



Refill, Return, Reimagine

INNOVATIVE SOLUTIONS TO REDUCE
WASTEFUL PACKAGING

U.S. PIRG
Education Fund



FRONTIER GROUP

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Executive summary

THE WORLD HAS A PLASTICS PROBLEM

– and it's getting worse.

Every day, the world produces an astronomical 3.5 million tons of solid waste.¹ That's around 250,000 garbage trucks' worth of waste. Lined up end to end, those trucks would stretch 1,160 miles – roughly the distance between Los Angeles and Seattle.² The United States is a major contributor to that problem, producing 12% of the world's trash, despite accounting for only 4% of the global population.³ Of that trash, an estimated 12% is plastic.⁴

By far the largest single contributor to this plastic waste is packaging.⁵ Roughly 36% of all global plastic production is for packaging, and around half of all plastic produced today is destined specifically for single-use products, including packaging widely used in the restaurant and takeout industry, such as food and beverage containers.⁶

Such is the ubiquity of plastic packaging in our everyday lives that a future without it is hard to imagine. However, a wave of new businesses in the retail and food industries are eliminating single-use plastic packaging entirely, showing us what a future with dramatically less plastic could look like and demonstrating the need for smart public policies to help green business models grow.

Plastics harm wildlife and the environment.

- Plastic accounts for roughly 80% of all the litter in the world's oceans.⁷ The largest single source of that plastic, accounting for 44% of all ocean plastic, is single-use food and drink packaging.⁸

- With millions of tons of plastic waste making their way into our waterways every year, recent estimates suggest that plastic waste in the ocean is responsible for the deaths of more than a million seabirds and 100,000 marine mammals each year.⁹

Plastics are damaging our health.

- Research suggests that every one of us could be ingesting an average of anywhere between tens of thousands and millions of microplastic particles per year.¹⁰ Bottled water and other beverages, food packaged in plastic wraps or containers, and takeout fast food packaged in plastics are thought to be among the main sources of human exposure.¹¹
- Exposure to toxic chemicals and additives in plastic has been found to disrupt the functioning of the endocrine system (the system that regulates the release of hormones into the body) and increase risk for premature births, neurodevelopmental disorders, birth defects, infertility, obesity, cardiovascular disease, kidney disease and certain cancers.¹²
- High levels of exposure to plastics and the chemicals involved in their production have similarly been linked to a range of health impacts among plastics production workers, including increased risk of leukemia, lymphoma, various types of cancer, neurotoxic injury and decreased fertility.¹³

- Recycling workers handling plastics have been found to have increased rates of cardiovascular disease, toxic metal poisoning, neuropathy and lung cancer.¹⁴

Plastics contribute to climate change.

- Figures from the Organization for Economic Co-operation and Development (OECD) suggest that greenhouse gas emissions from plastics in 2019 totaled around 1.8 billion metric tons – 3.4% of all global emissions – 90% of which came from the processes involved in their production.¹⁵

A small but growing number of companies around the world are working to address this crisis through new models of retail and food service designed to help stem the tsunami of plastic waste by eliminating the need for single-use plastic packaging. These new models include:

- **Refill stores:** Generally stocking foods and/or household and personal care products, refill stores – sometimes known as “refilleries” – allow customers to fill their own containers with as much or as little of a product as they need and pay for it by weight, eliminating the need for plastic packaging and the waste it creates. Online directories indicate there are currently at least 600 refill stores and mobile delivery services across all but three U.S. states, although with new stores opening every year, this figure is likely conservative.¹⁶
- **Returnable packaging:** Containers designed to be sent back to the retailer or manufacturer after use to be cleaned, refilled and used again have been employed by bars (beer kegs), business-to-business transport (pallets, crates) and other sectors for years. Now a new generation of businesses, in particular in the restaurant and takeout industry,

are adapting this idea as a means of replacing single-use containers. Examples include DeliverZero, which supplies returnable takeout packaging to 150-plus restaurants in the New York City area, and the “OZZI” machines, dispensing returnable food containers, that have become an increasingly common sight in college and university cafeterias and other dining service areas over recent years.¹⁷

- **Products without plastic:** While many companies are developing ways of cutting down on their plastics use by cutting down on packaging, others are asking: Instead of rethinking the packaging, why not rethink the product itself? Though they’re still a relative rarity in mainstream stores, solid versions of traditionally liquid products – particularly cosmetics and toiletries, such as shampoo bars – are becoming increasingly easy to find, with hundreds of options produced by a growing range of companies, from individuals and startups selling (often homemade) products via e-commerce platforms through to major brands like Lush cosmetics, which now has almost a thousand stores across the world.¹⁸

Taking these business models to scale requires smart policy aimed at creating an environment in which plastic-free businesses are able to compete effectively with traditional forms of retail and food service. This means measures to hold all companies accountable for the waste they produce, coupled with incentives and support to help sustainable businesses overcome the barriers that currently put them at a disadvantage compared with less environmentally responsible businesses.

Specifically, governments should:

- **Enact bans on single-use plastics:** Federal, state and local governments should enact laws that will directly limit plastics use, including banning disposable plastic packaging and utensils and requiring that only durables be used in dine-in restaurants.
- **Create producer responsibility programs:** Companies must be required to take responsibility for the waste they create. Producer responsibility laws create a system of accountability for producers, disincentivize companies from producing plastic packaging in the first place and incentivize a switch to reusable packaging.

In addition, **policymakers must also enact specific measures to facilitate low- and zero- plastic modes of retail, including bulk stores, refilleries and returnable packaging services.** Specifically, governments at all levels should:

- **Provide financial support in the form of grants, rebates and tax incentives to businesses seeking to develop and implement low- or zero-plastic**

business models, taking into account the different needs of retail startups and the restaurant industry. Each of these two sectors faces its own unique set of challenges, but businesses in both categories often require substantial initial investment, even as they reduce environmental costs and lessen the financial burden on cities and states for waste disposal. States and the federal government should provide grants to help cover initial costs and overheads to enable these businesses to compete effectively with companies engaged in unsustainable practices.

