



# Understanding the Role of Compostable Packaging in North America



**SUSTAINABLE PACKAGING**  
COALITION®

# About us



GreenBlue is an environmental nonprofit dedicated to the sustainable use of materials in society. We bring together a diversity of stakeholders to encourage innovation and best practices to promote the creation of a more sustainable materials economy.

The Sustainable Packaging Coalition is a membership-based collaborative that believes in the power of industry to make packaging more sustainable. We are the leading voice on sustainable packaging and we are passionate about the creation of packaging that is good for people + the environment. Our mission is to bring packaging sustainability stakeholders together to catalyze actionable improvements to packaging systems and lend an authoritative voice on issues related to packaging sustainability. The Sustainable Packaging Coalition is a trademark project of GreenBlue Org.



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# Introduction

Compostable packaging is receiving significant attention from brands and retailers. Though composting infrastructure is not yet widespread across the U.S., interest in this recovery pathway is growing rapidly. As more communities look to divert food scraps (currently at least 21% of the waste stream) out of the landfill, composting (also referred to as organic recycling), will be a big part of their materials management strategy. At the same time, cities across the U.S. are beginning to require compostable packaging for foodservice vendors, and retailers, quick service chains, and even airlines are jumping on board.

It's not just foodservice that's turning to compostable packaging. In response to recycling challenges, CPGs are also starting to include compostable packaging as part of their packaging sustainability goals. Unilever, Aldi, and PepsiCo have all included compostable packaging as part of their strategy for tackling currently unrecoverable packaging waste. Consumers are increasingly interested in compostable packaging options, but also confused about their value and how to dispose of them.



**This guide aims to provide a framework for understanding the best role for compostable packaging in a sustainable packaging strategy.** It offers considerations for **appropriate use cases**, insights into **composting infrastructure** and **municipal collection programs**, and perspectives on **composter and consumer engagement**. It clarifies the recovery ecosystem surrounding compostable packaging today, for the benefit of brands, retailers, municipalities, consumers, and other stakeholders.

While this guide focuses on composting as a recovery pathway for packaging, recovery is only one aspect of sustainable packaging - there are also important sourcing, manufacturing, and material health considerations. These will impact the overall environmental footprint of the packaging, and should be examined closely.

# Why Are We Exploring Compostable Packaging?

## Compostable packaging is part of global commitments for better packaging

The Ellen MacArthur Foundation's New Plastics Economy includes compostable packaging as one pathway to building circularity for plastics that are not eliminated. More than 450 companies have signed on to the New Plastics Economy commitment to date. While not all of these companies will pursue compostable packaging, many are interested in substituting some of their packaging portfolios with compostable alternatives. **What products are most appropriate for compostable packaging applications?** This question is explored in the **Design** section of this guide.

## Compostable packaging can be an alternative to currently non-recoverable plastic waste

For packaging that is not readily recyclable, compostable packaging may provide an alternative recovery pathway. A [recent SYSTEMIQ analysis](#) identified the need for substitutes to non-recoverable plastic to help manage plastic waste. These substitutes include compostable bioplastics, coated paper (which may be recyclable, compostable, or neither, depending on the coating), and paper (which may be compostable if wet or food-soiled and free of harmful additives). Substitutions like these may be a viable option for packaging that cannot be eliminated, reused, or recycled. However, to effectively manage litter and plastic waste, merely reconsidering the material selected for the package is insufficient. We need to critically analyze the package's broader relationship to systems of consumer use and recovery in mind, which means investing in composting infrastructure or assessing whether the material can be eliminated altogether. **What is the state of North American composting infrastructure, and where can these products be composted?** These questions are explored in the **Collection** and **Composters** sections of this guide.



Figure 1. New Plastics Economy Vision statement, which includes compostable materials

## The purpose and value of compostable packaging is widely misunderstood

Consumers, brands, retailers, and packaging manufacturers are confused about where compostable packaging fits into a company's sustainability efforts. At the same time, there are ongoing, widespread public misconceptions around both the benefits and drawbacks of compostable packaging. **Some media coverage portrays compostable packaging as a welcome innovation for every application and the predominant solution to marine plastic pollution, which is incorrect.** In other instances compostable packaging is described as not truly compostable, which is also incorrect. Brands working with compostable packaging must strive to understand the intersection of systems of food waste, composting infrastructure, and marine pollution. How does compostable packaging affect a composting facility? What do consumers think about compostable packaging? These questions are explored in the **Composters** and **Consumers** sections of this guide.

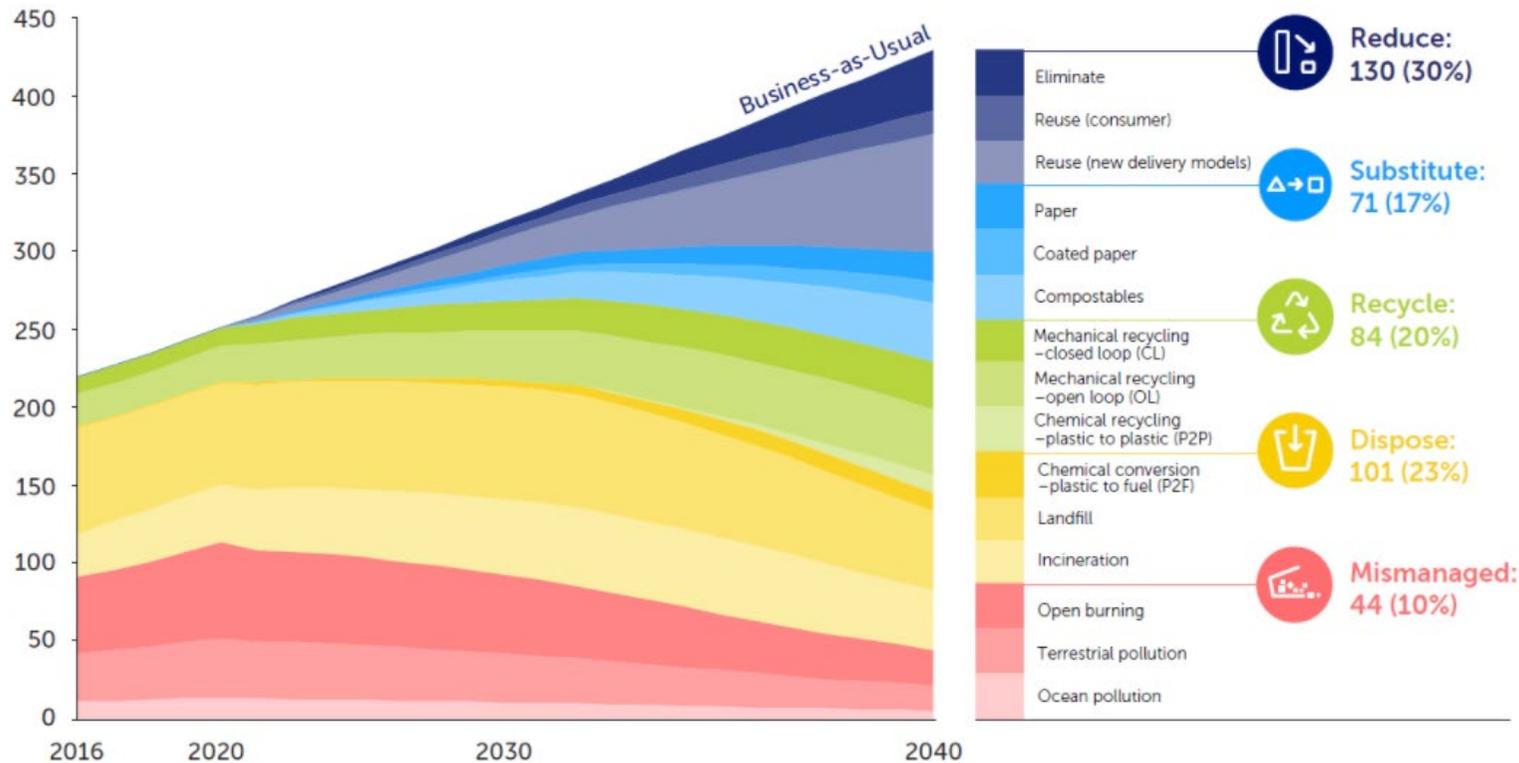


Figure 2. Pew Charitable Trust / SYSTEMIQ, 2020. Compostables can substitute commonly-leaked plastic items that contribute to mismanaged plastic waste

# Value of Compostable Packaging

What is the value of compostable packaging, and why do we need it as part of a suite of solutions that improve the sustainability of packaging?





## Capturing and diverting food waste

Compostable packaging's primary value is when it is used to capture food waste and deliver it to the composting bin. Food waste in landfills is a large source of methane, a greenhouse gas which is 25 times more potent than carbon dioxide at warming our planet. More food waste is diverted in packaging and food waste programs than in food-only composting programs.

Compostable packaging can be used in foodservice settings, where it's likely that the plate, cup, clamshell, or tray will have food residue or food scraps. Once a consumer is finished eating or storing the contents, both the packaging and the remaining leftovers can be composted together.

Compostable packaging acts as a vehicle for diverting food waste. More food waste is diverted in packaging and food waste programs than in food-only composting programs.

**Learn more here:** [Value of Compostable Packaging](#)



## Simplified consumer experience and a cleaner recycling stream

When a suite of compostable packaging is used, consumers don't need to sort, wash, or separate food scraps from packaging. Their takeout container and utensils can be placed directly in the composting bin along with any leftovers. This helps simplify the process of composting both at home and on the go, lowering the barriers for consumers to compost food waste.

This is particularly true for packaging used in closed venues, such as stadiums, airports, university and corporate campuses. If compostable packaging is used exclusively in these environments, consumers receive a simplified message about how to sort their waste.

A compostables-only approach to food serviceware and heavily food-soiled packaging can also lead to cleaner recyclables. If this packaging is consistently labeled and collected for composting, less food waste and mis-identified compostable packaging will be put into the recycling bin.

