McDonald's: Hamburglaring Reuse

A WARNING FOR U.S. AND CANADIAN POLICYMAKERS

THE STORY OF STUFF PROJECT

MARCH 2025

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Glossary of Materials Listed in this Report

Bagasse is the dry pulpy fibrous material that remains after crushing sugarcane or sorghum stalks to extract their juice. It is used to make compostable foodware.

Expanded Polystyrene is a rigid, closed cell, thermoplastic foam material produced from solid pellets of polystyrene, which is polymerised from styrene monomer and contains an expansion gas (pentane) dissolved within the polystyrene pellets. Styrene is a known human carcinogen, and can migrate out of polystyrene into food and beverages.

Melamine or melamine formaldehyde (also shortened to melamine) is a resin with melamine rings terminated with multiple hydroxyl groups derived from formaldehyde. This thermosetting plastic material is made from melamine and formaldehyde. It is used as a hard plastic, often for children' s plates and cups. Formaldehyde is a known human carcinogen.

Polyethylene (PE) is the most commonly produced plastic. It is a polymer, primarily used for packaging (plastic bags, plastic films, geomembranes and containers including bottles, cups, jars, etc.). PE is usually a mixture of similar polymers of ethylene, the most widely used chemical in the chemical industry. It can be low-density or high-density and many variations thereof. Its properties can be modified further by crosslinking or copolymerization

Polylactic Acid (PLA) is a thermoplastic monomer derived from organic sources such as corn starch or sugar cane. PLA can be produced using the same equipment as petrochemical plastics, PLA is the second most produced bioplastic (after thermoplastic starch) and has similar characteristics to polypropylene (PP), polyethylene (PE), or polystyrene (PS), as well as being biodegradable.

Polypropylene (PP) is a thermoplastic polymer produced via chain-growth polymerization from the monomer propylene. The melting process of polypropylene can be achieved via extrusion and molding. The most common shaping technique is injection molding, which is to make foodware like cups, cutlery, and clamshell containers.

Polystyrene (PS) is a commonly used polymer plastic to manufacture commercial and consumer products today. It is made by combining styrene, which is a clear and colorless liquid. Polystyrene is very transparent in solid form, and offers excellent optical clarity and can also be dyed using different colorants. Polystyrene is a thermoplastic. It melts at high temperatures, particularly above 210°C. So, it can be remolded and used for another purpose. It is also amorphous and easy to process into a variety of shapes and objects.

Executive Summary

McDonald's wasn't the first company to replace real dishes, glasses, and utensils with disposable packaging — that was White Castle. Nonetheless, as the largest fast-food chain worldwide, with 41,800 McDonald's locations across more than 100 countries that consume 2.2 billion pounds of packaging and toys a year — the equivalent of more than 100 Eiffel Towers — McDonald's is an icon of disposability or what Life Magazine in 1955 hailed as "throwaway living."[1]

Photo: Peter Stackpole - The LIFE Picture Collection/Getty Images

The food service sector currently spends $24 billion in the U.S. a year to purchase nearly 1 trillion pieces (9 million tons) of disposable packaging and foodware.[2] Most of it is used for a matter of minutes, almost instantly becoming trash, leaving local governments and taxpayers to deal with the associated environmental, public health and financial costs of the resulting waste.

Between 2022 and 2024, McDonald's launched a massive lobbying campaign that blocked European regulations that would have required changing its disposable model. Regulations proposed by the European Union, if finalized, would have required the food service industry in all 27 EU countries to switch from disposable to reusable foodware for serving customers on-premises. It also would have imposed quotas for reusable foodware in takeout meals — 10% by 2030 and 40% by 2040.[3]

McDonald's wasn't "loving it." They pushed back, organizing other fast-food brands and the largest producers of paper and food service packaging in Europe into a "Together for Sustainable Packaging Alliance" that launched a lobbying campaign that succeeded in rolling back these regulations.[4] No other industry group avoided mandatory reuse targets that were proposed. McDonald's and the paper packaging industry commissioned three Life Cycle Analysis (LCA) studies to discredit the EU's previous findings regarding the benefits of reusable packaging over single-use. Based on skewed assumptions and questionable data, these studies showed paper packaging has lower climate and water impacts than reusables.[5]

The Alliance launched a massive public relations and lobbying campaign using the findings of the reports. The amount of industry lobbying on this issue was unprecedented and caused considerable confusion among elected officials preceding the vote on the final regulation.[6] Together, the Alliance's members logged more than 290 official meetings with Members of the European Parliament (MEPs) in the first four months of 2022. NGOs advocating for packaging reduction and reuse held 21 meetings.[7] The final waste and packaging regulations adopted almost completely exempted the food service sector from regulations to prevent waste, unlike the beverage, consumer goods, and transportation industries who are now bound by high targets for reusable packaging.[8]

According to the Ellen MacArthur Foundation (EMF), **a low performing reuse system** would be one with 2% market share, an 80% return rate and only five use cycles for containers due to lack of shared infrastructure. **A medium performing system** would have 10% market share, some sharing of infrastructure, a 90% return rate and 10 use cycles, and **a high functioning system** would achieve market share of 40% with a 95% return rate and 15 uses. To achieve this, the system would require shared infrastructure and standardized packaging. According to EMF, in each of these systems, the reuse system outperforms the single-use option. The greater the market share and functionality, the greater the environmental and cost benefit.[9]

The industry LCAs lacked transparency regarding much of the data and assumptions built into their analyses, but where assumptions were clear, they are notable for modeling low performing reuse systems. Use cycles portrayed in two of the industry-funded reports range from two to three cycles with return rates from 50-70%. Basing the LCAs on assumptions of low return rates and use cycles, the companies skewed the outcomes for reusables poorly, showing that they had higher water consumption and climate impact than recycled paper packaging. If the fast-food industry had to meet the proposed target of 40% of their takeout meals served in reusables, they would have needed to achieve a high performing system. Therefore, a more accurate approach to evaluating the impacts of the proposed regulations would have at least included one scenario that assumed the 95% return rates and 15 use cycles necessary to achieve this target. Fifty-eight academic experts on LCAs wrote a letter to the MEPs warning them about the "misleading" industry-funded studies and noting flawed assumptions about the weight of reusable products, the transportation logistics and distances, overestimates of dishwashing cycles, and very low return rates and use cycles for reusables.[10]

COMPANY	GEOGRAPHY	RETURN RATE	AVERAGE # OF USES	RETURN INCENTIVE
CUPCLUB (now ClubZero)[11]	London	95%	238 per cup	Subscription
OKAPI REUSABLES[12]	Brooklyn, Columbus, Portland, Seattle, SF Bay AreaV, Tahoe/Reno, Vancouver	97%	50 per cup	Charge: $15 if not returned
MUUSE[13]	Hong Kong, Singapore, Toronto, U.S.	98%	Over 100	Charge: $20 if not returned in 30 days
RECUP[14]	21,000 locations (including 750 Burger King restaurants) in Germany	Close to 98%	Over 100	Deposit: 1 euro per cup; 5 euros per bowl
VYTAL[14.1]	Germany	98%	Hundreds-company claims they can replace up to 1,000 cups and 500 bowls	Charge: 1 euro if not returned

Contrary to the conclusions of the industry-funded reports, the weight of evidence in peer-reviewed research shows that reusables have lower environmental impacts compared to single-use, both for onsite dining and takeout scenarios.[15] Some notable findings include:

- **Dishware.** Paper products have higher global warming, climate change, human toxicity, ecotoxicity, and eutrophication impacts than reusables and often higher than single-use plastics. Policy measures should be established to make reusables the most practical option for all stakeholders.[16]
- **Cups.** Single-use cups have similar environmental impacts regardless of the material they are made of (whether bio-plastic, fossil-based plastic or paper). Reusables outperform single-use as long as the dishwashing equipment or method is efficient.[17]
- **Cost Benefit.** Real-world experience from ReThink Disposable, a technical assistance program offered by Clean Water Fund that helps businesses transition to reuse for onsite dining, demonstrates through work with over 600 food service operators

that reuse saves businesses money 100% of the time. The average annual cost savings range from $3,000 to $22,000 per business.[18] LCAs and other studies demonstrate high cost-savings potential for reuse in the food service sector. ReThink Plastic Alliance estimates the potential savings of 20% reusable packaging in the European takeout food sector could achieve a savings of 3.7 billion Euros.[19] A reuse system modeled for Ann Arbor, Michigan is 25%-26% less expensive than single-use.[20]

Similar Tactics Under Way to Block Progress in the U.S. and Canada. The Story of Stuff has received insider information that McDonald's and the paper packaging industries are planning to launch a similar disinformation and lobbying campaign in the U.S. and Canada in 2025. The difference is that unlike Europe, where all the focus was at the EU level, U.S. and Canadian policy progress is being made locally. Since the City of Berkeley adopted the first reusable foodware policy in the world in 2019, 29 reusable foodware policies have been enacted locally in California and more than 50 policies in the U.S. and Canada.[21] To block this progress, the fast-food industry will need to work locally or at the national level through policies that preempt local action.