- **Amend health regulations regarding bulk foods and bulk retail stores.** Governments should modify restrictions that may make retailers wary of implementing in-store open containers and dispensers and develop clearly defined universal standards on sanitation, cross contamination, and monitoring tailored specifically for bulk sections and refilleries, and for enabling restaurants to provide reusable containers and/or allow customers to bring their own containers (coffee mugs, takeout containers and so on).

Introduction

OVER THE LAST FOUR DECADES, plastics use in the United States has tripled, exceeding 84 million metric tons in 2019, and this trend is projected to continue over the coming years.¹⁹ As plastic packaging is often designed to be used once and then discarded, it ends up polluting our environment, either buried in landfills, burnt in incinerators, or littering our parks, rivers or ocean waters, where it wreaks damage on both humans and wildlife.

Addressing the growing crisis of plastic waste will require much more than focusing on how to deal with waste plastic at the end of its life. The only sustainable solution to plastic waste is to stop the tide of single-use plastic at its source.

Given the ubiquity of single-use plastic in our everyday lives, a future without it might seem a long way off. But examples of what that future might look like are already here. Recent decades have seen the emergence of companies all over the world attempting to tackle the root causes of plastic waste by creating business models that minimize the use of single-use plastic packaging or eliminate it altogether.

In this paper we look at companies working to prove that the retail and food service industries can thrive without the intensive use of single-use disposable packaging: refill stores where customers bring their own containers, startups attempting to renormalize the once-common concept

of returnable containers, and innovative attempts to rethink products themselves to avoid the need for plastic packaging entirely.

Current policies both at the state and federal levels are insufficient to control the use of plastic packaging and curb the damage it causes at the end of its useful life. Moreover, the current business environment in which the innovators discussed in this paper are operating is one that still incentivizes the overuse of plastics and makes it hard for emerging companies to compete with waste-intensive businesses. Effective policy changes disincentivizing the use of plastic packaging while rewarding and supporting more sustainable practices can help level that playing field and enable innovative forms of plastic-free retail to thrive.

Growing public concern about the global plastic waste crisis has led to a variety of responses from manufacturers and retailers. Many major brands, for example, have begun to make small, incremental changes to reduce the plastic content of their existing packaging. Others have switched from single-use plastic to alternative materials, such as metal or glass (in effect, from one single-use product to another). While these are positive steps, it is new types of businesses such as those discussed in this paper that provide the most optimistic vision of what a world without plastic waste, and the immense damage it causes, could look like.

Plastic pollution is a major problem in the United States and around the world

EVERY DAY, THE WORLD produces an astronomical 3.5 million tons of solid waste.²⁰ That's around 250,000 fully loaded garbage trucks' worth of waste. Lined up end to end, those trucks would stretch 1,160 miles – roughly the distance from Los Angeles to Seattle.²¹ The United States is a major contributor to that problem, producing 12% of the world's trash, despite accounting for only 4% of the global population.²² Of that trash, an estimated 12% is plastic.²³

By far the largest single consumer of plastics, and the largest single contributor to the ever-growing mountains of plastic waste being pumped into the environment, is the packaging industry.²⁴ Roughly 36% of all of the plastic being produced today is used in packaging, including single-use products widely used in the restaurant and takeout industry, such as utensils and food and beverage containers designed to be used once and then thrown out.²⁵ Thanks largely to the rise of takeout, food delivery, ready-made meals and on-the-go snacks, food packaging is a growing sector of the global plastic packaging market.²⁶

Research published in 2022 found that only 5% to 6% of all plastic waste in the U.S. ends up being recycled.²⁷ Around 10% of our plastic waste is incinerated – emitting greenhouse gases and toxic chemicals into the atmosphere – and the remaining 85% is sent to landfills or otherwise ends up in the environment.²⁸

Despite a growing awareness of the scale of the problem, current trends indicate that the situation is getting worse. Over the last two decades, worldwide plastic production has doubled, and it is continuing to increase steadily.²⁹ The United Nations Environment Program (UNEP) estimates that 460 million tons of plastic are being produced globally every year and predicts that, should current trends be allowed to continue, by 2060 this figure will have tripled.³⁰

Plastic waste is damaging our health and the environment

With so many everyday items now sold in plastic wrapping, packaging or containers, plastic today is almost impossible to avoid. Plastic packaging is convenient, durable and cheap to produce, and with few legal mechanisms in place to discourage its use, companies continue to produce it in vast quantities instead of switching to sustainable alternatives – or simply eliminating unnecessary packaging. This ubiquity of plastic has dire consequences for our health and the health of our environment.

Plastics harm wildlife and the environment

A report published in 2022 by the Organization for Economic Co-operation and Development (OECD) estimated that there are currently around 30 million

metric tons of plastic waste in the world's oceans, and a further 109 million metric tons in our rivers.³¹ In 2019 alone, according to the report, 6.1 million metric tons of plastic waste found its way into rivers, lakes and oceans; 1.7 million metric tons of that waste ended up in the ocean.³²

Research suggests that plastic accounts for approximately 80% of all ocean litter.³³ And the largest single source of that plastic is takeout food and drink packaging. Single-use food and drink packaging alone – food wrappers, plastic bags, bottles, plastic caps and lids, food containers and cutlery – accounts for more than 40% of all the plastic in the ocean.³⁴

These plastics do immense harm to marine life.³⁵ UNESCO estimates that plastic is responsible for the death of more than a million seabirds and 100,000 marine mammals every year.³⁶ Plastic residues have been found in an array of marine species, including sea turtles, seals, whales, birds, fish and shellfish.³⁷ Research suggests that half of all the world's sea turtles and 60% of all seabird species have ingested plastic.³⁸ As well as causing death by suffocation, starvation and drowning, plastic can also promote the growth of pathogens in the ocean with devastating results for marine life. One recent study, for example, found that corals impacted by plastic waste have an 89% chance of becoming diseased, compared with a 4% chance for corals that are not.³⁹

Plastics damage human health

Plastics are harmful to human health at every stage of their life cycle, from production right through to disposal.