**Learn more here:** [A case study for composting: Taco Time Northwest](#)



## A solution for non-recyclable packaging

Compostability can be a recovery pathway for packaging that is in contact with food and is not recyclable today. This includes packaging such as meat trays, cheese wrappers, produce trays, and cling film used in a variety of grocery and packaged food applications.

In these applications, it is difficult to recover the packaging for recycling, often because it is made of lightweight, flexible plastic packaging. Store drop-off is one way of recycling film, but is limited to clean and dry flexible plastic made from PE, such as plastic bags and plastic wrap.

While compostable solutions to non-recyclable flexible packaging are still nascent, if properly designed and labeled they may be a promising option to help companies meet their packaging goals.

**Learn more here:** [Compostable Overwrap for Tea Bags](#)



## Supporting biological cycles of the circular economy

The circular economy consists of both technical and biological loops of materials. Recycling supports the recovery of technical nutrients, such as metals and polymers.

Meanwhile, in biological cycles, food and biologically-based materials (such as cotton or wood) can feed back into the system through processes like composting and anaerobic digestion.

Compostable packaging can be designed as a biological nutrient that, once used, will decompose in a composting environment without negatively affecting soil quality.

**Learn more here:** [What is a Circular Economy?](#)



## Compost supports soils as a carbon sink

Carbon sinks are environments that absorb and store more carbon than they release, lowering the concentration of carbon dioxide in the atmosphere. Globally, the two most important carbon sinks are vegetation and the ocean.

Land sinks, such as forests, help to return 26% of human-caused emissions into the earth. Soil is an enormous storehouse of carbon, and soil with more carbon content is also more agriculturally-productive and resilient.

Experiments by the Marin Carbon Project have shown that applying compost can double soil carbon sequestration. Vast quantities of compost can be applied to soil everywhere, sequestering carbon and reducing demand for nitrogen fertilizers. Compost should be recognized as a key tool for absorbing carbon.

[Learn more here: Compost Key to Sequestering Carbon in the Soil](#)



## Supplementing carbon sources in the composting process

Because compostable packaging is used to divert food waste, it is often assumed that there is no inherent value to the composting process from the packaging itself.

In fact, fiber-based compostable packaging can serve as a valuable source of carbon in the composting process. A composting operation needs sources of fiber, such as wood chips, to mix with other organic material. During the winter, composters may have trouble getting natural sources of carbon, like yard waste, which is generated and captured predominantly in warmer seasons.

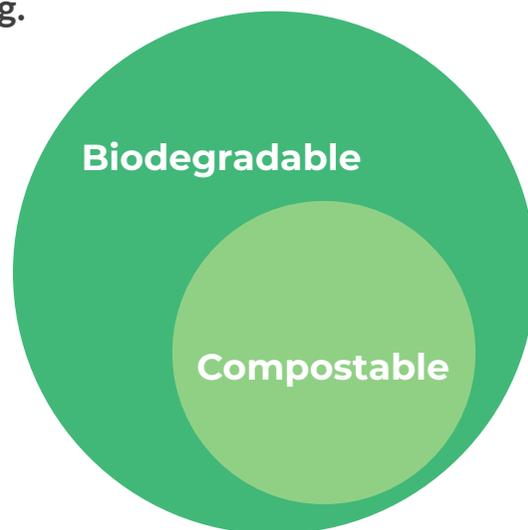
In a composting operation, compostable packaging can serve as a bulking agent, adding structure or bulk to the compost pile in the same way as carbon-based yard waste materials.

[Learn more here: Value Of Compostable Packaging As "Feedstock"](#)

# Basics of Compostable Packaging

**Compostable packaging is a specific type of biodegradable packaging.** Compostable materials are degradable by biological processes to yield carbon dioxide, water, inorganic compounds, and biomass at a rate consistent with biodegradation of natural waste while leaving no visually distinguishable remnants or unacceptable levels of toxic residues. “Biodegradable” is a more general concept that refers to materials breaking down over unspecified amounts of time, and usually in unspecified environments. In this guide, we use the term “compostable” to describe packaging designed for composting as an end-of-life solution.

Compostable packaging can be broken down into two material categories: **fiber packaging** and **compostable bioplastic packaging**.



**Fiber packaging** is typically made out of tree fiber or plant fiber such as sugarcane, wheatstraw, or bamboo. Fiber is often used to make paper plates, takeout containers, boxes, sleeves (such as for bakery items), or pouches. Fiber packaging that requires grease or moisture resistance is often lined with a bioplastic.

**Compostable bioplastic packaging** can be made out of a wide variety of bioplastics. The most common examples of bioplastics used are PLA, cellulose, starch blends, PBS, and PHA. Many of these bioplastics are also bio-based, while others, like PBAT, are only partially biobased today, and may still include fossil-based materials.

There are important life cycle considerations surrounding compostable packaging. **While they tend to have higher water use and aquatic toxicity impacts, they also tend to have lower greenhouse gas emissions and fossil fuel use.** Life cycle assessments (LCAs) can be used to better understand the impacts from the sourcing and manufacture of these materials. At the same time, we should keep in mind that LCAs are not perfect tools, and the robustness of their findings can be limited by the boundaries set, availability and recency of data, and other factors.

Packaging can be designed to be commercially compostable (also referred to as industrially compostable). This is when composting occurs at a large-scale permitted facility, which uses specific technologies to break down a variety of organic material. Other packaging may be designed to be home compostable (also known as backyard compostable). This is when composting takes place in small piles or containers at a resident's home.

Commercial composting in the United States began in earnest in the late 1980s and early 1990s, when the country perceived a “landfill crisis” - landfills running out of space and full of garbage. In response, municipalities started passing ordinances banning yard waste from landfills. Prior to that, little composting was being done on a large scale. ([Waste360](#)).

In the 2010s, the push for “green infrastructure” development in urban areas (including stormwater management efforts and LEED certification) and the growing trend of regenerative agriculture created significant demand for compost products. At the same time, community composting, which is typically a small-scale composting program managed by a local community, took off in part due to “demand for better soils for community gardens and urban farms” ([BioCycle, 2020](#)).

**Today, the composting industry has grown significantly but continues to operate on a fairly decentralized level, with collection programs and composting operations varying widely from state to state.** A renewed overall emphasis on soil health is boosting compost markets, and landfill disposal bans or mandates continue to be effective tools for driving organic material to composting ([BioCycle, 2020](#)).

The global compost market is expected to reach an estimated \$9.2 billion by 2024 with a compound annual growth rate (CAGR) of 6.8% from 2019 to 2024 ([Compost Market Report](#)). This is slightly higher than the projected growth rate of the plastic recycling industry (5.4%) and double the projected growth rate of the paper recycling industry (3.4%).



# Compostable Packaging in Landfills



**The goal for compostable packaging should be for it to get composted.** The composting process provides important climate change benefits, with soils serving as a critical carbon sink. However, as composting infrastructure is still being developed, it is likely that compostable packaging may initially be landfilled.

There is significant confusion around what happens to compostable packaging in a landfill, and whether its property of biodegradability is still beneficial. Conditions at a composting operation are very different than conditions at a landfill, and landfills have different families of microbes that behave differently than those at composting operations. Some compostable bioplastics will not biodegrade in landfill conditions, others will. Similarly, compostable packaging may or may not biodegrade in terrestrial or marine environments.

**Landfills are engineered to prevent any interaction of landfill waste with the surrounding environment, so there will be no completion of naturally-occurring biological cycles when something biodegrades in a landfill.** Landfills are the third-largest source of man-made methane emissions because material breaks down in the absence of oxygen, which generates much more methane than biodegradation at composting facilities. From a carbon footprint perspective, it's best if nothing biodegrades in a landfill.

Regardless of whether compostable packaging is composted, it may still have important environmental benefits. This is because most of the impacts from packaging tend to come from the manufacturing and sourcing phases of the life cycle, while the end-of-life impacts are less significant. Compostable packaging tends to have lower greenhouse gas emissions and fossil fuel use during the sourcing and manufacturing life cycle phases than traditional packaging.

# Collection: Insights Into Composting Infrastructure & Access



Collection



The predominant narrative regarding composting infrastructure and programs in the United States and Canada is that it is largely absent, insubstantial, and incapable of handling packaging. This is a concern that is often cited by consumers, who may feel misled or confused by compostable packaging's disclaimer that "Composting facilities may not be available in your area".

This narrative does not fully stand up to research that examines the current state of composting infrastructure in North America. While access to composting programs is not universal, free, or widespread, according to our research, at least 27% of the US population has access to some kind of composting program that accepts either food waste only, or food waste and some forms of compostable packaging. More specifically, at least 11% of the US population has access to composting programs that accept some form of compostable packaging in addition to food waste. These programs differ widely, and may include privately-run or municipally-run curbside service, privately-run or municipally-run drop-off or programs, or a combination of these.

# Availability of Composting Infrastructure

To better understand the challenges and opportunities for composting, GreenBlue has developed several interactive [maps and charts of composting infrastructure](#) and supportive legislation, available on Tableau Public. This data was collected from state databases of permitted waste facilities and individual facility websites. Information about privately-run composting programs was supported by [CompostNOW's](#) directory.



Figure 3. Breakdown of US composting facilities by material accepted

## In the United States, 15% of composting facilities accept some compostable packaging

While 55% of the verified facilities accept only green waste (yard waste and other agricultural waste), facilities that accept food waste and some combination of other compostable materials are not insignificant — about 45% of the facilities identified accept these feedstocks. Specifically, about 29% accept food waste, and about 15% accept packaging in addition to food waste.

We see that 102 facilities take compostable packaging, including [compostable bioplastics](#), from residential and commercial sources. Another 28 take fiber-based compostable packaging (no bioplastics), and another 13 take compostable packaging from residential sources only. In total, 143 composting locations are accepting some kind of compostable packaging.