A recently-completed three week pilot of reusable cups in Petaluma, California, sponsored by the Next Gen Consortium (McDonald's, Starbucks, Yum! Brands, Wendy's, KFC, Taco Bell, Pizza Hut, Peet's among others) and Closed Loop Partners[22] yielded a low return rate of 51%. The cups were reused on average twice- a level that barely breaks even with the environmental impacts of the single-use cups that were replaced. This is the kind of data that was used in the LCAs published by McDonald's and the paper packaging industry for the EU.

Return rates in the Petaluma project might have been higher had there been incentives for consumers to return the cups. In addition, customers had no choice. All orders at participating businesses were provided in a reusable cup, even if the customer was just passing through Petaluma and would end up in a locale with no return stations.

For decades, both consumer goods companies and the plastics and paper industries that produce their packaging have promoted recycling to legitimize the continued sale of single-use packaging. Fast-food giants have responded to the waste crisis that they helped to generate by issuing false promises, sustainability pledges, and engaging in greenwashing around recycling as a panacea. For example, McDonald's pledged in 2018 that, by 2025, 100% of their food service packaging would come from renewable, recycled, or certified content. The benefit to the environment is dubious when"renewable" and "certified" includes wood fiber (i.e., trees). They rely on sources with Forest Stewardship Council certification,[23] a program that is riddled with implementation failures, and after three decades has failed to prevent ecosystem destruction.[24]

Local Governments and Activists Must Be Prepared and Continue to Lead. Progress toward better, more upstream solutions that prevent waste, rather than manage it, should not be stymied by false solutions and hollow industry promises around recycling and paper packaging. We offer this report to aid local governments and activists in the U.S. and Canada addressing misleading information and PR campaigns funded by an industry holding tight to the disposability model. We believe it is highly likely that McDonald's and the paper packaging industry will attempt to block efforts to bring reuse to food service.

Fast food and throw away living was born in the U.S. and exported to the rest of the world as global companies like McDonald's expanded their markets. With the planet's resources dwindling rapidly and climate change accelerating and causing devastating impacts on communities across the globe, it behooves Americans to take a stand to end the throwaway culture. It's time for vigilance in ensuring that the fast-food and paper industries do not "Hamburglar" progress already being made to bring back reuse.

Introduction

In response to a rising tide of policies to end single-use plastics and disposable packaging in the food service industry,[25] McDonald's is leading an effort by the fast-food and paper packaging industries to reverse the trend. Using similar tactics to other "merchants of doubt" regarding the threats posed by climate change, tobacco consumption and toxic chemicals exposure,[26] McDonald's and the paper packaging industry between 2022 and early 2023 published a series of studies and reports about the environmental impacts of disposable versus reusable food packaging.

The unsubstantiated data was the basis of an industry-led public relations and lobbying campaign that sowed doubt among European lawmakers regarding proposed new regulations that would have required restaurants to switch from disposable to reusable foodware for onsite dining and phase in reusables for takeout food service. McDonald's joined forces with the paper packaging industry to characterize single-use paper products and recycling as better for the planet than reusable foodware even though the weight of peer-reviewed science demonstrates that reuse outperforms single-use in delivering environmental benefits. Reuse also saves food service businesses money.[27] When the dust settled and the regulations were finalized, McDonald's had succeeded in eliminating the reuse requirements for the food service industry.

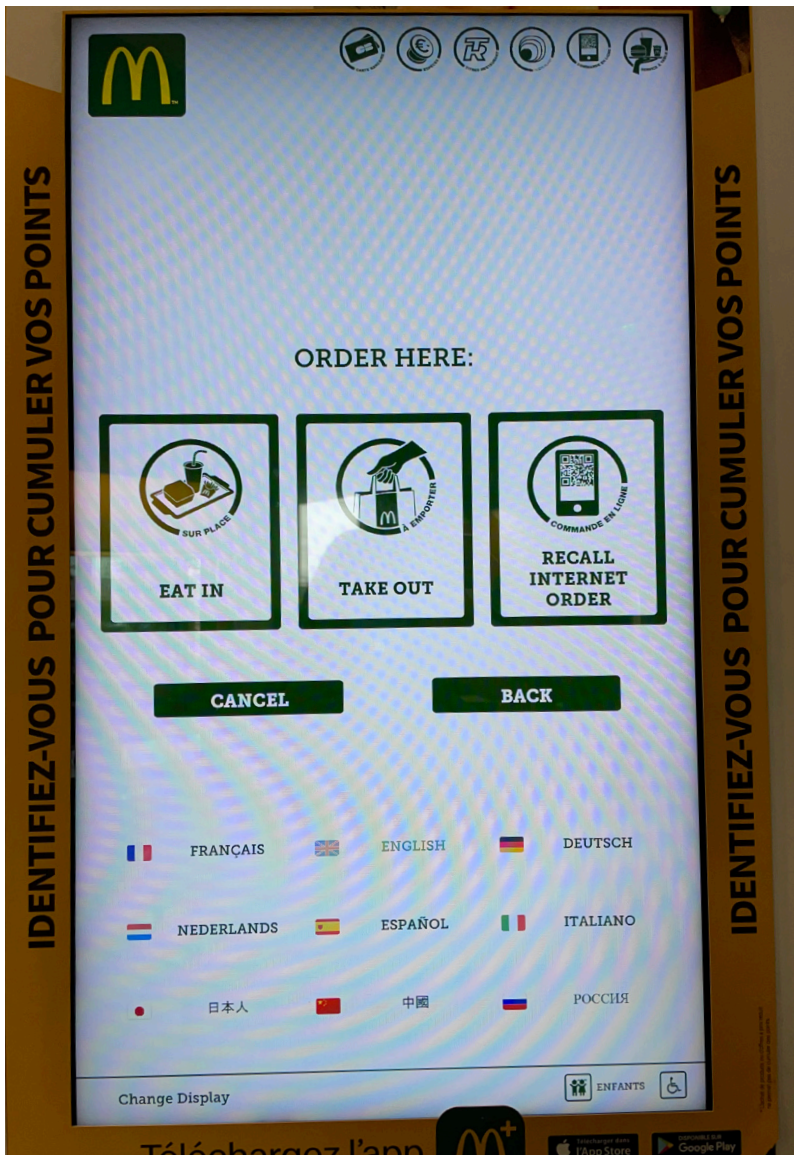
Meanwhile, across the pond in the U.S. and Canada, local and state governments are beginning to shift their focus from managing waste once it's created to preventing it from being created in the first place — an upstream, source reduction approach. After decades of waste regulations that prioritize "diversion from landfill" through recycling and composting, jurisdictions with these systems in place are acknowledging that they may not be able to compost or recycle their way to a sustainable, circular economy.

From requiring that accessories like straws and utensils be provided only upon customer request, to mandating only reusables for on-premises dining, to charges for disposables in takeout, and allowing customers to bring their own reusable containers and cups for takeout, local policies are paving the way for new reusable foodservice systems in the cities that enact them. Reusable cup and container systems, wash hubs, and service providers are a growing trend in restaurants, stadiums, theme parks, and schools where such policies are enacted. But the progress away from single-use to reusable packaging is being threatened by McDonald's and a fast-food industry that is reluctant to relinquish the throwaway model.