A recent study found that workers involved in the production and recycling of plastics are at increased risk of leukemia, lymphoma, brain cancer and decreased fertility, and workers at plastics recycling



Plastic accounts for 80% of all ocean litter. And the largest single source of that plastic is takeout food and drink packaging.

facilities are more likely to suffer from cardiovascular disease, toxic metal poisoning and neuropathy.⁴⁰ People living near plastic production and waste disposal facilities, too, are at heightened risk.⁴¹ A stretch along the Mississippi River between New Orleans and Baton Rouge, La., for example, has been nicknamed “Cancer Alley” due to its high concentration of petrochemical facilities that refine fossil fuels into the raw materials for plastics.⁴² Many of these facilities are located in low-income and minority communities, where residents suffer from high rates of cancer and respiratory diseases.⁴³ Ascension, a parish in Cancer Alley, has a cancer case rate six times higher than an average community of its size.⁴⁴

Each year, every one of us is thought to ingest an average of anywhere between tens of thousands to millions of microplastic particles – plastic particles smaller than 5 mm in diameter – or several milligrams each day.⁴⁵ Microplastics have been found in human lungs, blood and breast milk, and in the placentas of pregnant women.⁴⁶

Research suggests that water and other drinks in plastic containers are likely the second largest source of human exposure, after inhalation (i.e., microplastic particles in dust), and that food packaged in plastic wraps or containers, and takeout fast food packaged in plastics, is also likely a major source of human exposure.⁴⁷

During their use and disposal, plastics release additives and other toxic chemicals that can have a range of serious health impacts. Plastics exposure has been linked, for example, to disruption of endocrine function, increased risk for premature births and stillbirth, neurodevelopmental disorders, birth defects, infertility, obesity, cardiovascular disease, kidney disease and various types of cancer, including childhood cancers.⁴⁸

Ingestion of microplastics can contribute to a range of serious health impacts.⁴⁹ Animal studies have shown that exposure to microplastics can disrupt gut microbiome, lead to lower sperm quality and testosterone levels, and impair learning and memory.⁵⁰ Chemicals used in plastics have been linked to problems with early childhood development, insulin resistance, obesity, and damage to metabolism and reproductive health.⁵¹

Plastics contribute to global warming

Plastics emit greenhouse gases throughout their life cycle, from the extraction and refining of the fossil fuels used in their production, to their end-of-life disposal.⁵² Plastic production is an emission-intensive process, producing large amounts of greenhouse gases in the processes of turning oil alkanes into olefins, a base for most plastics, and then plastic resins.⁵³ Figures from the Organization for Economic Co-operation and Development (OECD) suggest that greenhouse gas emissions from plastics in 2019 totaled around 1.8 billion metric tons – 3.4% of all global emissions – 90% of which came from the processes involved in their production.⁵⁴

Production and demand for plastic are steadily increasing and are expected to continue to do so over the coming decades.⁵⁵ Between 2019 and 2021 alone, global production of single-use plastics specifically rose by 6 million metric tons.⁵⁶ And as the world transitions away from fossil fuels for power, industry and transportation, plastics production is a potential avenue for oil and gas corporations to sustain their growth.⁵⁷ If current trends continue, the OECD predicts, by 2060 greenhouse gas emissions from plastics will have more than doubled.⁵⁸

Products without plastic

GIVEN THE UBIQUITY OF PLASTIC

packaging, a future without it seems hard to imagine. Getting to that future will require a sea change in how our economy operates – but it is possible. Indeed, not only is it possible, but there are businesses springing up all over the world that show us what that future could look like should the right policies be put in place.

Three emerging business models are especially promising options for reducing the use of plastics in retail and food service: refill stores (also known as “refilleries”), businesses using returnable packaging, and the redesign of common products to avoid the need for packaging altogether.

The rise of the refill store

Refill stores – sometimes known as “refilleries” – are a variant of the bulk store concept of “weigh-and-pay” shopping, whereby customers can pick up what they need without store-provided packaging. Generally stocking foods and/or household and personal care products (laundry detergent, shampoo, skincare products, toothpaste, etc.), refill stores allow customers to fill their own containers with as much or as little of a product as they need and pay for it by weight or volume. These stores also often return their own empty bulk containers to be refilled by the product manufacturers, thus creating a “closed-loop packaging system.”⁵⁹

Variants of the refillery concept existed well before plastic packaging came to dominate the retail sector – but what’s interesting about its current revival is the pace at which these kinds of stores have been emerging across the world as more people look for ways to reduce their plastics use.

In Long Beach, Calif., as just one example, a Google search for “refillery near me” brings up a range of these kinds of stores in the local area. A “refillery and low waste goods boutique,” BYO Long Beach (BYO = “bring your own”) has three stores across the city selling a wide selection of products,

Photo: Benjamin Brunner, via [Unsplash](#)



Refill stores – or “refilleries” – have established themselves as a leading form of package-free retail in North America, Europe and elsewhere over recent decades.