## In Canada, composting facilities often accept uncoated fiber products, but bioplastics are not widely accepted

In Canada, 33 facilities accept uncoated fiber products, such as paper plates, food soiled paper, and greasy pizza boxes, and 10 facilities accept fiber packaging such as paper takeout containers. Seventeen composting facilities accept food waste in addition to green waste, but do not accept uncoated or coated fiber packaging or bioplastics. An additional 36 facilities accept green waste only (i.e. no food waste, fiber packaging, or compostable bioplastics are accepted). One facility accepts compostable bioplastics. Of the 97 total composting facilities identified in Canada, around 44% accept uncoated fiber or fiber packaging.

These data are constantly evolving as composting facilities open and close their locations, accept new material or restrict incoming material, and enter into contracts with local municipalities and waste haulers.

This means there is enormous potential for growth in the composting industry - the number of facilities or the material they accept is not set in stone. Rather, industry can expand to divert more organic material from landfills, closing biological loops and reducing greenhouse gas emissions.

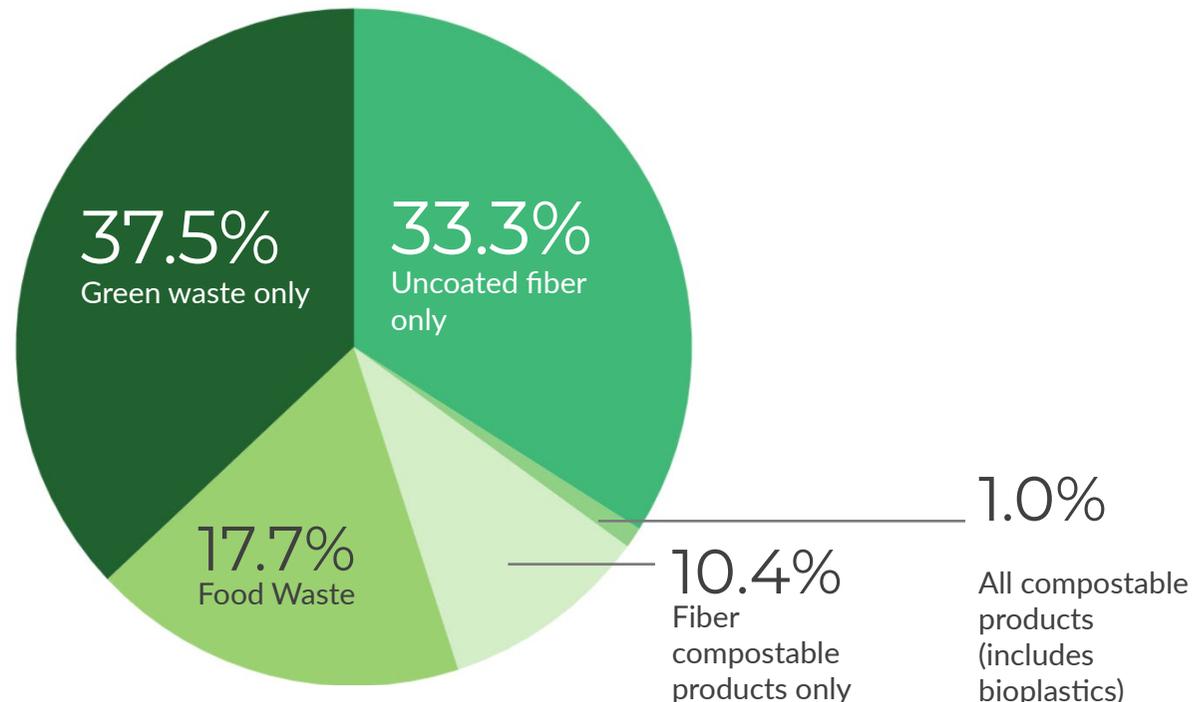


Figure 4. Breakdown of Canadian composting facilities by material accepted

# Residential Access to Composting Programs

Looking at composting facilities gives us important insights into the availability of infrastructure, but there is an additional question to consider- how many people do these facilities serve? To answer this question, we explored residential access to composting programs. Consumers can have access to composting programs through:



## Municipally-run curbside programs

Municipal-run programs are administered by the resident's city or county, and are generally considered to be easy to participate in, with a lower barrier to entry. This is because the resident typically already accesses other waste services through the municipality, and composting is included in city communications. For example, the city of Austin, Texas includes information about organics recycling alongside its other [resource recovery programs](#).



## Privately-run curbside programs

Composting programs that are run by a private composting company, such as [CompostNow](#), typically pick up material from residents, and may take them to a nearby composter or process the material at their own composting site. These programs are often structured as a monthly subscription service, rather than on a weight or volume-based fee. They are often built through word-of-mouth engagement and are used by motivated residents. In some programs, residents may receive finished compost.



## Drop-off programs

These programs can be municipally-run or privately-run, and often offer multiple locations where residents can bring their food scraps and other accepted compostable items for composting. Drop-off locations are typically free to use but in some cases may include a fee.

*Backyard composting is not considered in this analysis.*

## Composting Programs in the United States

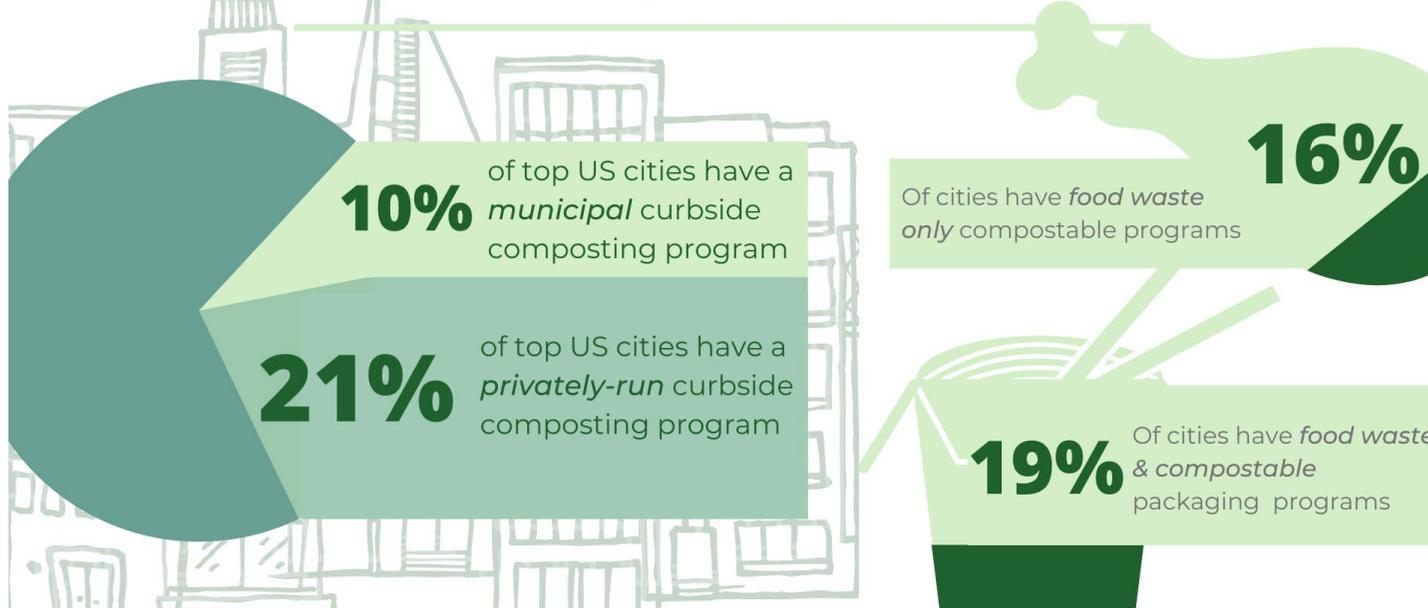
To get a better understanding of residential access to composting programs in the urban United States, GreenBlue conducted an analysis of the 1,000 largest cities in the U.S. These cities represent 40% of the total US population.

These cities were categorized by whether they have residential composting programs, either through curbside collection or drop-off. Composting programs that only accept green waste, and do not accept food waste, were not included in this analysis.

As of October 2020, the following insights can be drawn about urban access to composting in the United States:

# COMPOSTING PROGRAMS IN THE US

## A LOOK AT THE 1,000 LARGEST US CITIES



## COMPOSTING ACCESS ACROSS THE UNITED STATES

**27%**

of the US population has access to a *drop-off or curbside* composting program

**16%**

or more of the US has access to *food waste only* composting programs

or more of the US has access to *food waste & compostable packaging* composting programs

**11%**

**16% of the largest cities have some kind of composting program that accepts food waste (not including packaging)**

157 cities have access to some kind of composting program that accepts food waste, whether that is a municipally-run or privately-run curbside collection program, or a municipally or privately-run drop-off program. These cities represent 16% of the total US population.

**19% of the largest cities have some kind of composting program that accepts some form of compostable packaging**

193 cities have access to some kind of composting program that accepts some form of compostable packaging in addition to food waste, whether that is a municipally-run or privately-run curbside collection program, or a municipally or privately-run drop-off program. These cities represent 11% of the total US population.

## Many densely populated counties in the US have insufficient composting infrastructure

Even though composting may be more widespread than many believe, it's still largely insufficient. When we look at dense counties and their access to composting facilities, it's clear that many of the US's most populous areas (cities with populations of more than 36,000 people) do not currently have sufficient access to composting food waste or packaging. For example, Southern California's high population areas like Los Angeles and San Diego have a handful of facilities in their respective counties, but these likely lack the scale and capacity needed to accept the large volumes generated. New York City has delayed the roll-out of its municipal composting programs, and the densely-populated surrounding Tri-State area also lacks sufficient composting capacity.

