact material. Mixes of fibre and compostable plastic need to satisfy the conditions needed for the plastic, and for the fibre. It's important to note that all products benefit from being shredded, ground, and damp or food-soiled before composting.

TABLE 1. COMPOSTING CONDITIONS REQUIRED FOR DIFFERENT MATERIAL TYPES

Material type	Product example	Required Composting Conditions*
Fibre (e.g. paper, sugarcane, wheat)	Napkin, fibre-based clamshell	Medium to low temperature, medium to high moisture, long time**
Fibre + compostable plastics	Hot cup, soup bowl	High temperature, high moisture, long time
Compostable plastic only	Cold cup, straw, cutlery	High temperature, high moisture, moderate to long time

*This continues to be an area of active research.

** For the purposes of this document, a 'long time' is 6 months or more.

Is a product compostable in the region it's sold?

Compostable plastics require high temperatures (60+ degrees Celsius), oxygen and moisture (60% +) to compost. Most backyard/home composts are unlikely to reach these processing conditions for a sufficient period of time. This makes it necessary for these products to be composted in large-volume commercial facilities.

Each municipality has a unique way of collecting, transporting, and processing organics. The variety of methods in use today means that each region also has its own criteria for what are acceptable compostable products and packaging. For more information on what determines acceptance at composting facilities, read the report entitled *Can I Compost That? Certification and Acceptance*.

Individuals can discover what their municipality accepts or does not accept in curbside organics, by contacting their local government waste management services. Businesses should be aware that their hauler may not have every answer, and there may be more than one compost facility in a region. It is best to also contact their local government to learn about all the composting options available to business operators in a region. The appendix to this document provides some tips on how to find this information.

Materials acceptance in organics bins

Acceptance of materials will vary by region and facility type. The table below provides an overview on the compostability of common products and their base materials in both backyard/home and commercial composting. This can be used as a preliminary guide for purchasing and design decision-making. It is non exhaustive, but provides guidelines for the most widely used material types. For making final selections of compostable materials to design a closed-loop product life cycle, contact municipalities and compost facilities in the target market area to confirm acceptance.

Products and materials are split into three categories:

- Natural fibre based materials, including ones with a compostable lining – *compostable, sometimes accepted in organics bin*
- Certified compostable plastics – *compostable, sometimes accepted in organics bin*
- Other common plastics – *not compostable, not accepted in organics bin*

TABLE 2.
COMPOSTABLE MATERIAL & PRODUCT GLOSSARY FOR GREEN BIN ACCEPTANCE

Material Type / Product	Raw material	Found In	Can I Compost That?	
Fibre based				
Unlined paper	Trees Other fibrous plants e.g. bamboo	kraft bags paper plates & bowls plain paper cups	Backyard	Commercial
			Yes	Usually*
Other unlined fibre	sugarcane wheatgrass mizuna fibre	plates, bowls, fibre-based clamshells	Yes	Usually*
Wax coated paper	waxes any fibre source	meat wrap some cups	No	Maybe**
Metallized paper	aluminum any fibre source	hot sandwich wraps, candy wrap	No	No***
Hot cups (PE coated) ****	paper fossil fuels	hot cups, soup bowls	No	No
Hot cups (compostable plastic coated)****	paper vegetable starch	hot cups, soup bowls	No	Maybe**
Compostable plastics				
Poly-lactic acid (PLA)	vegetable starch	deli containers cold cups lining of hot cups	Backyard	Commercial
			No	Maybe**
Crystallized PLA (cPLA)	vegetable starch minerals	utensils hot cup lids	No	Maybe**
Poly-hydroxyalkanoate (PHA)	vegetable starch methane	drink containers lining of hot cups	No	Maybe**
Polybutylene adipate co-terephthalate (PBAT)	fossil fuel & bio-based	waste collection bags, hot cup lining, utensils	No	Maybe**
Other common plastics				
 Polyethylene terephthalate (PET)	fossil fuel & bio-based	food jars drink bottles	Backyard	Commercial
			No	No
 High density polyethylene (HDPE)	fossil fuel	detergent bottles milk jugs	No	No
			 Polyvinyl Chloride (PVC)	fossil fuel
 Low density polyethylene (LDPE)	fossil fuel	6-pack rings bread bags		
			 Polypropylene (PP)	fossil fuel
 Polystyrene (PS)	fossil fuel	CD / DVD cases foam packaging		
			Nylon	fossil fuel
PSM “biodegradable” material	plant starch and fossil fuel	cutlery plateware and containers	No	No
Oxo- & photo-degradable materials	fossil fuel	a wide range of products, notably bags	No	No

* Some papers and unlined natural fibres can be too thick to compost in your backyard, and commercial composting facilities will also reject them if they will not break down within the time they need to for the facility to function efficiently.

** Some commercial facilities are able to take compostable plastics, while others aren't. Read the 2015 National Zero Waste Council paper on Certification and Acceptance of Compostable Products & Packaging for more information (final title to be confirmed.)

*** Metallized compostable papers are a recent innovation which are seldom accepted in facilities due to the risk of confusion between compostable and non-compostable versions by end users.

****You can tell a hot cup is coated with a compostable polymer when it has a certified compostable logo on it. If there is no logo, it is a PE or 'conventional' lining and should not be composted.

Best Design Practices for Compostable Products and Packaging

Design for Food Contact Only

Compostable products and packaging increase organics diversion from landfill when the packaging contains food or food scraps. Importantly, compost facilities are not a disposal pathway for products and packaging that do not come into contact with food. Designers should not consider using compostable materials if their use will not contribute to diverting food scraps from landfills, and instead should design for recycling.