A variation of the bulk store concept of “weigh-and-pay” shopping, refill stores allow customers to stock up on dried foods and household and personal care products without the need for single-use packaging.

including cleaning products, personal care products, teas, herbs, spices and other household basics. Just up the road in Los Angeles, Sustain L.A. in Highland Park – one of a range of similar stores across the city – sells an extensive selection of refill items, including soaps, shampoos and conditioners, household products and more. Up in Ventura, The Refill Shoppe sells a similarly wide range of refillable cleaning and body care products (cleansers, scrubs, moisturizers, shaving products, bath oil, shampoos and conditioners, hair serum,

moisturizers, toothpaste, shower gels, laundry soaps and more). Sonora Refillery in Oceanside sells body, bath and home product refills, as does My Zero Waste Store in Pasadena and Eco-Now – “Orange County’s first zero waste shop and refill station” – which has stores in Costa Mesa, Anaheim and Laguna Beach.

Southern California may not be representative of the United States as a whole, but a growing number of similar takes on the refill store concept can now be found all across North America, Europe and elsewhere. Zero-waste resource hub Litterless provides a state-by-state, city-by-city list of these kinds of stores in the U.S., now numbering in the hundreds across the country. The Refillery Collective lists around 600 refill stores and mobile delivery services across all but three U.S. states.⁶⁰ Let’s Go Zero Waste has a directory of stores across the U.S. and Canada (as of February 2024, the category “Refillery” lists 707 such stores⁶¹).

Refilling at home

Many of these refill businesses operate delivery services that bring the refillery to customers’ homes (and some operate exclusively as such), or as mobile refilleries that set up shop on a “pop-up” basis at local markets and other places. As of January 2024, the Let’s Go Zero Waste directory lists 152 such services across the U.S. and Canada, including companies like Rolling Refills in Louisiana, which sells refillable kitchen, bathroom, laundry and other products at local markets and delivers to customers’ homes across New Orleans; Refillery Market, delivering a wide range of refillable personal care and household cleaning products in the Toronto area; and many other similar businesses.⁶²



A shampoo and conditioner refill station. Customers refill their own containers with as much of a product as they want and pay by volume.

Franchising a foodie paradise?

Another example of the “weigh and pay” concept is found in Connecticut-based company BD Provisions, which has stores in Newtown and New Milford, Conn., and Severna Park, Md. The idea behind this business was, its founders say, to “take the concept of bulk food but elevate it to more of a foodie paradise, at affordable prices and with eco-friendly packaging.”⁶³ The result was to merge a “gourmet, specialty market with an environmentally friendly zero waste shop,” offering “a carefully curated collection of bulk foods sold by the pound in sustainable containers.”⁶⁴

One key difference between BD Provisions and most other zero-waste stores is that, in addition to its current locations, its founders have also developed a franchising system whereby they provide training and support for franchisees seeking to set up similar shops. This support takes the form of help with real estate and site selection, store build-out/construction, training systems, operational support, recipe development, marketing and brand building, vendor and equipment selection, point-of-sale systems, pre-opening/grand opening support and business consulting. Arrangements like this could play an important part in helping the zero-waste store concept achieve the scale necessary to make a significant dent in the plastics crisis.

For more information

Litterless

<https://www.litterless.com/wheretoshop>

Directory of refill stores in the United States.

Let's Go Zero Waste

<https://letsgozerowaste.com/>

Directory of refill stores across the United States and Canada.

BD Provisions (Connecticut and Maryland)

<https://www.bdprovisions.com/>

Bulk food products, including coffee beans, baking supplies and mixes, vinegars, oils and others.

BYO Long Beach (Long Beach, Calif.)

<https://byolongbeach.com/>

Cleaning products, personal care products, teas, herbs, spices and other household basics.

Eco-Now (Costa Mesa, Anaheim and Laguna Beach, Calif.)

<https://www.econowca.com/>

"Orange County's first zero waste shop and refill station" – cleaning, kitchen and personal care products.

My Zero Waste Store (Pasadena, Calif.)

<https://www.myzerowastestore.com/>

Laundry liquids, cleaning and personal care products, kitchen staples, containers and more.

Refillery Market (Toronto)

<https://refillerymarket.ca/>

Sells a range of refillable products, including package-free soaps, detergents and personal care products, and operates a refillery delivery service across the Toronto area.

Rolling Refills (New Orleans)

<https://rollingrefillsnola.com/>

Sells refillable kitchen, bathroom, laundry and other products at markets and operates a home delivery service, delivering package-free dry food, toiletries and cleaning products across the New Orleans area.

Sonora Refillery (Oceanside, Calif.)

<https://www.diyrefill.com/>

Wide selection of personal care products, kitchen products and more.

Sustain L.A. (Highland Park, Los Angeles)

<https://sustainla.com/refill-station>

Extensive selection of refill items, including soaps, shampoos and conditioners and household products.

The Refill Shoppe (Ventura, Calif.)

<https://www.therefillshoppe.com/>

Refillable cleaning and body care products.



DeliverZero is one of a growing number of companies developing returnable packaging solutions for the restaurant and takeout industry.

The return of returnable packaging

In the pursuit of alternatives to single-use plastic packaging, there is no more important place to start than the restaurant and takeout industry – an industry whose reliance on single-use plastics has made it responsible for more than 40% of all the plastic waste in the world’s oceans.⁶⁵ One such alternative, which a growing number of startups across the world are exploring, is returnable packaging: containers designed to be sent back to the retailer or manufacturer once they have been used, to be cleaned, refilled and used again.

Returnable packaging is not a new idea. Some of us might remember how milk used to be delivered to our doorsteps in glass bottles that were collected and returned to the dairy to be reused once we were done with their contents. Bars have long done the same thing with beer kegs, and pallets, crates and other forms of reusable/returnable packaging are widely used in

business-to-business transport. In the last decade or so, however, a new generation of companies has sprung up across the world attempting to adapt this idea to a range of other products.