**While this research examined the largest urban areas in the United States, rural and suburban areas may also have access to curbside composting programs, particularly if state or municipal governments require food waste to be diverted from landfills - see [Legislation that Supports Infrastructure](#).**

For a full outline of the data, refer to the [Appendix](#). Information on access to curbside composting programs is continually in flux, since it depends on the operations of local composting facilities and the details of municipal programs. Additional research on access to residential composting programs has been conducted by [BioCycle](#).



## Composting Programs in Canada

What kind of residential access to composting exists in Canada? While GreenBlue did not conduct a separate analysis of urban access to composting programs in Canada, we can gain insight from existing data. According to data from 2011, 63% of Canadian households that had composted their green waste and 60% that composted their kitchen waste used a curbside collection system, while the rest used a compost bin or pile or some other method to compost ([StatCan](#)). In British Columbia, 64% of the population lives in regions with organic waste bans and organic diversion programs in place ([BC](#)). Montreal plans to provide composting services to citizens across the province, as well as to all industries, businesses and institutions, by 2025 ([Montreal](#)). **On the whole, Canada has more widely-established food waste composting programs than the United States.** In the table below, we can see a sampling of the some of the largest cities and the curbside programs that accept, at a minimum, food waste:

City	Municipal Waste Program	Population
Toronto, ON	<a href="#">Green Bin Program</a>	2,930,00 (2017)
Montreal, QB	<a href="#">Food Waste Program</a>	1,780,00 (2017)
Calgary, AB	<a href="#">Green cart food and yard waste</a>	1,336,00 (2017)
Ottawa, ON	<a href="#">Green Bin Program</a>	994,837 (2017)
Edmonton, AB	Pending Rollout - <a href="#">Organics Program</a>	981,280 (2017)
Vancouver, BC	<a href="#">Food Scraps Recycling Program</a>	675,218 (2017)
Hamilton, ON	<a href="#">Green Cart Program</a>	549,200 (2017)
Surrey, BC	<a href="#">Organics Cart</a>	518,467 (2017)
Halifax, NA	<a href="#">Green Cart Program</a>	431,479 (2017)
Saskatoon, SK	<a href="#">Green Cart Program</a>	273,010 (2017)
Regina, SK	<a href="#">Food and Yard Waste Pilot</a>	228,928 (2017)
Charlottetown, PE	<a href="#">Compost Cart</a>	36,094 (2016)

# Legislation that Supports Infrastructure

In the study of the top 1,000 cities in the US by population, we also looked at how many of these cities are in states with ordinances requiring businesses, and in some cases residents, to compost their food waste. This gives us insight into how many cities will begin to offer food waste composting in the near future in order to comply with these ordinances.

States with ordinances include California, New Jersey, New York, Massachusetts, Connecticut, Vermont, and Rhode Island. **Of the largest 1,000 cities in the US, 309 cities are in states with food waste ordinances. These cities represent 13% of the total US population.** This is important for future developments to composting infrastructure, since cities in these states are likely to face limited composting infrastructure and will need to have conversations about how to increase their capacity and access to programs if they are to be in compliance with their state's mandates. Enforcement, which is often lacking, will be necessary to make sure these ordinances are effective.

In addition to these states, a handful of cities and counties have also passed food waste legislation, which requires generators to compost food waste and other organic materials when feasible. This

legislation is mostly limited to Northeastern or coastal cities, with the exception of Minneapolis, Austin, and Boulder. However, food waste legislation doesn't have to be a coastal phenomenon. **Additional cities and states across the country may be well-suited for this type of legislation because of their access to composting infrastructure.** For example, Chicago is in close proximity to a number of composting facilities that accept food waste and, in some cases, packaging.

## Legislation Banning Food Waste from Landfills

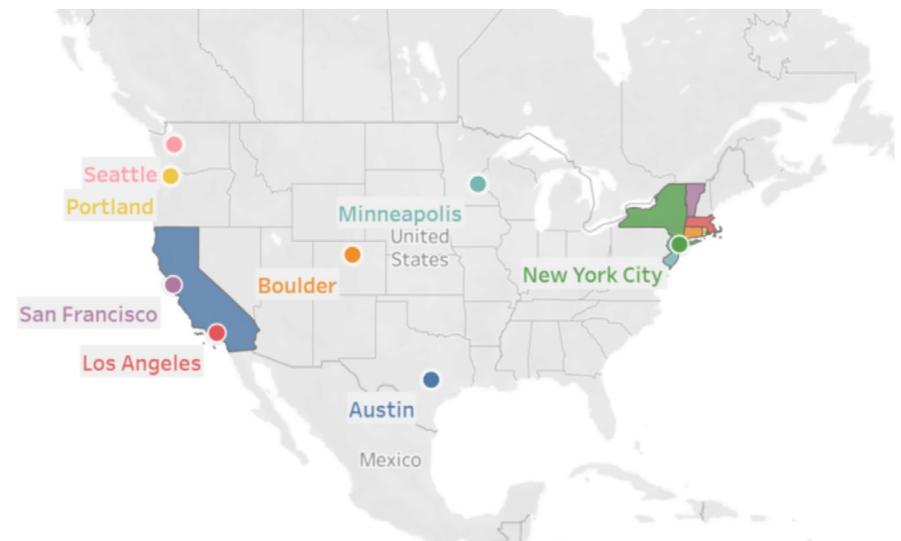


Figure 6: GreenBlue, 2020. Mapping Composting Infrastructure and Supporting Legislation

# Key Takeaways for Composting Collection

A look at the data above reveals the nuances of composting infrastructure and collection programs in the United States and Canada. **We can see that not only does composting exist in greater numbers than expected, but a notable amount of facilities and programs accept food waste and compostable packaging.**

In short, there are several key takeaways from the data:

- **15% of US composting facilities accept some kind of compostable packaging**
- **A third of the largest US cities have curbside composting programs that accept food waste, and around 20% also accept compostable packaging**
- **The majority of Canada's large cities offer food waste curbside collection programs**
- **Food waste legislation is an important lever for driving new composting infrastructure and collection programs**

How likely is it that a compostable package will be collected for composting? Understanding residential access to composting programs is an important first step in beginning to answer this question, but the full story is yet to be written. The answer will depend on how many of these programs are opt-in versus opt-out, have high participation rates, and are accessible to both single-family and multi-family households.

# Composters: Understanding Technologies & End Markets



Composters are an essential part of the compostable packaging ecosystem - without them, compostable packaging will not get composted. It's critical to understand how composters manage their technologies, operations, and end-markets.

# Types of Composting Technologies

The most common types of commercial composting technologies are:



**Windrow composting**, in which organic waste is formed into rows of long piles and periodically turned, either manually or mechanically.



**Aerated static pile (ASP) composting**, in which organic waste is mixed in a large pile and designed so that air can pass from the bottom to the top of the pile. Piles are often aerated with a network of pipes, or with air blowers that are activated by a timer or sensor.



**In-vessel composting**, in which organic waste is fed into a drum, silo, concrete-lined trench, or similar equipment ([EPA](#)).

These technologies may be supplemented with covers that build heat and retain moisture. Composters' preference towards one of these systems may depend on a number of factors, including climate, feedstocks processed, permits, and the age of their facility.

Facilities may also choose to limit the types of material they accept. As previously mentioned, some facilities only accept green waste (also known as yard waste). Small-scale composting operations may choose not to accept dairy or meat because of challenges with odor or vermin. Commercial composting facilities are typically able to handle a variety of biomass, including all types of food scraps, yard waste and plant trimmings, fiber-based materials such as paper towels, hair and fur, and cardboard.

# End Markets for Finished Compost

Composting facilities are ultimately product manufacturers making finished compost that is applied to range land, agricultural land, landscaping, green roof installation, new construction, and road sides. There are many uses for compost, and the buyers for finished compost are varied. They include farming operations, state agencies, construction firms, landscapers, and consumers. As one example, LEED has recognized compost's benefits and has created specifications for its application on LEED-certified buildings. The end markets for finished compost vary greatly by state and geographic region.

For most of these applications, finished compost must be nearly entirely free of visual impurities, another reason why managing contamination is critical. For example, in Washington state, the Department of Transportation specifies that the compost it purchases must have less than 0.5 percent "manufactured inert material (plastic, concrete, ceramics, metal, etc.)". In other states or for other applications, the tolerance for visual impurities may be higher, and customers tend to set the standard for what kind of finished product composters can sell.

The end-markets for finished compost vary greatly. In some regions, finished compost is used in municipal projects such as road-side application, while in other regions,

finished compost goes into the agriculture industry. In regions without these end-markets, it may be harder to find buyers for finished compost. **If the finished product has substantial visible impurities, it may be more difficult to sell, or may need to be sold at a lower price.** All of these factors depend on the region where the compost is being manufactured and sold.

There are a number of certifications available for finished compost. One is the US Composting Council's Seal of Testing Assurance Program, or STA. Compost manufacturers participating in the STA Certified Compost program are held to high standards for using quality labs, testing frequently, disclosing specific information about their product, and following regulations. Finished compost may also be certified organic by the Organic Material Review Institute (OMRI). OMRI certification, based on National Organic Program standards, currently restricts the use of bioplastics and other manufactured inputs as a feedstock in the production of compost, although this is being reevaluated by the industry.



**The success of the composting industry depends on the strength of the end-markets for finished compost.** In the same way that brands need to consider whether recyclers are able to find end markets for recyclable packaging, the compostable packaging industry should consider how packaging fits into composters' profitability and finished product.

Since manufacturers and brands don't typically purchase finished compost directly, the composting system doesn't have the same pull-through as recycled content for packaging. Rather, the system depends on a different industry, such as agricultural or construction, for the pull-through. It is important that brands understand these end market dynamics. Though brands may not drive demand for finished compost directly, they should support broad education and engagement around the benefits of composting.

**Be part of the solution.** Companies can support the composting industry by purchasing finished compost, when possible, and advocating for the application of finished compost as part of agriculture, transportation, and construction projects. They can also join the [USCC Corporate Compost Leadership Council](#) and engage in policy - a number of states have passed legislation that supports end market development for compost.