The Story of Stuff has received insider information that McDonald's and the paper packaging industries are planning to launch a similar misinformation and lobbying campaign in the U.S. and Canada in 2025. McDonald's and its packaging allies influence policy by participating in and shaping the policy positions of local and national restaurant associations and other trade groups, monitoring and analyzing emerging policy developments, and forming industry coalitions to influence policy decisions. They are active in groups like AMERIPEN, the Foodservice Packaging Institute, the Recycling Partnership, Closed Loop Partners, and the Sustainable Packaging Coalition, where they work to drive a "sustainability" agenda that focuses on recycling rather than reuse. McDonald's rarely submits public comments or prepared testimony on its own letterhead. More

likely, the comments will come from restaurants, restaurant associations, and local merchants associations, that read from a policy playbook and reiterate the data generated by McDonald's and paper packaging-funded studies and reports.

This report aims to debunk the myths and clear the smoke and mirrors created by McDonald's and the paper packaging industry regarding the environmental benefits of paper packaging over reusable foodware that they used to stymie reuse regulations at the EU level. At the outset, the report examines the role of McDonald's in normalizing the throwaway culture in the U.S. and then exporting it across the globe. It exposes the ways in which the company is working to "repackage" disposable foodware as the climate-friendly option despite the weight of scientific evidence that runs counter to this argument. The report shares the evidence base that contradicts industry arguments favoring recycling over reuse. It concludes with a warning to environmental advocates and policymakers in the U.S. and Canada not to be misled by the industry's questionable science and public relations campaigns.



The Rise of McDonald's, Fast Food, and Throw-away Culture

The McDonald brothers, Richard (Dick) and Maurice (Mac) opened their first diner — a hot dog stand — in Monrovia, California, in 1937. In 1940, they moved to San Bernardino and opened McDonald's Bar-B-Q, a successful venture that led to the first McDonald's restaurant in San Bernardino in 1948.[28] It was at this restaurant that the brothers iterated their main profit strategies. They narrowed the menu and decided to focus on hamburgers, the big selling item on their menu. They also served food of consistent quality and used disposable packaging to encourage families to take orders home rather than dine on-premises. Overall, they created a model of food service that offered families cheaper, faster meals. This "fast system" birthed the idea of "fast food."[29]

Photo: Peter Stackpole—The LIFE Picture Collection/Getty Images

In 1952, Ray Kroc, a distributor for a milkshake mixing machine, saw the promise of the brothers' restaurant concept and became their franchise agent and their first franchisee, and eventually bought them out in 1961, when he launched McDonald's System, Inc., later known as McDonald's Corporation.[30] Through standardization and by eliminating labor costs associated with table service, McDonald's grew into the largest fast-food chain in the world.

McDonald's can't be credited with originating the use of disposable foodware to replace reusable dishes, cups, and utensils in food service — that was White Castle[31] — but it is the company that made fast food a major U.S. phenomenon and expanded it across the globe. In 2023, there were 41,800 McDonald's across more than 100 countries.[32]

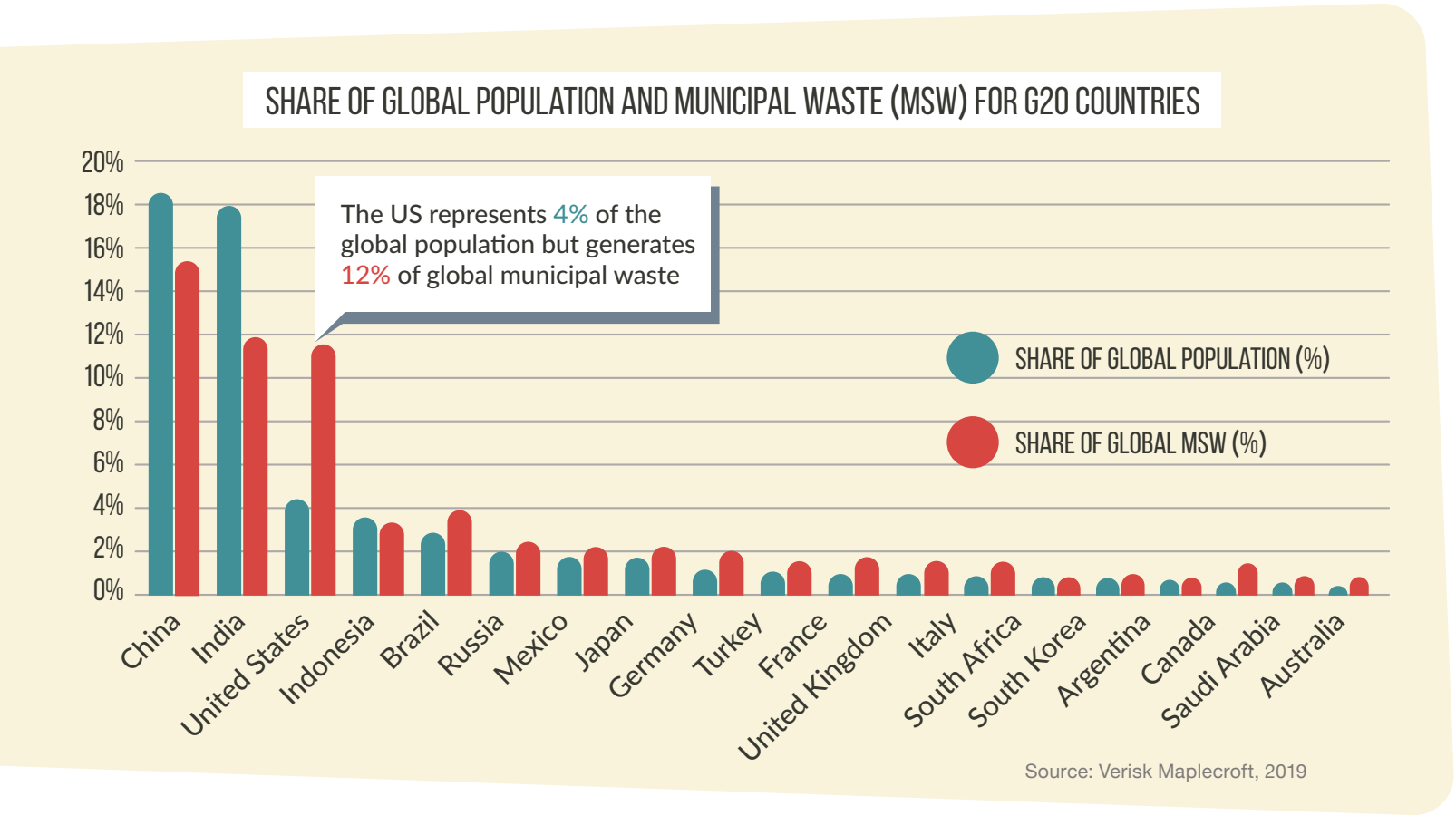
THROWAWAY LIVING AND MCDONALD'S PACKAGING

In 1955, LIFE magazine published "Throwaway Living," a piece that celebrated disposable foodware's liberation of the American housewife from the drudgery of cleaning the dishes. Today, U.S. restaurants spend $24 billion a year purchasing nearly 1 trillion pieces (1.9 billion pounds) of disposable packaging and foodware —- 21% is for onsite dining and 70% is used in takeout and delivery of prepared meals.[33] McDonald's reports that globally it uses 2.2 billion pounds, or 1.1 million metric tons of packaging and toys, based on 2021 data.[34] *It's almost as much packaging as used by the entire rest of the U.S. fast-food industry and the equivalent in weight of more than 100 Eiffel Towers.*[35]

The fast-food industry's packaging is a major component of litter. Food service disposables account for 20 billion pieces of litter entering the environment each year.[36] McDonald's packaging accounts for half of all fast-food litter in England.[37] Similarly, in a brand audit of street litter in the San Francisco Bay Area conducted by Clean Water Action and five municipalities in 2011, 49% of the litter was from fast-food restaurants. The five most significant sources were McDonald's, Burger King, 7-Eleven, Starbucks and Wendy's.[38]

Packaging accounts for 28% of non-hazardous waste in the U.S.[39] The U.S. has 4% of the world's population and yet it is the world's largest consumer of the planet's resources. Generating 12% of the world's municipal waste (200 million metric tons), the U.S. is by far the largest producer of municipal waste worldwide per capita.[40] The inability of U.S. municipalities to recycle their way out of the growing waste problem was compounded by China's decision to ban imports of other countries' hard-to-recycle waste in 2019,[41] which exposed the fact that most U.S. cities were exporting rather than recycling their hard-to-recycle waste. Businesses and local governments spend $6 billion managing all the associated waste from disposable packaging in the U.S.[42]