For example, students on some college campuses might recently have noticed a new addition to their cafeterias: a distinctive black-and-green machine, somewhat resembling an ATM. Known as the OZZI system, these machines are the creation of Rhode Island-based company AGreenOzzi LLC, a market leader in a new generation of startups developing reusable container systems as a sustainable alternative to single-use plastics. The system is simple: The customer pays a one-time fee of a few dollars for an “O2GO” container, fills that container with food, and returns the used container at a kiosk at any participating location in exchange for a token that can be exchanged for another clean container in the future.



An OZZI machine at Spangdahlem Air Base, Germany.

OZZI machines have become an increasingly common sight in dining service areas at colleges and universities, businesses, healthcare facilities and military bases over the last 10 years.⁶⁶ During that time, the company claims, it has prevented roughly 35 million plastic containers from ending up in landfills and oceans.⁶⁷

The OZZI system is just one new take on the returnable packaging concept – and there are plenty of others.

CLUBZERØ in the United Kingdom, for example, offers a returnable packaging system for takeaway and delivery. The company partners with restaurants, cafes, offices, universities and online food delivery platforms. Customers sign up for access to a range of restaurants, choose their meals, and receive their deliveries in CLUBZERØ bags with dishes packed in reusable containers. When they're done with their meal, they leave the used containers

out for collection by the company, which washes and redistributes them for reuse. CLUBZERØ is active across Europe and North America, partnering with brands like Just Eat Takeaway, Starbucks, McDonald's and others, and by its own analysis has so far saved 68 metric tons of carbon dioxide and more than 2.2 million single-use plastic items.

A similar system has been developed by German company RECUP/REBOWL, which has adapted the tried and tested deposit system to its own returnable packaging model. The company supplies refillable cups and bowls to cafes, restaurants and canteens within its network; customers can buy the reusable crockery from these establishments and pay a deposit, refundable when the items are returned to any retailer in RECUP's network. Customers can also use the cups and bowls in stores outside the network or exchange used ones for clean ones at RECUP partners.

In the Netherlands, Ozarka has developed a similar model, providing reusable containers to restaurants, cafes, bars and food trucks operating delivery services. Participating restaurants receive a supply of reusable food containers, customers order either direct from the restaurant or through Ozarka's website or app for delivery or pickup, and they then drop off their used

containers at any participating restaurant or return them to the driver when they receive their next delivery. In the U.S., DeliverZero has similarly been supplying returnable takeout packaging to a growing network of restaurants (150 as of 2022) in and around New York City. Customers can return the used containers to any participating location, schedule a pickup to collect them

For more information

Bold Reuse (Portland, Ore.)

<https://www.boldreuse.com/>

Provides reusable containers and collection as a subscription service to restaurants and grocery stores, with collection points across Portland.

CLUBZERØ (United Kingdom)

<https://www.clubzero.co/>

Returnable packaging system for takeaway and delivery.

DeliverZero (United States)

<https://www.deliverzero.com/>

Supplies returnable takeout packaging to network of restaurants in and around New York City.

Meu Copo Eco (Brazil)

<https://www.meucopoeco.com.br/site/>

Deposit system for returnable cups and other containers at festivals, conferences, corporate gatherings and other events.

Muuse (Indonesia)

<https://www.muuse.io/>

Partner cafes and delivery services across Singapore, Hong Kong and Toronto where users can borrow containers and return them to a network store to be reused.

Ozarka (Netherlands)

<https://ozarka.biz/?lang=en>

Provides reusable containers to restaurants, cafes, bars and food trucks operating delivery services.

OZZI (United States)

<https://www.planetozzi.com/>

Returnable containers for restaurants and cafeterias.

reCIRCLE (Switzerland)

<https://www.recircle.eu/europa/>

Provides reusable containers to restaurants for takeout food.

RECUP/REBOWL (Germany)

<https://socialventures.bcgdv.com/recup-rebowl>

Adapted the deposit system for returnable packaging.

TURN Systems (Australia)

<https://turnus.in/>

Developed a model whereby consumers buy a drink in a TURN "smart cup" and download an app that gives them access to the reward system of the distributing business.

from their home, or return them to the courier delivering their next order.

Some businesses are taking a more high-tech approach to incentivizing returnable packaging. Australian company TURN Systems has developed a model whereby consumers buy a drink in a TURN “smart cup” and download an app that gives them access to the reward system of the distributing business. When they return their empty cup to a “smart collection bin,” they scan it and get points toward rewards like discounts, prizes, etc.

Other companies offering alternatives to single-use food containers include Swiss company reCIRCLE and its network of restaurants. Indonesian company Muuse has partner cafes and delivery services across Singapore, Hong Kong and Toronto where users can borrow containers and return them to a network store to be reused. In Brazil, Meu Copo Eco deploys a deposit system for returnable cups and other containers at events like festivals, conferences and corporate gatherings. The list goes on.

Enabling takeaway restaurants to adopt returnable packaging at scale is somewhat trickier for a range of reasons.⁶⁸ For example, unlike college students, restaurant-goers aren’t necessarily frequenting the same establishments on a regular basis, which makes it harder for them to return containers to a specific restaurant. In addition, it can be harder for restaurants to create and manage systems to reward people for returning containers than it would be, for example, for college campuses, which can use students’ dining service accounts to deliver reimbursements or incentives. There are, however, business models that are attempting to overcome these hurdles. Bold Reuse in Portland, Ore., for example, provides reusable containers and collection as a subscription

service to restaurants and grocery stores, with collection points across the city, so businesses that don’t provide reusables in house are able to offer them through a third party.⁶⁹

It is worth noting that many of the companies experimenting with returnable packaging use durable plastics in delivering their services. Increasing the use of these services will not necessarily eliminate plastics from food delivery altogether, but they do present an opportunity to dramatically reduce the amount of plastic used in the restaurant industry and reduce the amount of single-use plastic that finds its way into rivers, streams and ocean waters. Building out sustainable models for returnable packaging could also provide an incentive for future innovation in returnable packaging itself that could lead to a further reduction in plastics use.