## Does the technology used at a composting facility impact its ability to process packaging?

Yes, but it's usually not the determining factor. All of the technologies listed above can be used to process compostable packaging. Windrow composting may give more time for materials to break down than ASP composting, while ASP may break down materials more easily due to more tightly-controlled air and moisture. However, these are not hard and fast rules.

Typically, a facility's ability to process compostable packaging will depend on its willingness to work with the material and the amount of time that materials are given to break down in the active composting phase. A facility that operates under shorter time frames, such as 30 days, may find that the packaging has not broken down. Ultimately, how quickly and readily packaging biodegrades into compost depends on variables such as operating procedures, temperature, moisture, and climate.

# Addressing Contamination

**Contamination is an ongoing issue for composting facilities.** It can take many forms, and packaging is just one possible source - household goods such as garden hoses in yard waste, and conventional plastic items are common contaminants. When it comes to packaging, what is considered contamination will vary by facility, but may include:

- Packaging that is not designed to be compostable, such as conventional plastic bags, produce stickers, and glass bottles
- Packaging that is certified compostable but is not accepted by the facility (e.g. because the facility only accepts food waste or food soiled paper)

Higher levels of contamination are closely linked to increased recovery of food waste, as residents and commercial businesses incorrectly sort non-compostable packaging and other items, and include contaminants with their food scraps ([Cascadia Consulting, 2020](#)). This is why facilities may avoid accepting food scraps and choose to only process green waste.

## Does compostable packaging contaminate a composting facility?

Though facilities that do not accept compostable packaging may consider it a contaminant, it is usually not the biggest culprit. Typically, the majority of contamination at composting facilities is from non-compostable materials, particularly non-compostable plastics. In one study of composting infrastructure in Washington State, contamination of incoming material was 3.9% by weight. This contamination included “noncompostable plastic, glass, and noncompostable papers, such as aseptic and polycoated papers.” ([BioCycle 2019](#))

**Many facilities struggle with contamination from “look-alike” food serviceware items that are not compostable, but appear identical to compostable packaging.** In these instances, composters must decide whether to allow the packaging to move through their process, assuming it is compostable, or remove it as a contaminant, assuming it is not compostable. Though look-alike items are most commonly an issue for plastic packaging, it can also be an issue for fiber-based packaging.

Removing and disposing of contamination is an extremely important added cost for composting facilities. At some facilities, contamination-removal is done at the beginning of the composting process using equipment such as Trommel screens. More often, it is done at the end of the composting process, when the finished product is screened and any large pieces of material (“overs”) are removed. At some composting facilities, the “overs” are sent through the composting process a second time, or they may be landfilled.



## Do standards for compostability match composting facility conditions?

One common concern about compostable packaging is that it will not break down in a facility’s operating time frame or conditions, frequently referred to as “real-world” conditions. To better understand this concern, it helps to review how compostability standards are set.

To determine if packaging is compostable, certification programs typically use independently-developed, third-party standards. In North America, ASTM is an international standards organization that develops and publishes voluntary consensus technical standards for a wide range of materials, products, and services. The standards for packaging that is designed to be industrially composted are ASTM D6400 for compostable bioplastic packaging, and ASTM D6868 for fiber packaging with compostable bioplastic coatings or additives. The ASTM standards were first developed in 1999 based on science-based test methods ([learn more here](#)).

Today, there is an increasing desire to have the ASTM standards reverified by data from the field. This work is being done by the [Compost Council Research and Education Foundation](#) and the [Compost Manufacturing Alliance](#), and is supported by the North American certifier, the [Biodegradable Products Institute \(BPI\)](#).

## Contamination from Look-Alike Packaging



Not made of 100% compostable materials

Without prominent labeling, it can be impossible for composters to distinguish between a compostable bioplastic and a conventional plastic, or between a bioplastic-lined container and a polycoated container.



Certified compostable materials

Because composters use machinery to handle loads of compostable material, product labeling should be visible from a distance, using prominent striping or color-coding.

**Be part of the solution.** Brands should certify all compostable packaging to ensure that it fully decomposes and does not leave toxic residue. Field testing by groups like the [Compost Manufacturing Alliance](#) can be used to verify that packaging is breaking down in a variety of timeframes and conditions. Review [BPI's labeling guidelines](#) to ensure that your compostable packaging is properly labeled to help reduce contamination.

Companies can also consider supporting legislation that outlines which kinds of materials should be used for food serviceware and food contact packaging. For example, it may outline that all food serviceware or cutlery must be certified compostable, or may require that only certified compostable bags be tinted green. This kind of legislation helps limit the issue of look-alike packaging by requiring compostability in certain applications, and helps reduce consumer confusion when disposing of packaging - see [The Future of Compostable Packaging](#).

“It is not operational... These products break down. That is not the issue. The clear labeling is for the consumer [to sort properly] because once the products are in the bin, it is hard to distinguish them from conventional plastic packaging. That’s why we tend to prefer fiber-based certified compostable packaging.”

*Tim Dewey-Mattia, Napa Waste & Recycling Services, [BioCycle](#)*

# Consumer Engagement: Communicating Compostability to Consumers

Consumers play an important role in pushing for compostable packaging and being the ones to actually put packaging into the compost bin. While many are motivated to seek out compostable packaging, consumers need better ways to distinguish it from conventional plastic packaging.



# Consumer Perceptions of Compostability

Increasingly, consumers report a preference for packaging to be compostable. **At the same time, there is widespread confusion about compostable packaging - some consumers believe that it helps prevent ocean plastic pollution, breaks down in landfills, is always preferable to recyclable packaging, or is synonymous with biodegradable packaging.** These assumptions are not true, but may nevertheless be driving consumer demand.

Three recent studies help illuminate how compostable packaging is perceived by consumers.

A survey of European consumers found that 32% of consumers believe this type of packaging is the least damaging for the environment, and 50% of consumers would buy a product for its compostable packaging ([Amcor](#)).

In the UK, 85 percent of surveyed consumers believe that food packaging should be compostable, with two thirds of those asked agreeing that the food industry should lead the move towards compostable packaging ([resource.co](#)).

In the US, 60% of surveyed consumers called compostable packaging “extremely or very eco-friendly” ([EcoFocus](#)), and 71% of Millennials feel positive towards companies that only use packaging that is compostable ([Evergreen Packaging](#)).



# Education Through Certifications & Labeling

Despite considering compostable packaging as preferred and eco-friendly, consumers still have a hard time understanding the nuances. In the same survey of European consumers, upwards of 50% of respondents could not identify the corresponding logo and consider biodegradable and compostable as interchangeable ([Amcor](#)). There is also ongoing consumer confusion about which packaging is recyclable and which is compostable, particularly when it comes to transparent compostable bioplastics. This is particularly problematic because consumers are the first line of defense in properly sorting materials and preventing contamination, since it isn't always possible to identify a compostable item once it's mixed in with other materials.



More needs to be done by brands to make it clear which packaging is compostable, what should be done with it, and how “compostable” is different from “biodegradable”. All compostable packaging should be certified compostable by a third-party organization that verifies product attributes and claims. A certification body issues a product the “compostable” logo after reviewing independent lab results that test for compostability.

In North America, the predominant certifier of compostable packaging is the [Biodegradable Products Institute \(BPI\)](#). It is based on the third-party standards ASTM D6400 and ASTM D6868, and certifies packaging for industrial composting environments.

It's important to note that there is no North American certification for home compostability, and no corresponding ASTM standard. There are two European certifications that may be used for products that are sold in both European and North American markets. The [TUV Austria OK Compost](#) certification is based on the EN 13432 standard. There is also the [European Bioplastic “Seedling”](#) mark, which is based on the EN 13432 and EN 14995 standards.



Certification programs like BPI go beyond certifying that a package breaks down in a given timeframe. BPI has strict eligibility criteria that are unique to its program: 1) the item must be associated with desirable organic wastes, like food scraps and yard trimmings, that are collected for composting, 2) the item cannot be a redesign of an item that is a better fit for recycling based on existing demand, infrastructure, and consumer awareness (e.g., water bottles), and 3) the item cannot require disassembly in order to be composted. Products may not have intentionally added per- and polyfluoroalkyl substances (PFAS), and the presence of these chemicals must be limited to 100 PPM.

Once certified, products should prominently bear the certification mark on the product. BPI requires that all certified items and associated packaging must be labeled with the BPI Certification Mark unless a category level exemption is in place. This requirement is in place as a best practice to combat contamination from non-compostable products.



In addition to logos, brands should use prominent labels, stripes, and green or brown coloring to distinguish compostable packaging. These colors have been identified as [industry guidelines](#) and are stipulated in [state labeling legislation](#). Finally, brands should consider including additional information that distinguishes between home and commercially compostable, and that helps consumers identify their local commercial composting facilities.

At the same time, brands should avoid recyclability symbols or language on packaging that is designed to be compostable. Compostable packaging should not be labeled with similar words such as “biodegradable,” “degradable,” “decomposable,” or “oxo-degradable”.

One way to help consumers understand compostability is to use the [How2Compost label](#). How2Compost is a standardized on-package label that clearly communicates composting instructions to the public, and all BPI-certified items are eligible.

A few unique call-outs in the How2Compost label help consumers compost correctly. Here, we see a label that a PLA cold cup might receive with a special call-out at the top that the item is “Not Yet Recyclable”. While PLA is technically recyclable, per Federal Trade Commission guidelines, consumers do not have access to recycling collection for PLA, nor is there an established end market or established sortation nationwide, which means that it cannot be claimed as recycled per Federal Trade Commission guidelines. For the time being, a compostable bioplastic like PLA can only be composted. Appropriate labeling helps minimize consumers unintentionally contaminating the recycling stream with PLA and increases the successful disposal of compostable items, either to a compost bin if available or to a trash bin if no composting bin is accessible.