Tremendous quantities of natural resources are being sacrificed to make food packaging. Three billion trees are logged every year to produce paper packaging. More than half the paper used globally is for packaging.[43] Meanwhile, 42% of the non-textiles related plastics are used for packaging and 32% of it ends up in the environment.[44]



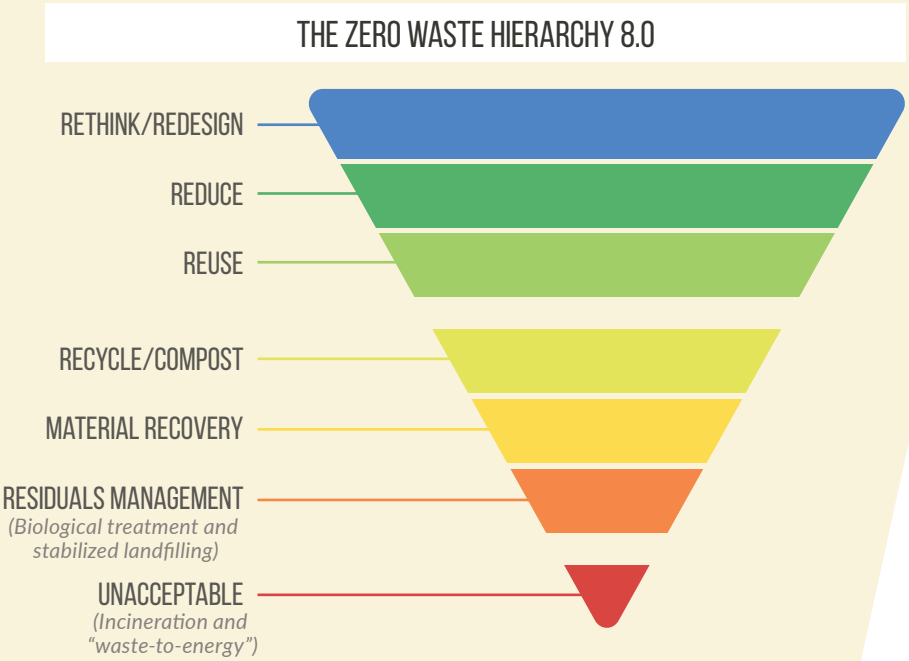
Source: Verisk Maplecroft, 2019

THE RECYCLING MYTH

For several decades, the plastics and paper industries have promoted recycling to legitimize the continued sale of single-use products.[45] Fast-food giants are responding to reports that their products are among the top sources of plastic in the oceans with claims about recyclable packaging, including Starbucks' rollout of a "recyclable lid," Taco Bell's recyclable cold cups and lids,[46] and commitments like McDonald's made in 2018 that by 2025, 100% of their food service packaging would come from renewable or recycled content.[47] Even though the plastics industry has known for decades that the economics of recycling plastic and the technical challenges make plastic recycling unrealistic, recycling is a myth that they perpetuated for decades because, as one industry insider stated, "selling recycling sold plastic."[48]

Despite the widespread belief that recycling is better than landfilling waste, the recycling of food packaging doesn't always provide environmental benefits. Oregon's Department of Environmental Quality analyzed hundreds of recyclable food serviceware studies produced over an 18-year period and found that recyclable foodware demonstrated lower environmental impacts in only 56% of the studies.[49] In addition, most food packaging that gets recovered in recycling bins doesn't actually get recycled since it's made with multi-materials and layers that are hard to separate, and food-soiled packaging is often too contaminated to be sold to recyclers.

In the 1970s, the three Rs — Reduce, Reuse, and Recycle — entered the lexicon of waste management. Reduce and Reuse are upstream solutions aimed at reducing the generation of waste at the source and Recycle is a downstream approach focused on how best to manage waste once it's created. States, following federal regulatory guidance under the federal Resource Conservation and Recovery Act of 1976, made recycling the main focus of waste policies that stressed the need to divert waste from landfills.[50] State regulations do not require upstream solutions like Reduce and Reuse, or waste prevention. Weak regulations produced a system wherein product manufacturers make single-use, throwaway products that were never designed for recycling and leaves local governments and taxpayers on the hook to figure out how to deal with them. That is, until very recently, with a rising transition toward producer responsibility-focused policies that are aiming to make producers responsible for managing and paying for their packaging waste.[51]



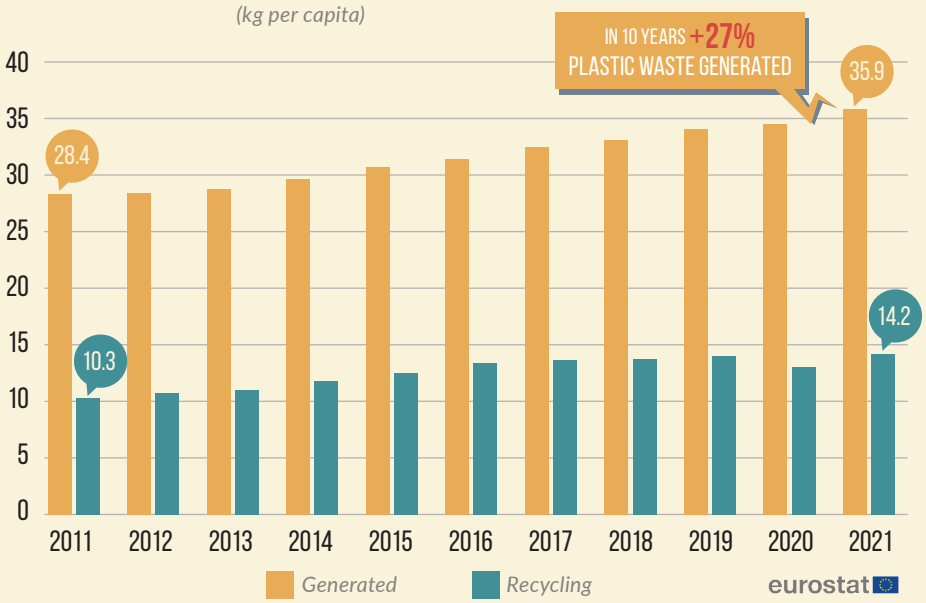
Source: Zero Waste International Alliance

The EU Response to Rising Packaging Waste

The idea of "Extended Producer Responsibility" (EPR) was born in Europe. The theory was that the only way to get producers to design their products for proper waste management (e.g., recycling) is to require them to take their products back at "end of life" and both manage and pay for their recycling and proper disposal.[52] Packaging waste comprised half of all landfill volume and one-third of all waste produced in Germany when it became the first country to introduce an EPR law related to packaging in 1991-Packaging Ordinance (VerpackG).[53] It was subsequently amended seven times and then revised completely. Although it aimed to prevent packaging waste, the performance measures focused only on achieving high recycling rates.

Following Germany's lead, in 1994, the EU also came up with a Packaging and Packaging Waste Directive that required the 27 EU nations to come up with packaging EPR laws that adopted recycling targets.[54] There were no reuse or waste prevention targets. Despite increases in recycling, the amount of packaging waste continued to rise. In 2021, the EU reported that it generated 188.7 kg of packaging waste per inhabitant, almost 32 kg more than in 2011.[55] Plastics became a larger portion of the waste stream. Between 2011 and 2021, the amount per capita of plastic packaging waste generated increased by 26.7% (+7.6kg/per capita).