Reimagining the product

While many companies are developing ways of cutting down on their plastics use by cutting down on packaging, others are asking a different question: Instead of rethinking the packaging, why not rethink the product itself?

Many liquid products currently sold in stores – dish soap, shampoo, laundry detergent and more – consist predominantly of water. Remove the water and you remove the need for those products to be sold in bottles at all. Though they’re still a relative rarity in mainstream stores, solid versions of traditionally liquid products – particularly cosmetics and toiletries – are becoming increasingly easy to find.

A search for “shampoo bar” online brings up hundreds of options from a range of companies all over the world, from now-major brands like Lush cosmetics to individuals and small companies selling products, often homemade, via



Although still a relative rarity in mainstream stores, solid versions of cosmetics, toiletries and other traditionally liquid products are becoming increasingly easy to find.

Etsy and other e-commerce platforms.⁷⁰ Ethique, founded in New Zealand in 2012, manufactures a wide range of solid-form shampoos, deodorants and other haircare, skincare and body care products, and now has products in more than 6,800 stores worldwide.⁷¹ French company Lamazuna makes a wide variety of solid shampoos, among other body care products, as do Bars over Bottles (Brazil), Amor Luminis (Australia) and others. These companies make products including shampoos and conditioners designed for all hair types (and species types: Zookie Bars from Canadian company Etee are among the various shampoo bars on the market made especially for dogs).

Toothpaste, likewise, only needs to come in its current packaging because it consists

of up to 40% water.⁷² A host of companies, including major brands like Colgate, have developed toothpaste in the form of dry tablets that turn into a paste when chewed. Bite, Huppy and Unpaste are among the many companies producing toothpaste in these and other plastic-free forms that can be shipped in recyclable or reusable containers rather than single-use tubes that are made from multiple materials and therefore unrecyclable.⁷³

Colorado-based company EcoRoots and other zero-waste cosmetics brands, including Etee, Katie Mae Naturals and countless others, all specialize in solid versions of traditional toiletries, from shampoo and conditioner to deodorant, lotion, sunscreen and more. As well as cosmetics, solid forms of household

cleaning products are also on the rise. Even a cursory web search brings up a range of different dish soap bars, for example, from brands like No Tox Life, Etee, Mamaforest and others. Other reimagined cleaning products include dissolvable cleaning tablets from German company Everdrop. These tablets are mixed with water in reusable bottles at home to make the final product. The idea proved an almost instant success, with more than 1 million tablets sold within months of the product going to market.⁷⁴

The rise of e-commerce platforms like Etsy has given the many small businesses producing these kinds of products a global reach, while also providing a fuller

Photo: HPRG Les Hôtels Paris Rive Gauche,
via [Flickr](#), [CC BY-NC-ND 2.0 DEED](#)



Shampoo bars in a Lush store in Paris.

picture of the range of plastic-free product possibilities than might be apparent from looking at the shelves of mainstream stores. But these products have been gaining a foothold offline, too. Lush, for example, now has almost a thousand stores across the world, as well as its online business.⁷⁵

While many major cosmetics brands have been keen to be seen as moving toward more sustainable packaging, in practice this has often meant only minor changes, like incorporating a certain percentage of recycled materials into their plastic bottles.⁷⁶ While a positive step, these concessions are unlikely to have any significant impact on the plastic waste crisis. If, on the other hand, the large corporations that dominate the cosmetics market were to follow the lead of companies like Ethique, Lush and the growing number of small producers across the e-commerce landscape and invest their R&D dollars in reimagining their products so they didn't have to be sold in bottles at all, it would be a different story.

Shifting the design of a product is not always a simple matter, and all kinds of considerations come into play – from how to list a product's ingredients and directions without a label (Lush has an app that allows users to scan a product with their phone to get the information they would normally find on a label), to convincing consumers that these products are as effective as their liquid equivalents.⁷⁷ Such products have long been a staple of the travel section in many pharmacies, however, and to outdoor enthusiasts, solid toiletries are nothing new. There is no reason why the qualities that make these products logical for travel and outdoor activities – the fact that they're convenient, compact, lightweight and do the job just as well as their liquid counterparts – shouldn't make them equally appealing to the general consumer.

For more information

Amor Luminis (Australia)

<https://amorluminis.com.au/>

Solid-form hair products.

Bars over Bottles (Brazil)

<https://www.usebob.com.br/>

Solid-form hair, body and skincare products.

Bite

<https://bitetoothpastebits.com/>

Solid toothpaste.

EcoRoots (United States)

<https://ecoroots.us/>

Solid-form laundry detergent, soap and shampoo, and liquid/cream forms of other products.

Etee (Canada)

<https://www.shopette.com/>

Solid-form body products and concentrated forms of cleaning supplies.

Ethique

<https://ethique.com/>

Solid-form shampoos, deodorants and other haircare, skincare and body care products.

Everdrop (Germany)

<https://www.everdrop.de/>

Solid versions of laundry, kitchen, cleaning and personal care products.

Huppy

<https://behuppy.com/>

Solid toothpaste.

Katie Mae Naturals (United States)

[https://www.etsy.com/shop/](https://www.etsy.com/shop/KatieMaeNaturals)

[KatieMaeNaturals](https://www.etsy.com/shop/KatieMaeNaturals)

Solid versions of traditional toiletries (shampoo, deodorant, lotion, etc.).

Lamazuna (France)

<https://www.lamazuna.com/>

Solid-form shampoos and other body care products.