The How2Compost label is designed to be used in tandem with the How2Recycle label when relevant. This means that for compostable packaging or food serviceware that comes in packs and uses a recyclable paperboard box or PE sleeve, for instance, both the How2Compost and How2Recycle labels can be used to explain how a consumer should recover every piece of the packaging system.

For more on labeling, refer to [BPI's guide](#) for labeling compostable packaging to make it easily identifiable for both consumers and composters.

**Be part of the solution.** Brands play a critical role in educating consumers through consistent and clear messaging. By following the guidelines and resources above, brands ensure that all stakeholders are able to easily identify compostable packaging, and prevent compostable packaging from contaminating the recycling stream.

# Engaging Consumers on Composting

Brands may be hesitant to draw attention to the limited composting infrastructure. Yet this is key to building trust and transparency with customers and other stakeholders, and can also help ensure that compostable packaging gets composted in the municipalities where composting is available. When brands draw attention to the limited infrastructure, they also encourage consumers to learn what is available to them.

For instance, consumers may not be aware of privately-run, rather than municipally-run, composting services in their area, or the option to take material to a drop-off site. **Brands can share resources that help consumers identify composting facilities**, such as [GreenBlue's composting maps](#) and the [FindAComposter site](#).

Even when compostable packaging is not widely accepted at facilities, brands can begin to activate composting behavior in consumers by encouraging them to compost their food waste. As just one example, Novamont, a bioplastics manufacturer, created an [app](#) to teach kids how to recycle food scraps.

Brands and manufacturers can also create educational campaigns to help clarify the distinction between “compostable” and “biodegradable” and the properties of compostability, as in this [Pepsi video](#).

It is important to clearly communicate to consumers that compostable packaging does not outperform other materials in a landfill, and that it does not “compost” in a landfill. Brands can explain that they may be choosing compostable packaging due to lower environmental impacts during sourcing or manufacturing, rather than end-of-life benefits.

**Be part of the solution.** Brands may also want to encourage customers to reach out to their local municipality to express interest in composting programs. They may consider providing template letters for community outreach, or petitions that make it easy to express interest. Consumers that are not able to compost locally, but would like to, are powerful allies in advocating for new composting programs and facilities.

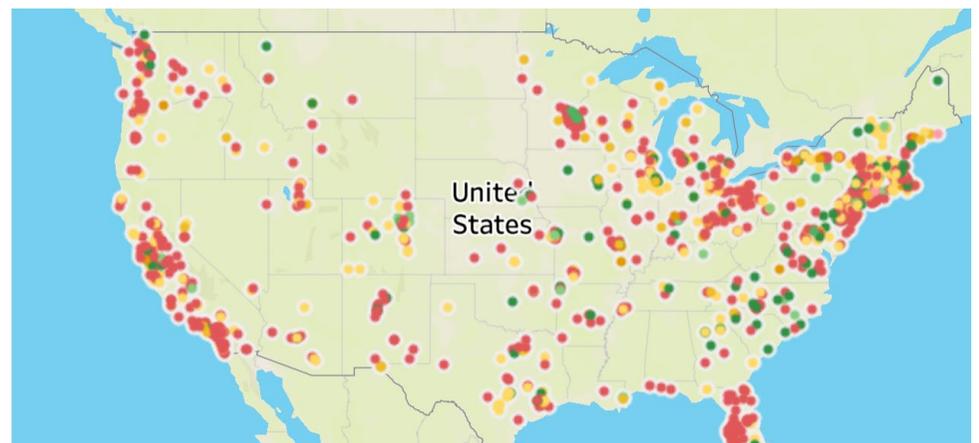


Figure 6. GreenBlue, 2020. Mapping Composting Infrastructure and Supporting Legislation.

# Design: Starting with the Right Applications

The first step to designing compostable packaging is to understand whether it is the right fit for your packaging application. Compostable packaging should not be a blanket solution for all packaging.

Rather, compostable packaging should be used in applications where it helps divert food waste out of landfills and into compost bins, reduce food scrap contamination of recyclable materials, or replace non-recyclable packaging.

This will help brands prevent problems down the road. Issues with certification and composter acceptance are likely if compostable packaging is used to replace packaging that doesn't come into contact with food.



# Best Applications for Compostable Packaging

Here are the categories of packaging that can be effectively designed to be compostable:

## 1 Packaging for prepared food in grocery stores and foodservice

Foodservice packaging for restaurants, cafeterias, venues, and grocery store prepared food bars is the most natural fit for compostable packaging. It includes packaging like takeout containers, salad bowls, taco trays, soup bowls, and the associated napkins, cutlery, sauce cups, and lids. That's because this type of packaging is covered in food residue and leftovers, and goes hand-in-hand with food consumption. While large amounts of food contaminate recycling streams, food scraps are exactly what composters are looking for.

Designing this category of packaging to be compostable helps guide food scraps towards the composting bin, rather than the recycling bin or the landfill. It eliminates the need for consumers to sort food-contact items into different bins, which they are apt to do incorrectly.



## 2 Food-contact packaging that is not readily recyclable

Today, many food items are in packaging that is not readily recyclable. Think of cuts of meat, frozen food, and cheese - these are just three examples of entire categories of products that are mostly in non-recyclable films, lined paper trays, or foam packaging. Usually, they are not readily recyclable in curbside or store drop-off programs because of the design choices made around the material and format, and because the packaging is often covered in food residue.

While today this is a less common application for compostable packaging, it can be a new frontier for forward-thinking brands. As an example, consider ketchup packets. Typically made of plastic film, these wrappers have limited recovery options, except as part of future innovations in advanced/chemical recycling. Meanwhile, there are bioplastics on the market that could replace this film with a compostable option. Any leftover ketchup would be easy for the consumer to compost instead of landfill. This new compostable food-contact packaging would need to be certified for compostability and labeled for consumers. However, if approached correctly, compostability may be the right choice for many types of food-contact, food-soiled packaging that is not recyclable today.



### 3 Fiber packaging that becomes food soiled

Some fiber packaging that becomes food soiled may be better suited towards composting than recycling. Consider fiber-based e-commerce packaging used as dividers or holders in meal kits or grocery delivery. If it becomes heavily food soiled from the products inside, it may no longer be recyclable. This material is often uncoated corrugated cardboard which is readily compostable, but consumers will need to first understand whether they should recycle or compost this packaging. In these situations, companies should consider labeling the packaging in a way that communicates a hierarchy of decisions. For example, the [How2Recycle](#) and [How2Compost](#) labels can help educate consumers to recycle the item if it's clean and dry, or compost it if it's food-soiled.



### 4 Packaging that is a contaminant at composting facilities

Composting facilities that accept food waste already have to manage unwanted contaminants from non-compostable packaging. These items are food-related and “ride along” with the food scraps that consumers and businesses are trying to compost. This can include items like sauce cups, produce stickers, meat trays, plastic wrap around produce, salad bags, rubber bands, and twist ties. Making these items compostable would provide high value to composters because it would help to solve a contamination problem, while helping to bring in food.



For these categories of packaging, compostability is a promising recovery option.

## Checklist for Compostability

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### ○ **Is your packaging used to serve prepared food?**

Compostable packaging makes it easy for consumers to compost any leftovers of prepared food.

### ○ **Does your non-recyclable packaging contain frozen or raw food?**

Compostable packaging can replace meat, produce, and frozen food packaging that is not recyclable. Any food residue from these contents can be composted alongside the packaging.

### ○ **Will your packaging bring in food to the composting facility?**

Food residue may make your package too dirty to be recycled. Instead, significant remnants of uneaten food may be a sign that the packaging is a better fit for compostability.

### ○ **Is your packaging a common contaminant at composting facilities?**

Designing for compostability for packaging items like sauce packets and salad bags helps to address composters' challenges with contamination. These items are already coming into composting facilities along with food, and designing them to be compostable would help composters.

### ○ **Do consumers typically throw away food waste along with your packaging?**

Consumers do not always separate food waste from its packaging, and may be throwing non-compostable packaging into the compost bin. For packaging that is difficult to clean/rinse, such as salad bags, compostable packaging can instead allow consumers to easily compost both the bag and the spoiled contents.

### ○ **Does your fiber packaging get food soiled?**

Fiber packaging that becomes food soiled may not be suitable for recycling. Compostability may be a better choice for food-contact fiber packaging.

# Gray Areas for Compostable Packaging

There is no clear formula for what kinds of packaging should be compostable. Rather, it depends on a variety of variables, many of which have been outlined above. In many applications, such as food serviceware, salad bags, and produce stickers, the case is clear. Compostability in these instances helps to bring more food waste to composters and addresses common contamination challenges.

**Yet a number of gray areas exist where it is unclear whether packaging should be compostable.** For example, there is no established definition for how much food is required for something to be considered “food soiled”. In general, the more food that can be diverted to a composting facility, the more value the packaging brings to a composter, but there is no exact threshold. An item like a candy wrapper may not always be food soiled, and may bring very little food scraps to a composting facility. At the same time, candy wrappers may already be a common contaminant at composting facilities, and making them compostable might help alleviate this problem for composters.

There is also limited data on exactly how much food residue presents a contamination challenge at recycling facilities. Plastic reclaimers have washing procedures in place to remove food residue, but too much food residue may be a sign that the product is better suited for compostable

packaging. **Brands and retailers should think holistically about the entire product-package system,** including secondary packaging, so that compostable packaging does not contaminate the recycling stream, and recyclable packaging does not contaminate the composting stream.

With some food packaging, such as for baked goods or cheese products, there will typically be very little food residue under normal use by consumers. However, it’s worth considering the likelihood that the entire product will spoil during distribution or will not be sold to consumers. If that were to happen, compostable packaging may make it easier for retailers to compost these items.