PLASTIC PACKAGING WASTE GENERATED AND RECYCLED IN THE EU, 2011-2021



Frustrated by its failure to prevent packaging waste, in November 2022, the European Commission (EC)[56] released a draft "Packaging and Packaging Waste Regulation" (PPWR) that proposed serious packaging reduction measures. The PPWR aimed to prevent the production of packaging waste, limit the use of virgin materials, reduce unnecessary packaging, and promote reuse, and recycling. It included packaging reduction targets of 5% by 2030, 10% by 2035, and 15% by 2040, and banned single-use plastic packaging for hotel toiletries, fruit and vegetable packaging, and certain food service items by 2030. Most notably, it proposed refill targets for the beverage industry and reuse targets for food service packaging.[57]

Targets for reuse in takeout were proposed in Article 26:

- Takeout hot or cold beverages must be in reusables filled by customer or in reusable packaging operating in a reuse system — 20% by Jan. 1, 2030, 80% by 2040;

- Takeout of prepared food for immediate consumption in the HORECA (hotels, restaurants, cafes and catering) sector must be sold in reusables filled by the customer or in reusable packaging in a system for reuse — 10% by Jan. 1, 2030, 40% by 2040.58

Targets for onsite dining reuse were proposed in Article 22:

- Single-use packaging for onsite dining would be banned in restaurants by 2030 — a 100% reuse target.
- Articles 32 and 33 of the proposed regulations required that:
- Restaurants must allow customers to bring their own containers for refill and provide an option for customers to take out food and beverages in reusable, returnable packaging at no higher costs than single-use takeout.[59]

The next step for the PPWR was to go from the European Commission to the European Council and Parliament for approval. If both the Council and Parliament agreed with the Commission, the regulation would have been finalized and would have been the world's strongest packaging prevention regulation. It would have shifted the focus from managing disposable food service packaging waste to eliminating it. But before the vote, McDonald's and the paper packaging industry launched a disinformation campaign that derailed the process and resulted in the adoption of a final regulation that failed to set enforceable reuse targets for food service. The final version adopted as of December 2024:

- dropped the takeout reuse targets (instead the regulations suggest that businesses aim to achieve 10% of products sold for takeout in reusables by 2030, which is unenforceable and therefore lacks any real teeth as a regulation);
- eliminated the requirement of reusables for onsite dining;
- banned *plastic* packaging for onsite dining, giving the paper industry a huge boost.

However, two positive requirements were included in the final regulations in Articles 32 and 33:

- takeout businesses must allow customers to bring their own reusable cup or container; and
- must provide customers a returnable reusable cup and container takeout option for customers, and it can be at no higher cost than single use.[60]

In the end, intense lobbying and disinformation circulated by the fast-food and paper packaging industry severely undercut efforts to mandate reusables for onsite dining and targets for reuse in takeout food service. Meanwhile, mandatory reuse and reduction targets were adopted for other industries that use disposable packaging. Hotels can no longer provide cosmetics, hygiene and toiletry products in single-use containers as of January 1, 2030. The transport packaging or sales packaging for transport industries must ensure that 40% of packaging is reusable by 2030 and 70% by 2040, and 100% reusable for transport within the same country. By January 1, 2030, alcoholic and non-alcoholic beverage containers must be 10% reusable and operating in a reuse system, and by 40% by 2040.[61]

McDonald's and the Paper Packaging Industry: Manufacturing Doubt

McDonald's and its paper industry allies undercut the packaging reduction and reuse targets for food service using a well-worn playbook of generating skewed and often false data to convince lawmakers to vote in support of the industry position. Similar tactics have been used to prevent regulations to curb global warming and address the health effects of lead, plastics, DDT, tobacco and many other toxic materials.[62] The playbook starts with funding a few "junk science" studies that contradict large bodies of scientific evidence that disfavor the industry in question. Then legions of industry lobbyists and public relations executives use the data in extensive lobbying and misinformation campaigns that confuse legislators and lead to weak policy outcomes.

In 2022, when new packaging waste regulations were proposed, the EU Commission estimated that by 2030, the measures would bring significant environmental and cost benefits. Greenhouse gas (GHG) emissions from packaging would be reduced to 43 million tons annually, compared with 66 million estimated for 2030 if the regulations were not adopted. Water use would be reduced by 1.1 million cubic meters. The costs of environmental damage for the economy and society would be reduced by €6.4 billion relative to the baseline 2030. Meanwhile, there would be a boost of about 600,000 jobs in the reuse economy by 2030, and consumers would be expected to save almost 100 euros per year if businesses passed the cost savings on to them.[63]

Five months later, McDonald's and a number of other fast-food brands (Yum, Dunkin' Donuts, Baskin Robbins, and Inspire Brands) as well as several of the largest producers of paper and food service packaging) formed the "Together for Sustainable Packaging" alliance. They sent an open letter[64] to the presidents of the EU Council, Commission, and Parliament threatening that the shift to reusable packaging proposed for the food service industry could result in significant increases in water

consumption, greenhouse gas emissions, and costs. They demanded that the regulations be paused.[65] The claims were based on three studies commissioned and funded by the same industries.

1. The "No Silver Bullet" report by Kearney Consultants, commissioned by McDonald's (2022)[66]

2. The Ramboll report, funded by the European Paper and Packaging Association (EPPA) (2022).[67]

3. A McKinsey report and an identical report by five paper packaging associations (2022).[68]

The Alliance launched two websites and sponsored multiple articles attacking the proposed regulations and called for their halt, including an article in Politico EU[69], a website that attracts 5.6 million views in the EU every month. Together, the Alliance's members logged more than 290 official meetings with Members of the European Parliament (MEPs) on the topic in the first four months of 2022. NGOs that were advocating for packaging reduction and reuse in the foodservice sector held 21 meetings.[70]

The industry used these reports to discredit the EU's previous findings[71] regarding the benefits of reusable packaging over single-use citing data that showed higher greenhouse gas emissions and water consumption for reuse than paper. European officials note that the amount of industry lobbying on this issue was unprecedented and caused considerable confusion among elected officials preceding the vote on the final regulation.[72] In response, 58 academic experts on Life Cycle Analyses (LCAs) wrote a letter to the MEPs warning them about the "misleading" industry-funded studies and noting flawed assumptions about the weight of reusable products, the transportation logistics and distances, decentralized dishwashing, and very low return rates and use cycles for reusables.[73] McDonald's and the paper packaging industry were essentially "a machine manufacturing doubt."[74] According to the European Parliament, which is investigating whether industry lobbyists went too far in the year-long lobbying battle, MEPs complained that the industry campaign obstructed their ability to fairly evaluate the draft regulations.[75]

Life Cycle Analysis (LCA): Garbage In, Garbage Out

LCAs are the currently accepted tool for evaluating the environmental impact of products from cradle to grave — i.e., throughout their life cycle from extraction of resources, through production, to disposal. Small variations in assumptions, such as container type, the rate of return, the breakage rate, the weight of reusables, transport distances, sources of energy in production, and use of incomparable functional units, and disposable methods can drastically alter results. Therefore, it is important to conduct sensitivity analyses that help to identify how the results of an LCA change when any one input parameter or assumption is changed. Sensitivity analysis (varying the assumptions input into the model) can help to assess the reliability, validity, or uncertainty of LCA results.[76]

When it comes to reusable versus single-use products, LCAs are often criticized for what they do not evaluate, such as the impacts of chemicals in products on human and ecosystem health, and plastic pollution impacts on marine and terrestrial systems.[77] LCAs also don't account for the impacts of packaging that ends up as litter. In a 2020 litter survey conducted by Keep America Beautiful, an estimated 394.7 million fast-food cups and 423 million other fast-food packaging items were identified as litter along U.S. roadways and waterways.[78] External costs of single-use packaging regarding pollution, litter cleanup and costs, health impacts, and environmental and health risks from plastics and chemicals are estimated to be at least $40 billion annually.[79]

However, LCAs are often the recognized tool used in setting policies. The reports used by McDonald's and the paper packaging industry to influence the PPWR regulations should not have been used in determining the outcome of the draft PPWR regulations. They fail well-recognized international criteria for reliability, outlined below.