Lush cosmetics

https://www.lush.com/us/en_us

Solid-form shampoos and bath bombs, spa treatments and more.

Mamaforest (Korea, United States)

<https://mamaforestusa.com/>

Solid versions of body care and kitchen products.

No Tox Life (United States, Canada)

<https://notoxlife.com/>

Solid versions of body care and kitchen products.

Unpaste (United States)

<https://www.unpaste.us/>

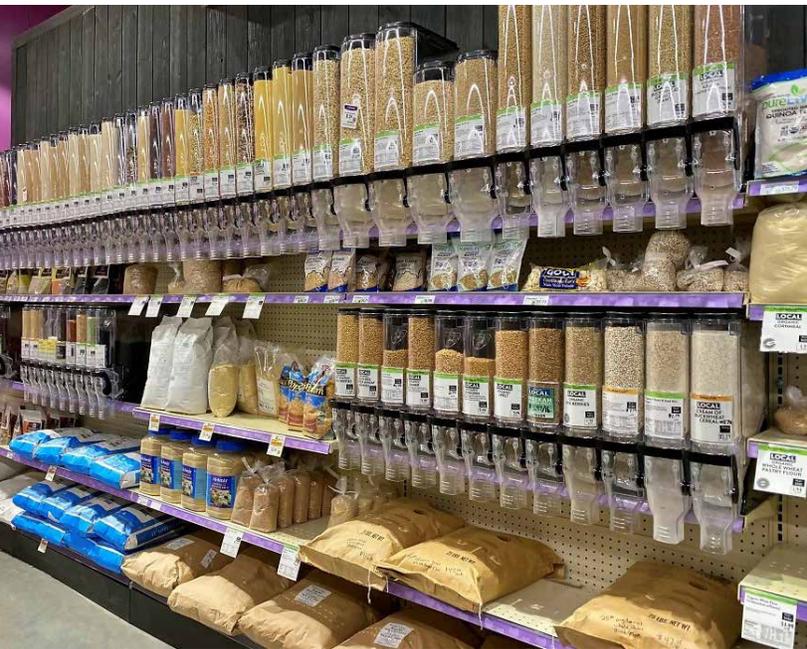
Solid toothpaste.

What's standing in the way?

THE EXISTENCE OF SO MANY businesses experimenting with packaging-free products – and the proven demand for, and profitability of, such products – raises the question of why more companies aren't pursuing a similar path, and, moreover, what can be done to facilitate the success, sustainability and scalability of those that are, or would like to.

Retail and food service providers experimenting with eliminating single-use plastics, like those discussed in this paper, currently face a range of key hurdles that give businesses opting for less sustainable practices the upper hand.

Photo: [Jo Zimny](#) via Flickr, [CC BY-NC-ND 2.0 DEED](#).



Smart policy can help more stores roll out bulk buying options and remove the obstacles standing in the way of package-free retail.

Low- and zero-waste businesses are at a disadvantage

Plastics are convenient, durable and cheap to produce, and with few legal mechanisms in place to discourage their use or to hold companies accountable for the impacts of the waste they create, there is little motivation for major producers and retailers to explore alternatives. While businesses using or producing plastic packaging are under no obligation to bear the full costs of the environmental damage caused by its creation, use or disposal, businesses attempting to go plastic-free may well have to bear some additional costs related to that choice. This means that these startups are, in effect, being penalized for taking the more environmentally responsible approach.

High costs and lack of incentives

Low- or zero-waste businesses have to shoulder an unequal financial burden to that borne by less responsible businesses when it comes to the environmental impacts of their waste. For example, a zero-waste restaurant might have to pay for extra staff time to collect used containers, and extra water and energy bills to wash those containers and return them to use. Meanwhile, a typical takeout restaurant using plastic packaging would need to pay for the packages, but it will often be government employees – paid for by taxpayers – or volunteers spending their own time, who pick up those containers off the streets, sidewalks, waterways and so on, and all of us, through taxes and fees, picking up the bill for municipal garbage collection.

Low- or zero-waste businesses also have to take on more risk in the form of upfront costs. Many of the business models discussed in this paper require significant initial investment – for example, for equipment.⁷⁸ Developers of returnables programs, for example, have to invest in a system for containers to be tracked, inventoried, restocked, refilled, cleaned and so on.⁷⁹ The initial investment may have to be recouped in the form of higher prices for consumers, effectively incentivizing consumers to stick with less environmentally friendly modes of retail, and making it more difficult for sustainable options to achieve scale.

Even in Europe, where zero-waste grocery retail is thriving, the sector mostly includes small, independent stores selling dry products, and these businesses struggle to set prices that would allow them to compete with large chains.⁸⁰ For example, when U.K. supermarket chain Tesco recently trialed a closed-loop packaging system, Loop – a platform developed by U.S. recycling company Terracycle that allows retailers to make reusable versions of their product packaging available to consumers – Loop’s website priced a refillable 910-gram can of porridge oats at £3.90 (plus a £1 deposit for the container), while the same product, in plastic packaging, costs just £1.10 from a Tesco store.⁸¹

Insufficient health guidelines and regulations

Health concerns about selling food in open containers have existed since the earliest modern experiments in bulk retail.⁸² These concerns have resurfaced recently, not least as a result of the COVID-19 pandemic, during which some companies rolled back their reusable container programs and reverted to single-use plastics and disposable packaging on health grounds, although these concerns later turned out to

be unfounded.⁸³ Similarly, since businesses have no control over the sanitation of customers’ reusable containers, it is not unreasonable for them to fear legal repercussions if a customer gets sick – regardless of whether or not those fears are supported by real-world evidence.⁸⁴