Some products which come into contact with food or beverages are still better designed for recycling. For example, cold cups which are used for beer at special events. These cups can be collected altogether, rinsed and recycled, which makes more sense than finding the necessary complement of organic waste to compost them.

Certify Your Products and Packaging

Compostability certification accomplishes two goals:

1. Products receive third-party verification that a product/package is capable of composting in industrial conditions.
2. Products are easily identified as compostable with a recognized certification mark, to ensure that it will educate and motivate consumers to compost the product/package, and that it does not contaminate the plastics recycling stream.



If a product is not intended to be in contact with food, it is better to design for recyclability.

A helpful guide for deciding whether a product should be designed or certified for compostability is the Biodegradable Product Institute's Decision Tree for Certification⁵. This specifies that being in contact with food, (and thus helping increase diversion of food scraps), is the main criterion when deciding to design a product for compostability. If a product is not intended to be in contact with food, it is better to design for recyclability.

Design for Acceptance

Purchasers and designers of compostable products and packaging should take into account both certification for compostability and facility acceptance requirements. The requirements for facility acceptance vary across facilities and between regions. Businesses should contact individual facilities in the target markets for their individual acceptance.

The more easily a product or package can compost, the more likely it is to be accepted. Some simple principles for designing for acceptance are:

3. Increase surface area of products and packaging.
4. Natural uncoated fibres are more readily accepted at facilities.
5. Make the products easily recognizable as compostable; include certification marks and explanatory text. This has the added benefit of protecting existing recycling programs and preventing cross-contamination of recycling and composting streams.

Certification Marks in North America



www.compostable.info



BPI®

COMPOSTABLE
IN INDUSTRIAL FACILITIES

Check locally, as these do not exist in many communities. **Not suitable for backyard composting.** CERT # SAMPLE

www.bpiworld.org

The compostable mark with the maple leaf is the Canadian certification program for compostable products, and the BPI mark is from the US certification program.

Overall, the option to design for recovery by composting is an exciting one. Product designers and compost producers will have to work together to make sure products are taken where they need to to close the loop on waste and build a circular economy. This guide and complimentary publications from the National Zero Waste Council are meant to help purchasers, brand owners and designers make smart decisions in designing for compostability in Canada.

More Resources

NZWC Design for Compostability in
Canada publication series

CAN/BNQ Standard 0017-088

BNQ List of Certified Products,
Website, <http://compostable.info/certified.htm>

BPI Certified Product Catalogue, Website,
<http://products.bpiworld.org/>

About the NZWC

The National Zero Waste Council is a cross-sector leadership initiative bringing together governments, businesses, and non-government organizations to advance a national waste prevention and reduction agenda in Canada. With a focus on influencing behavior and improving product design and packaging, the National Zero Waste Council aims to unite efforts in waste prevention and drive a fundamental shift in our relationship with waste. **www.nzwc.ca**

Reviewers

A wide variety of thought-leaders and practitioners have been consulted in the preparation of this white paper.

These include but are not limited to:

- A&W Foods Inc.
- Bureau de Normalisation du Quebec (BNQ)
- Biodegradable Products Institute (BPI)
- Canadian Plastics Industry Association
- Compost Council of Canada
- City of Edmonton
- City of Kingston
- Township of Langley
- US Composting Council's Sustainable Packaging Working Group

Appendix - Tips for Determining Acceptance at Facilities

“Should I Compost That?” Two-Step Checklist

- 1. Is this product/package certified compostable?
- 2. Is it accepted in regional compost facilities?
- (for municipalities) Does my local compost facility accept this product?
- (for the public) Is it accepted in my curbside organics bin?
- (for restaurants & food service) Can my hauler take my organics bin to a facility that accepts these products? Can my customers compost it at home in their curbside organics bin?
- (for facilities) Does this meet my operating criteria for acceptance?

The steps you take to answer this checklist vary depending on who’s asking, as follows.

The general public:

- Call your municipality and ask if the facility which takes your curbside organics accepts the product or package you want to compost.
- Ask if any other facilities in the region accept these products, and if yes, where you can drop the compostable products off to be received by that facility.

A restaurant or business with food services:

- Contact your municipality for a list of the licensed compost facilities in your area, as well as the names of licensed haulers and their environmental track record.
- If the municipality does not know, look for your local composting facilities online, in the phone book, or through the Find A Composter Website (note that this website does not have all composters listed, and an online search engine may yield more results).
- Contact your local compost facilities and ask if they accept the products in question. Also ask for the waste haulers they work with, and what types of compostable liners they accept (if any).
- Call a neutral, third-party professional with expertise in materials and waste reduction systems.

A municipality:

- Contact your local composting facilities and ask what compostable products they accept.
- Make sure to gather data on all local composting facilities. There may be some which take no compostable products, and others which take all of them.

A compost facility:

- Use compostability certification as a discriminatory criteria to ensure the product leaves no toxic residues. Then, test the product in your system; does it disintegrate completely and leave no residue that can be seen by your end customer?
- Ensure the compostable products are allowable as feedstock in the end compost product you are making. Currently, certified compostable food packaging that incorporates compostable plastics is not allowed as feedstock in certified organic compost by the Organic Materials Review Institute (OMRI).



The **National Zero Waste Council** brings together leaders in government, business and community organizations to advance waste prevention in Canada.

www.nzwc.ca