Another example is compostable cups for hot or cold drinks. Recyclable cup designs are available; however, in a closed loop venue, it may make more sense to serve compostable cups in conjunction with other compostable food serviceware to create a suite of compostable packaging. **Given the closed nature of the venue and the other products being used, it is often more effective to simplify the messaging to consumers by telling them to put everything in one bin.** Using recyclable cups in this instance may contribute to confusion or contamination.

There is little guidance on whether compostability is appropriate for packaging that contains non-food products, such as personal care products. These products may need to be certified separately to ensure they do not pose toxicity or disintegration problems in a compost facility, and no certification is currently addressing this.



Brands and retailers need to think carefully about the entire life cycle of their packaging and its context, asking questions like:

- Is this item used primarily on-the-go, in closed venues such as stadiums, or at home? What is the likelihood that it will be collected for composting in this setting?
- Is this item sold as part of a suite of other materials that are also compostable? Is this item sold as part of a suite of other materials that are predominantly recyclable?
- In the case of secondary packaging, is it going around an item that is compostable, such as tea bags or compostable coffee pods?
- How much food remains in or on the packaging after it is used by consumers? Is the food residue dry, wet, moist, sticky, gooey, or oily?
- How is it currently being disposed of? Is it a common contaminant at recycling facilities? At composting facilities?

Ultimately, brands and retailers should lean into these unknowns and have conversations with municipalities, composters, and customers to better understand how their packaging may or may not fit into the composting stream.

# What Shouldn't Be Compostable?

Today's composting systems are still ramping up, which means many municipal programs and composting facilities are just starting to accept food waste. In many cases, they do not yet accept food-soiled compostable fibers, and are not currently comfortable accepting compostable bioplastics. **While the composting industry learns to manage these feedstocks, it should not be overburdened with packaging, especially packaging that is not related to food.**

A variety of packaging categories should not pursue compostability. These include:

- **Rigid, readily-recyclable plastics**, such as PET water bottles. Most conventionally-designed rigid plastics can be mechanically recycled, and making these products compostable may cause consumer confusion.
- **Personal care and cosmetics packaging**, including sachet formats. Leftover product inside the packaging may not always be safe as a feedstock for compost, and these feedstocks would not typically be well-received by composters.
- **Packaging that's not used for food**. If the packaging is not used for food, it will not achieve the goal of sending more food waste to composters.

In these cases, brands may choose to design packaging using bio-based materials, and these bio-based materials may also be theoretically compostable at their end-of-life. However, rather than marketing the compostability to their customer, brands can instead emphasize the environmental benefits of sourcing bio-based materials, and not encourage consumers to compost these products.



### Best fit



Fruits



Food Court



Vegetables

Packaging with food scraps (e.g. food serviceware)  
Packaging with wet food residue (e.g. salad bags)

### May be a fit



E-commerce



Meat Department



Dairy Products, Eggs



Tea, Coffee/  
Outer Packaging



Breads, Bakery

Food-contact packaging with moist, sticky, gooey, or oily residue  
Food-contact packaging with dry food residue  
Food-contact packaging with no food residue



Bulk



Confectionery



Pet Food



Cannabis & CBD



Seafood, Fish



Dressings, Sauces

### Not a good fit



Cosmetics



Alcoholic Beverages



Furniture &  
Household Goods



Cleaning Products



Clothing

Packaging that is not in contact with food  
Personal care/cosmetics/cleaning products

## A Note About Chemicals of Concern

Regardless of the context, all compostable packaging needs to be free of chemicals of concern. Much attention has been given to per- and polyfluoroalkyl substances (PFAS), which are used to impart grease and water resistance to certain categories of compostable packaging. These chemicals are no longer permitted in BPI-certified compostable packaging as of January 2020. Substitutions to these chemicals need to be carefully considered, and all additives used in compostable packaging need to be screened for potential health concerns. This is why BPI's certification screens for carcinogens, reproductive toxins, and mutagens.

# The Future of Compostable Packaging

The success of compostable packaging requires a renewed focus on recirculating biological nutrients like food scraps, fibers, and plant material. Today, many of these nutrients are landfilled or mixed in with technical nutrients, and are not returned back into the biosphere. This is a lost opportunity to manage our resources in a way that does not produce methane or carbon dioxide, while also building the health of biological systems.

What might compostable packaging look like in the next decade? And more importantly, what will the ecosystem of collection, access, and consumer engagement surrounding compostable packaging be? **Here's a glimpse into what our future can look like if we actively address today's challenges.**

In the future, we'll sustain biological loops. We'll understand the importance of healthy soils for sequestering carbon and feeding growing populations. To restore soils, we'll use compost to increase crop yields and better absorb rainwater. The compost we require will be created with the food waste we're currently landfilling. This food waste will be collected more easily with compostable packaging and kept away from technical nutrients like aluminum and plastic. Municipalities will offer collection programs for a wide variety of biological nutrients, and composting facilities will process this material for local and regional use, including farming, landscaping, and the growth of crops for packaging applications.

### Biological & Technical Cycles of the Circular Economy

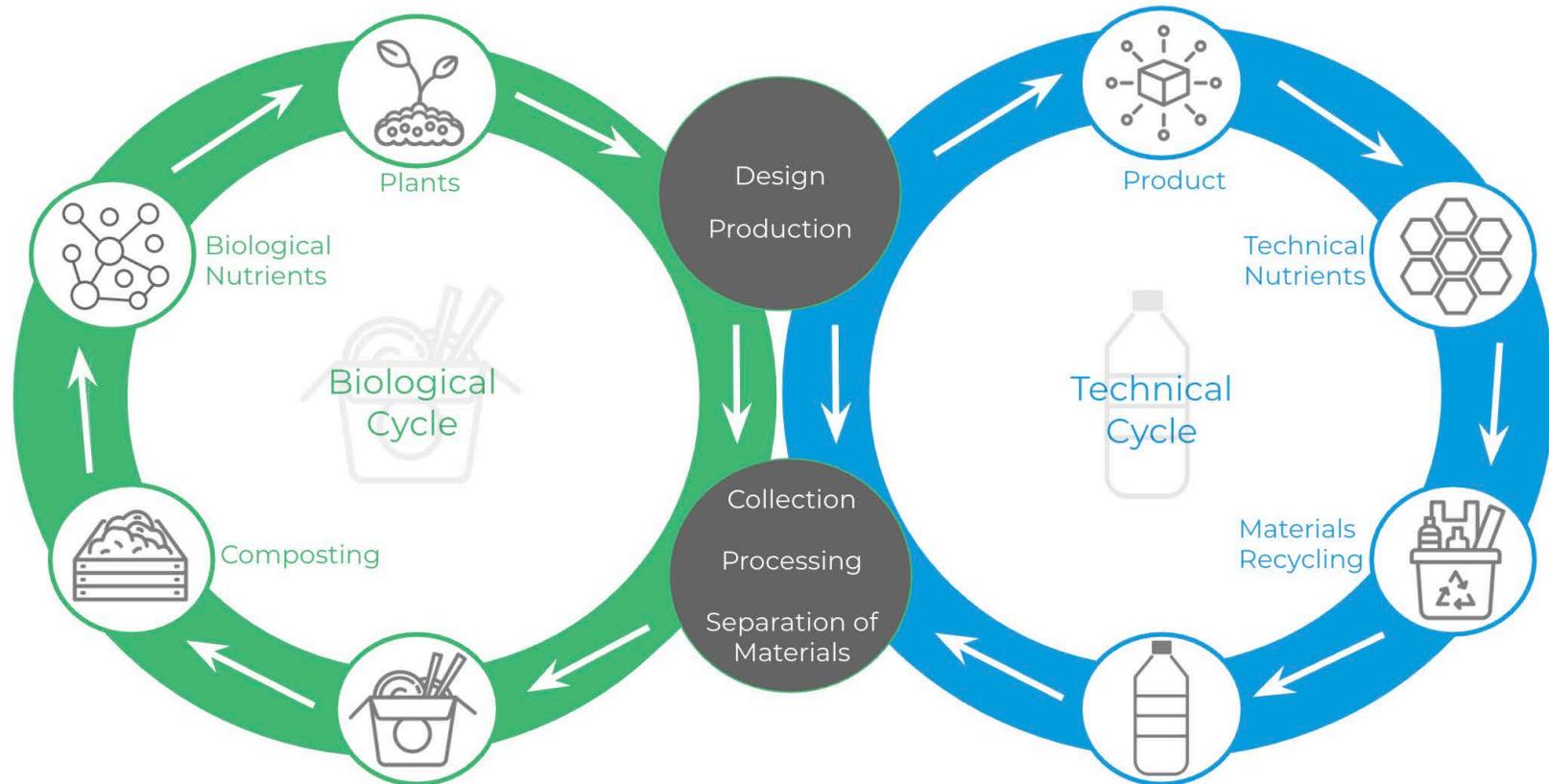


Figure 7. GreenBlue, 2021. Adapted from Remondis, The Cradle to Cradle® Design Concept

We can design compostable packaging to sustain biological loops by:

- **Eliminating all chemicals of concern.** Compostable packaging will need to be free of chemicals of concern that may persist in biological loops. A number of compostable packaging certifiers, including the Biodegradable Products Institute (BPI) and Compost Manufacturing Alliance (CMA), already restrict the levels of fluorinated chemicals (PFAS) allowed in certified compostable packaging. Packaging manufacturers using other certification programs, such as TUV Austria's OK Compost logo, will need to eliminate PFAS and other chemicals of concern.
- **Designing for faster biodegradation.** Today's compostable packaging is designed to break down in accordance with ASTM D6400 and D6868 standards. Some compostable packaging breaks down much more quickly than what the standards require, while other packaging may require the full timeframe stipulated in the standards. While many composting facilities successfully process compostable packaging designed to these timeframes, shorter degradation times would enable more facilities to integrate compostable packaging into their process.
- **Designing smart compostable packaging that can detect and prevent spoilage.** Compostable packaging should be used in applications where there is a high likelihood of spoilage and food waste, such as takeout food, produce, and meat. At the same time, we need to reduce the instances of food waste and spoilage, which in some cases is as high as 40% of all edible food. Compostable packaging can prevent spoilage by integrating sensing technologies, such as those that respond to temperature changes that may affect whether a product is still safe to consume.