LCAs: Criteria for Reliability

The open letter from 58 academic experts in sustainability assessment to MEPs provided a checklist for how to evaluate analyses of single-use versus reusable packaging.[80] They stressed that a reliable LCA study:

- is peer-reviewed by independent third parties;[81]
- uses consistent and transparent data (i.e., transparent about the assumptions) regarding the scope of the study, the assumptions made for each life-cycle stage, and the methodology used to calculate the impacts;
- includes clear, well-founded, non-static assumptions on breakage rate, return (trip) rate, usage rate, weight, and end-of-life strategies (including recycling performance, quality of the recyclate, waste-to-energy, and repurpose) both for single-use and reusable packaging. Non-static means that assumptions aren't just based on poorly performing systems a company has piloted but also on the potential of a system that is well-functioning if the right conditions are put into place.
- conducts sensitivity analysis to evaluate how environmental impacts might change if certain parameters or assumptions are changed. Differentiating assumptions includes identifying break-even points and consideration of different business model configurations for the use phase and disposal phase of products.
- reviews a wide variety of impacts (e.g., climate change, water consumption, land-use impacts, human toxicity, and more) throughout the product's life cycle, including both upstream (resource extraction and material production impacts) and downstream impacts (such as impacts of waste management — recycling, incineration, or composting).[82]

Unreliable and Biased Industry-Funded Reports

Each of the three reports generated and used by McDonald's and the paper industry fails to measure up to the criteria for reliability. Each is characterized by bias and unreliable assumptions as described below. Each was developed specifically as a tool for lobbying and influencing the outcome of the regulatory process. Here's how they measure up to criteria for reliability.

UNRELIABLE AND BIASED INDUSTRY-FUNDED REPORTS

REPORT	PEER REVIEWED?	LACKING INHERENT BIAS? I.E., INDEPENDENTLY FUNDED + NOT PRODUCED FOR LOBBYING PURPOSES	TRANSPARENT DATA?	WELL-FOUNDED ASSUMPTIONS?	SENSITIVITY ANALYSIS THAT VARIES THE ASSUMPTIONS?	CONSIDER UPSTREAM AND DOWNSTREAM IMPACTS?
MCDONALD'S	NO	NO	NO	NO	NO	NO
Models takeout reusables and dine-in reuse.	Not peer reviewed	No reference to peer-reviewed or technical research. When asked for that data, they reported it came from McDonald's and they were not at liberty to disclose it. 83	Only a few of the assumptions are stated in the report. The source cited for the investment assumptions is "Kearney analysis" with no links to any data, methodology, or assumptions used.	Assumes only three use cycles for reusable takeout packaging and only 70% return rate, modeling a low functioning system. . Assumes recyclables receive treatment not currently in use to separate multi-layers, sort materials and remove contamination. Relied on EPPA report assumptions regarding water impact of reusables, grossly inflating the outcome.	Does not vary the assumptions.	Does not address the plastics in paper packaging, the impacts of plastic and toxic chemicals in food packaging on the environment and human health, costs of litter, or cost savings from reduced spending on disposable foodware. Does not consider impacts of forest product plantations on the environment and the climate and ecosystem impacts of harvesting trees from healthy forests.
EPPA-RAMBOLL	NO	NO	NO	NO	YES	NO
Models takeout reusables. No consideration of onsite dining reuse.	Not peer reviewed	Industry-funded. Used for lobbying as it was adopted in whole as a report from the paper and packaging industry entitled "Impact Assessment of reuse targets in the proposed PPWR" (March 2023)	Sources of data are listed as confidential.	Only analyzes production impacts (gate to gate), not a full life cycle (cradle to grave). Assumes a 50% return rate, meaning a container would be reused only two times on average. Assumes 50% of containers would require a dedicated return trip, causing a poor outcome in climate impacts assessment. For water impact, assumes preliminary wash cycles occur at home before going to a central wash facility, which inflates water impact of reusables.	Provides some sensitivity analysis but the conclusions focus on the base case scenario, which clearly favors single-use.	Does not address the plastics in paper packaging, the impacts of plastic and toxic chemicals in food packaging on the environment and human health, costs of litter, or cost savings from reduced spending on disposable foodware. Does not consider impacts of forest product plantations on the environment and the climate and ecosystem impacts of harvesting trees from healthy forests.
MCKINSEY	YES	NO	NO	NO	NO	NO
A report that modeled takeaway food packaging in Belgium. No consideration of onsite dining reuse.	Peer-reviewed. Peer review alone is not a guarantee against bias.	Funded by the paper industry and developed specifically for lobbying purposes.	Some assumptions regarding use cycles and methods for return, but transport methods and distances, as well as washing methods, not reported. Models a system where reusables are picked up by consumers and also delivered to the office or home, the latter being a less likely scenario and inflating climate impacts.	A home or office delivery system creates new drop-off kiosks near homes and offices, and assumes that a third party collects, washes and returns to service providers, rather than returning directly to restaurants for washing. This is a complex and less likely scenario for takeout reuse, adding significant impact from transportation and cost for the system. Also assumes that 25% of returns require a dedicated trip.[84]	None provided.	Does not address the plastics in paper packaging, the impacts of plastic and toxic chemicals in food packaging on the environment and human health, costs of litter, or cost savings from reduced spending on disposable foodware. Does not consider impacts of forest product plantations on the environment and the climate and ecosystem impacts of harvesting trees from healthy forests.

HOW THE ASSUMPTIONS FELL SHORT

Most LCAs evaluate the life-cycle impacts of products from "cradle to grave" — i.e., from extraction of resources, through production, consumption, and end-of-life disposal methods. The EPPA-Ramboll study is notable for only evaluating impacts of product production. No impacts related to end-of-life disposal methods were included.

One of the most notable challenges with these reports is that the assumptions that were used were based on suboptimal, poorly designed reuse systems, and static scenarios.[85] A good LCA, with sensitivity analysis built in, provides a range of assumptions, including scenarios of well-designed, high-performing systems.

Hitt et al. (2023) is an example of an LCA that conducts sensitivity analysis. All the key parameters are varied and show ways to optimize for beneficial outcomes with reuse. For washing, the study varied the assumptions by modeling a variety of customer and restaurant washing behaviors. Handwashing and dishwashers were modeled for residential washing and water temperatures were varied as well. For commercial washing, three scenarios were created — hand washing, hot sanitizing machine washing, and chemical sanitizing and machine washing. Five different electricity grid scenarios were modeled for energy used for washing. For transportation, they also modeled various scenarios for extra trips to return and various distances travelled (2 miles and 5 miles) and using different models of vehicles (sedans, SUVs, EVs) and including a comparison of different electricity grids supplying the EVs. *In all cases, with each of the parameters varied, the reusable options outperform the single-use alternatives.*

Key assumptions that have a substantial impact on the outcomes for reuse vs. single-use include **return rates** (for takeout packaging), number of **use cycles, wash systems**, and **transport systems** for returns. The industry-produced reports are based on assumptions in each of these categories that are designed to disfavor reuse.

Return rates and use cycles. In the case of takeout reusable packaging, the business sector is nascent and constantly iterating. Businesses launched a few years ago have either failed or are continually optimizing and improving efficiencies. Therefore it is important that modeling and LCAs take into account a range of performances and that decision-makers not be presented with worst-case current systems, but rather the range of options likely to exist as a result of policy mandates that will result in substantial investment and continued improvement.

There are models that show the number of uses and the return rates that can be achieved in well designed systems that share logistics, standardize containers, make returns convenient and use best-in-class incentives to get users to return them. For example, an Ellen MacArthur Foundation (EMF) report on scaling reuse systems modeled **a low performing system** (with 2% market share, an 80% return rate and only five use cycles for containers due to lack of shared infrastructure), **a medium performing system** (with 10% market share, some sharing of infrastructure, a 90% return rate and 10 use cycles), and **a high functioning system** (market share of 40%, 95% return rate and 15 use cycles which requires shared infrastructure and standardized packaging). In each of these systems, the reuse system outperformed the single-use option in environmental benefit. The greater the market share and functionality, the greater the environmental and cost benefit.[86]

All three of the reports used by industry modeled low functioning systems that were poorly designed and based on data that was not disclosed.[87] Use cycles portrayed in two of the industry-funded reports range from 2-3 cycles with return rates from 50-70%.