The Food and Drug Administration (FDA) sets federal standards for food labeling with regard to ingredients, nutritional values and so on, but they are less clear on, for example, how long foods can remain in containers, how often those containers have to be cleaned, and whether old and new batches are allowed to mix.⁸⁵ The absence of clear, uniform and comprehensive standards and safety guidelines specifically for bulk food retail may contribute to businesses and consumers being wary about embracing the model.⁸⁶

Often such guidelines do exist but are open to misinterpretation. For example, Whole Foods has long claimed that FDA codes prohibit customers from using their own containers in bulk sections.⁸⁷ In reality, the FDA Food Code only suggests that vendors operating self-service sections of “ready-to-eat foods” should reduce the risk of contamination by “supplying clean utensils and dispensers” to customers.⁸⁸ Similar misreadings have led some state health authorities to ban customers from using their own containers for food and instead require disposable bags.⁸⁹ The FDA Food Code, in fact, does contain various guidelines relating to bulk food retail – none of which seems to rule out customers using their own containers – but these guidelines are scattered in disparate places throughout the code and are neither easy to find, nor defined in a clear and comprehensible way.⁹⁰ Clear, comprehensible protocols are needed so that retailers can confidently sell food in bulk and consumers can feel safe buying it.

Conclusion and policy recommendations

A FUTURE WITHOUT SINGLE-USE

PLASTIC packaging is possible, and the businesses discussed in this paper, and others like them, provide a glimpse of what it could look like. Taking these business models to scale, however, will require innovation and the adoption of policies that encourage and support that innovation.

Creating a business environment in which new forms of plastic-free retail can thrive will require a combination of measures, first to ensure that all producers are held accountable for the impacts of the products they create and thus ending the ongoing implicit subsidy for wasteful business practices, and second, to provide incentives and support to enable innovative, plastic-free businesses to get off the ground. The combination of these two approaches would help to disincentivize the use of single-use plastic packaging and remove the obstacles currently putting environmentally responsible businesses at a disadvantage compared with their less sustainable competitors.

Specifically, governments should:

- **Enact bans on single-use plastics.** Federal, state and local governments should enact laws that will directly limit plastics use. Specifically, given the restaurant industry's outsized contribution to plastic waste, policymakers should enact bans on disposable plastic containers, cups and utensils, and require only durables to be used in dine-in restaurants. Given the challenges that requiring durables for dine-in may bring for many restaurants, policymakers could consider coupling this mandate with an incentive program as outlined below.
- **Create producer responsibility programs.** In our current linear material economy, materials are made, used and then disposed of.⁹³ This system leaves it up to the consumer or a municipality's waste program to deal with disposal of those materials at the end of their useful life. Producer responsibility programs, by contrast, shift the burden onto the producer to collect and dispose of their own packaging waste, for example by

Growing numbers of states and cities across the country are following up bans on single-use plastic bags with bans on other types of plastic packaging. Several states and cities have taken steps to limit the use of plastic straws in restaurants, and, as of September 2023, 11 states plus Washington, D.C., have passed legislation to ban polystyrene, including for food containers such as cups, plates and other food packaging.⁹¹ Elsewhere, with its directive on single-use plastics, which came into force in 2021, the European Union has banned single-use plastics in a range of products, including cutlery, plates, straws and beverage stirrers.⁹²

requiring companies to participate in co-op programs through which used packaging is collected from consumers and recycled.⁹⁴ The intended outcome is to incentivize companies to use more recyclable and reusable packaging, and to use less packaging altogether, as well as to improve the effectiveness of recycling and shift the cost away from the public. Federal, state and local governments should require companies to create recycling or waste programs to pick up and dispose of the waste they create or pay a co-op program to do this work.

As of 2023, California, Colorado, Maine, Oregon, New Jersey and Washington have laws mandating producer responsibility programs or similar requirements regarding packaging.⁹⁵ Maine led these efforts in 2021 with a stewardship program that funds recycling and waste management programs with money collected from producers.⁹⁶ Similar programs are also found in Europe, whereby producers bear the costs of waste collection and cleanup.⁹⁷ This applies to most commercial packaging and container products like packets and wrappers, cups, covers, lids, and food and beverage containers.⁹⁸

In addition to ending the ongoing implicit subsidy for wasteful practices, federal, state and local governments should enact measures to ensure that low-/zero-waste businesses are given the support necessary to enable them to get off the ground and keep prices competitive.

Grant funding or rebates to reward sustainable business practices and policies to disincentivize unsustainable ones, e.g. through taxes on new non-returnable/reusable packaging, could further level the playing field and help propel new modes

of retail – bulk stores, refilleries, returnable packaging startups and products with little or no packaging – into the mainstream.

Specifically, governments should:

- **Provide financial support in the form of grants, rebates and tax incentives to businesses seeking to develop and implement low- and zero-waste forms of retail and food service,** taking into account the specific needs of each of these categories. These businesses often face large upfront investments in equipment and system design, and significant ongoing operating costs (for example, higher water and energy bills arising from the need for more washing, and so on) even as they reduce environmental costs and lessen the financial burden on cities and states for waste disposal. States and the federal government should provide grants to help cover the initial costs and so enable these businesses to compete with more well-established, less sustainable businesses.
- **Develop clear and comprehensible health regulations regarding bulk food retail, refill stores, and restaurants adopting returnable or reusable container systems.** Policymakers should lift unreasonable restrictions to allow for in-store open containers and dispensers and for restaurants to provide reusable containers and/or allow customers to bring their own containers. Policymakers should also develop clear standards and guidance regarding sanitation, cross contamination and monitoring with refilleries, supermarket bulk sections in mind. Legislation such as Oregon's recently passed Senate Bill 545, instructing the Oregon Health Authority to update the state's health code to make it easier for restaurants to provide reusable containers and for customers to bring their own containers, is an example of such legislation.

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