**Start  
Now**

**Eliminate chemicals of concern in packaging and explore R&D innovations that advance compostable materials.**

# Future Collection

We can collect compostable packaging in a way that sustains biological loops with:

- **Widespread curbside collection of food waste.** Food waste and food soiled paper is a significant part of the municipal solid waste stream. As municipalities pursue zero waste goals and work to lower their environmental impact, they will need to manage food waste in a new way. For some municipalities, curbside food waste collection can be added on existing green waste programs, while others will need to create both programs at once. Municipalities can also partner with existing private composting companies that service their area, incentivizing residents to participate in these programs.
- **Food waste legislation that makes composting programs more widespread.** Food waste legislation, which requires generators to separate and compost food waste, is a powerful driver of growth in the composting system. Municipalities with a reasonable number of composting facilities can consider passing new food waste legislation. This would give composters in these areas a welcome boost in demand for their services. As facilities become comfortable accepting food waste and managing related contaminants, they may begin accepting fiber compostable packaging or compostable bioplastics.
- **Collection programs that outline when compostable packaging should be used.** Municipalities can play a role in improving the quality and economics of composting by outlining what types of packaging should be used by businesses. For example, municipalities can require all food service and food-contact packaging to be certified compostable. This helps to eliminate look-alike, non-compostable packaging at composting facilities. Standardization among local ordinances will help manufacturers meet the needs of multiple markets, while also reducing confusion among consumers.

Start  
Now

Engage with the Biodegradable Products Institute, Plant Based Products Council and the US Composting Council's Target Organics group to advance local and federal legislation around composting.

# Future Composting

We can compost packaging in a way that sustains biological loops by:

- **Building and retrofitting more composting facilities.** To process the millions of tons of food waste currently being landfilled, we need substantial investments in new and expanded composting infrastructure. This can come in the form of federal and state grants, private investment, investments firms focused on the circular economy, and corporate funding. Facilities can also be funded by compostable packaging manufacturers, converters, and brands who use compostable packaging. For example, in Italy compostable producers pay environmental contributions into the national packaging waste extended producer responsibility (EPR) program that funds composting collection programs.
- **Turning to more advanced composting technologies.** Composting facilities can use pipes, probes, and other technologies to better monitor and regulate air flow, temperature, and moisture levels in composting piles. In some cases, renovating a composting facility from a windrow system to an aerated static pile (ASP) system that uses these technologies enables the facility to process more material more quickly. This will be key to efficiently processing large volumes of municipal food waste. At the same time, it will be important to ensure that compostable packaging is given enough time to break down in these advanced systems.
- **Using separate streams for non-organic feedstocks.** Some compostable packaging is not currently allowed as a feedstock for organic-certified finished compost. Until standards for organic finished compost are amended, composting facilities can develop separate processing flows for organic and non-organic compostable material. This will allow facilities to accept more material than if they only accepted wastes that are suitable for organic-certified finished compost.

**Start  
Now**

**Understand today's composting infrastructure and explore funding mechanisms for financing composting facilities.**

# Future Consumer Education

We can educate consumers about compostable packaging to sustain biological loops with:

- **Clear, prominent labeling on compostable packaging.** Brands using compostable packaging should use large, prominent words and symbols to communicate compostability to consumers. Compostable packaging should not be unlabeled, mislabeled with words like “biodegradable”, or use overly subtle markings, such as embossing or printing on the bottom of an item. Brands can use the [How2Compost](#) label to add instructions for how to distinguish between recycling and composting a package.
- **Laws that require distinct labeling for compostable packaging.** Legislation such as Washington State’s [HB 1569](#) outlines how compostable products must be labeled, including certification logos, colors, stripes, and other markings. This kind of legislation may become more widespread as other state and national bills seek to differentiate compostable packaging from non-compostable alternatives.
- **Consumer-facing resources for identifying access to composting programs.** Until composting access is widespread, compostable packaging will continue to bear the disclaimer that commercial composting is only available in certain areas. Brands and manufacturers can help consumers understand if composting is available in their municipality by creating and sharing resources such as look-up tools and [apps](#) that identify composting programs. This will help to ensure that consumers with access to composting programs are aware

**Start  
Now**

**Clearly label compostable packaging with colors, stripes, or the [How2Compost label](#), and incorporate consumer resources for composting into websites and social media channels.**

With a newfound understanding of the right approach to compostable packaging, brands can use compostable packaging to meet their sustainability goals and sustain the biological loops of the circular economy.



An analysis of municipally-run or privately-run composting programs looked at the 1,000 largest cities in the US. These cities represent 40% of the total US population. Programs that only accept green waste, and do not accept food waste, were not included in this analysis.

As of October 2020, the following insights can be drawn about urban access to composting in the United States:

- **16% of the largest cities have some kind of composting program that accepts food waste (not including packaging)**

157 cities have access to some kind of composting program that accepts food waste, whether that is a municipally-run or privately-run curbside collection program, or a municipally or privately-run drop-off program. These cities represent 16% of the total US population.

- **19% of the largest cities have some kind of composting program that accepts some form of compostable packaging in addition to food waste**

193 cities have access to some kind of composting program that accepts some form of compostable packaging in addition to food waste, whether that is a municipally-run or privately-run curbside collection program, or a municipally or privately-run drop-off program. These cities represent 11% of the total US population.

- **11% of the largest cities have curbside composting programs that accept food waste (not including packaging)**

111 cities have either municipally-run or privately-run curbside composting programs that accept food waste. These are typically opt-in programs - residents are not required to participate, except in cities where composting food waste is required by law (see Legislation). These cities represent 12% of the total US population.

- **19% of the largest cities have curbside composting programs that accept some form of compostable packaging in addition to food waste**

19% accept some form of compostable packaging in addition to food waste through either municipally-run or privately-run curbside composting programs. This may or may not include compostable bioplastics. For example, some programs may accept unlined fiber packaging, such as paper plates and containers, but not accept cold cups or utensils made from bioplastics. In other instances, programs may accept uncoated paper items, but not accept lined paper takeout containers or cups. These cities represent 11% of the total US population.

- **12% of the largest cities have private curbside programs that accept some form of compostable packaging in addition to food waste**

124 cities have privately-run curbside composting programs that accept some kind of compostable packaging, in addition to food waste. Not all of these programs accept compostable bioplastics - some only accept fiber packaging, or unlined paper products such as paper plates. These cities represent 8% of the total US population.

- **7% of the largest cities have municipal curbside programs that accept some form of compostable packaging in addition to food waste**

71 cities have municipally-run curbside composting programs that accept food waste and some form of compostable packaging. These cities represent 3% of the US population.

- **1% of the largest cities have municipal drop-off programs that accept some form of compostable packaging in addition to food waste**

13 cities have municipally-run drop-off programs that accept some kind of compostable packaging, in addition to food waste. These cities represent 1% of the US population.

	Accepting food waste (no packaging)		Accepting food waste and compostable packaging	
	#	%	#	%
Cities with <b>any kind of composting access</b> (municipal, private, curbside, and/or drop-off)	157	16% of cities analyzed	193	19% of cities analyzed
Population of cities with <b>any kind of composting access</b> (municipal, private, curbside, and/or drop-off)	52,399,722	16% of US population	35,416,952	11% of US population
Cities with <b>municipal</b> residential compost programs	33	3% of cities analyzed	71	7% of cities analyzed
Population of cities with <b>municipal</b> residential compost programs	4,570,688	1% of US population	10,441,248	3% of US population
Cities with private residential compost program	81	8% of cities analyzed	124	12% of cities analyzed
Population of cities with <b>private</b> residential compost programs	36,406,174	11% of US population	26,118,439	8% of US population
Cities with either municipal or <b>private</b> programs	111	11% of cities analyzed	191	19% of cities analyzed
Population of cities with either <b>municipal</b> or <b>private</b> programs	40,257,956	12% of US population	35,268,870	11% of US population
Cities with municipal <b>drop-off</b> programs	36	4% of cities analyzed	13	1% of cities analyzed
Population of cities with municipal <b>drop-off</b> programs	15,056,848	5% of US population	2,130,108	1% of US population
Cities with private <b>drop-off</b> programs	23	2% of cities analyzed	3	0.3% of cities analyzed
Population of cities with private <b>drop-off</b> programs	13,945,093	4% of US population	2,917,870	1% of US population

# Image Credits

Figure 1: Ellen MacArthur Foundation. New Plastics Economy Vision statement.  
<https://www.ellenmacarthurfoundation.org/our-work/activities/new-plastics-economy>

Figure 2: Pew Charitable Trust / SYTEMIQ, 2020. Breaking the Plastic Wave report, page 10.  
[https://www.pewtrusts.org/-/media/assets/2020/07/breakingtheplasticwave\\_report.pdf](https://www.pewtrusts.org/-/media/assets/2020/07/breakingtheplasticwave_report.pdf)

Figure 3: GreenBlue, 2020. Mapping Composting Infrastructure and Supporting Legislation.  
<https://greenblue.org/work/compostingmaps/>

Figure 4: GreenBlue, 2020. Composting Facilities in Canada.  
<https://public.tableau.com/profile/olga2630#!/vizhome/CompostingFacilitiesinCanada/CanadaDashboard>

Figure 5: GreenBlue, 2021. Mapping Urban Access to Composting Programs.  
<https://greenblue.org/work/compostingaccess/>

Figure 6: GreenBlue, 2020. Mapping Composting Infrastructure and Supporting Legislation.  
<https://greenblue.org/work/compostingmaps/>

Figure 7: GreenBlue, 2021. Adapted from Remondis, The Cradle to Cradle® Design Concept.  
<https://www.remondis-sustainability.com/en/inspiring/cradle-to-cradle/>



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