COMPANY	GEOGRAPHY	RETURN RATE	AVERAGE # OF USES	RETURN INCENTIVE
CUPCLUB (now ClubZero)[11]	London	95%	238 per cup	Subscription
OKAPI REUSABLES[12]	Brooklyn, Columbus, Portland, Seattle, SF Bay AreaV, Tahoe/Reno, Vancouver	97%	50 per cup	Charge: $15 if not returned
MUUSE[13]	Hong Kong, Singapore, Toronto, U.S.	98%	Over 100	Charge: $20 if not returned in 30 days
RECUP[14]	21,000 locations (including 750 Burger King restaurants) in Germany	Close to 98%	Over 100	Deposit: 1 euro per cup; 5 euros per bowl
VYTAL[14.1]	Germany	98%	Hundreds-company claims they can replace up to 1,000 cups and 500 bowls	Charge: 1 euro if not returned

These 12 peer-reviewed, independent LCAs regarding takeout single-use versus reusable cups and containers show a range of 20 to 1,000 use cycles for reusable cups and foodware, and conclude that reusables are favored over single-use paper and plastic:

- Hitt et al. (2023)[92] assumes 20 use cycles for plastic reusable containers in Ann Arbor, Michigan.
- Greenwood et al. (2021)[93] assumes 50 cycles; stainless steel box —- 100 and 200 use cycles for Luxembourg plastic takeout box and Tupperware.
- UNEP Life Cycle Initiative (2021)[94], a meta-analysis LCAs, shows eight studies of reusable cups with use cycles of 50 (plastic), 112 (plastic), 132 (plastic), 250 (glass), 260 (stainless steel), 500 (plastic), 750 (ceramic), and 1,000 (ceramic).
- UNEP Life Cycle Initiative (2021),[95] a meta-analysis of tableware impacts that includes two single-use vs. reusable tableware LCAs. The studies assume 1,000 use cycles (ceramic, melamine, stainless steel).

Wash Systems and Water Footprint. The McDonald's report relied on the EPPA report assumptions that forecast water consumption for a reusable system is 267% higher compared with a paper single-usage model. The EPPA report assumed that a preliminary wash cycle occurs at home and another one occurs in-house or at a central facility, effectively adding an additional wash cycle for reusable packaging that is uncommon.

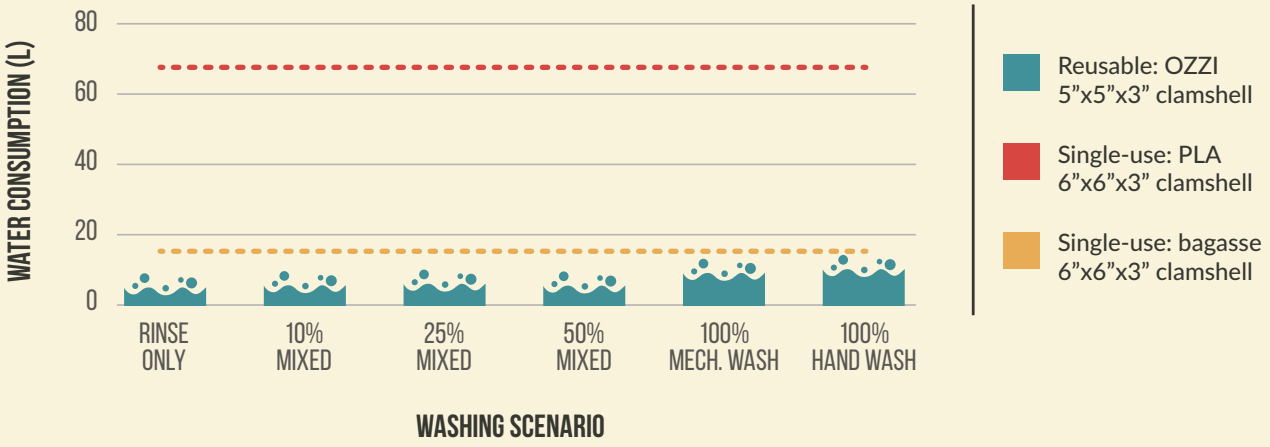
By contrast, a study by Circular Economy Portugal analyzed replacing single-use takeout paper cups and plastic food containers using the CupClub cup system in the UK and Uzaje food container system in France. In the cup analysis, paper cups with corrugated sleeves and a polystyrene (PS) lid and polyethylene (PE) liner are replaced with CupClub reusable polypropylene (PP) cups, assuming a 90% return rate and 132 use cycles and a centralized wash hub. For takeout food containers, single-use PP containers are replaced with Uzaje reusable PP containers assuming 100 use cycles for the reusable box, and a 90% return rate and a centralized wash hub.

To model the impact of the reuse policy, a range of washing scenarios and outcomes would be preferable, or use of assumptions that aim for a higher performing system based on the likelihood that the policy would force increased efficiency and optimization of dishwashing over time. Hitt et al. (2023) modeled different wash scenarios for at home residential washing and commercial dishwashing; each showed lower water consumption for the OZZI reusable PP clamshell container compared to single-use PLA and bagasse clamshells, even with handwashing, which generally consumes more water.[98]

Greenwood et al. (2021) modeled use of a small commercial dishwasher for returned containers and both handwashing and an automatic dishwasher for cleaning personal refillable cups and containers. Combining the results for automatic dishwashers, Tupperware and Luxembourg boxes (both plastic reusables) reused 50 times, and stainless steel tiffins reused 100 or 200 times, had significantly lower water consumption per use than single-use expanded polystyrene (EPS), PP, aluminum and bagasse (fiber) containers.

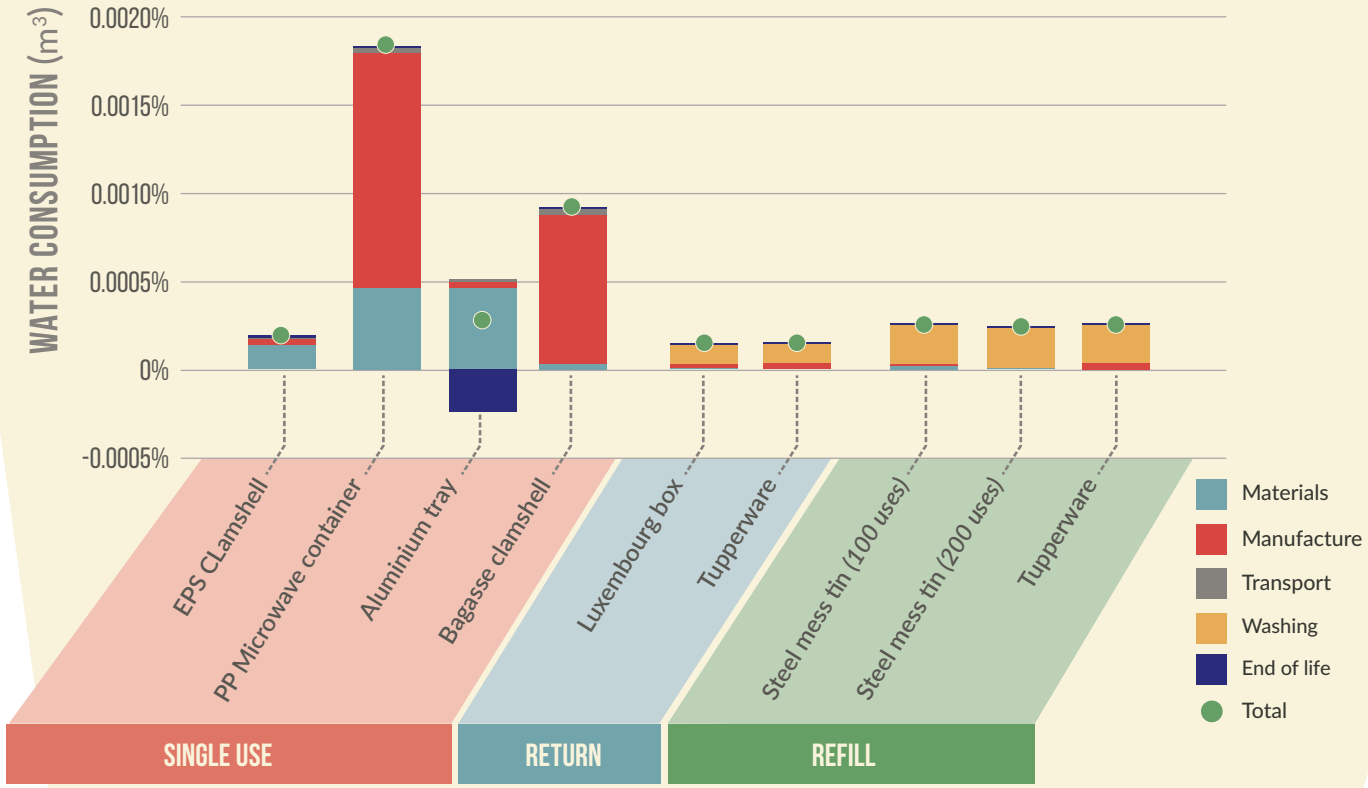
Assuming a 20% reuse rate for takeout in Europe (the first phase target of the proposed policy), reusable cups would save the equivalent of 153,000 Olympic size swimming pools of water, or 101 billion gallons of water and reusable food containers would *save 2.6 million swimming pools* or 1.7 trillion gallons of water.[96] CO2 savings would be considerable as well. At 20% there would be 50 million pounds of CO2 equivalent for cups and 70 million for containers.[97]

Photo: StockCake



Source: Greenwood et al. (2021)

Transport method for returns. The industry reports assume poorly designed systems for return of reusable packaging. Meanwhile, they fail to consider how the systems could be optimized to provide a better outcome for reuse.[100] Zero Waste Europe determined that if 18% of returns are dedicated trips, then the GHG emissions would break even with single-use packaging.[101] Anything lower than 18% would therefore favor reusable packaging for GHG emissions. More efficient return systems are possible with "pooled systems" where a wide range of companies and products participate and optimize drop-off and collection points. By comparison, Hitt et al. (2023) assumed that customers generally return containers to restaurants when purchasing new meals. They also modeled scenarios where customers made extra trips to return containers and varied the return distances and vehicles used. Dedicated return trips can increase global warming impacts and energy consumption depending on the distance and type of vehicle used.[102]

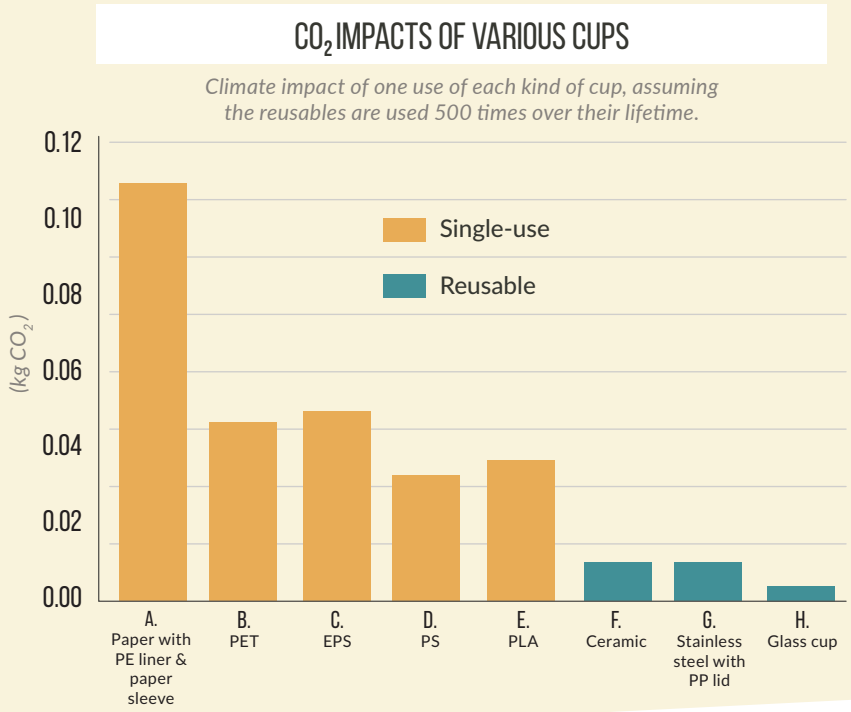


Source: Greenwood et al. (2021) [99]

The Weight of the Evidence: Reuse is Better for the Environment and Saves Businesses Money

The available meta-analyses that compile the results of LCAs comparing reusable to single-use packaging for food service show reusable packaging has lower environmental impacts across most environmental measures. Notably, a recent academic overview by Coelho et al. of the current situation and trends for reusable packaging makes this claim.[103]

Upstream's Reuse Wins report reviews 14 LCAs of single-use versus reusable food service packaging (plates, clamshells and cups) and only one of them found that the disposable options outperformed the reusable option in environmental benefits.[104] Most of the LCAs are peer reviewed and meet the criteria for reliability. The LCAs reviewed show that in as few as two and up to 122 uses, reusable foodware broke even with the single-use on environmental impacts. Since most reusable products last for more than 200 use cycles — especially stainless steel, glass, and ceramic that last for more than 1,000 uses — each use beyond the break-even point accrues environmental benefits. The report showed that through almost every environmental measure, reuse wins compared with single-use. For example, for cups:



Source: Gordon, M., Reuse Wins (2021)

- **Reusable cups have lower CO2 impacts than single-use.** The report evaluated the GHG emissions of cups cited in each of the studies and showed that 500 single-use paper cups with a PE line and paper sleeve have the most GHG emissions (0.11kg CO2), and single-use plastic PET, EPS, PS, and PLA had half as much as paper, whereas a ceramic, stainless steel and glass cup had 0.01 or less CO2.
- **Reuse saves water.** The life-cycle impact of 500 paper cups consumes nearly 370 gallons of water, whereas the life-cycle impact of one ceramic cup used 500 times consumes only 53 gallons of water. This is based on an LCA that proposes 500 uses as the lifetime usage of a reusable ceramic cup.[105]
- **Reuse reduces litter and saves communities money.** The report found that 17 billion pieces of litter are generated from disposable food packaging per year. Reuse can prevent this litter and local businesses and local governments would save $5.1 billion on solid waste management costs.

The UN Environmental Programme Life Cycle Initiative conducted two relevant meta-analyses, based largely on reliable peer-reviewed LCAs with sensitivity analyses that draw this conclusion.

- *Single-use versus reusable dishware*.[106] This UNEP analysis reviewed studies that compared single-use plastic and cellulose pulp (paper) dishware to reusable porcelain and found:
  - paper products have higher global warming, climate change, human toxicity, ecotoxicity, and eutrophication impacts than reusables, and those impacts are often also higher than single-use plastics;
  - reusable tableware consistently outperforms single-use tableware across most environmental impact categories, except for water consumption;
  - policymakers support measures that minimize the impacts of washing (efficient commercial dishwashers); and
  - reusable tableware is clearly environmentally preferable to single-use tableware, therefore policy measures should be established to make the reusable option the most practical option for all stakeholders.
- *Single-use versus reusable cups*.[107] The UNEP analysis of 10 LCAs looked at reusable versus single-use cups for hot and cold beverages. The conclusion was that reusable cups are the better option in regions where renewable electricity makes up a high proportion of the grid mix and recycling rates are low.
  - **Paper is only preferable to other single-use materials where recycling rates exceed 80%, which does not happen,** and is unlikely to happen with cups lined with plastic and contaminated with foodstuff. Single-use cups have similar environmental impacts regardless of the material they are made of (whether bio-plastic, fossil-based plastic or paper).
  - **Reusable cups** (e.g., ceramic cups, glass cups, reusable plastic cups, and melamine and bamboo cups; depending on the design, these cups can have silicon or cork bands; and silicone or rubber lids) **are the best option for hot beverages** as long as washing of the reusable cups between uses is efficient.
  - **For cold drinks, reusable cups are also a better option** (e.g., stainless steel, polycarbonate, etc.) and have lower environmental impacts compared with any other single-use alternative.
  - **In all cases, the number of reuses required to break even is well within the assumed life span of the reusable cups. The break-even points range from 10 to 140 uses, depending on the material used.** For both hot and cold drinks, most studies identify a break-even point for reusable cups, which is the number of times a reusable cup needs to be used for the impact to be similar or better than a single-use cup.

The Parametric life-cycle assessment modeling of reusable and single-use restaurant food container systems published in 2023 by the Center for Sustainable Systems at the University of Michigan considers the life-cycle impacts and costs of a reusable container takeout system in Ann Arbor, Michigan, using a parametric LCA and cost model.[117] In their review of existing LCAs that consider reusable versus single-use containers and takeout systems, they found gaps in the assumptions or inputs in each study. Their parametric LCA addresses gaps and adds sensitivity analysis on a wide range of system parameters such as electricity source, water heater type, and average customer distance from restaurants. They then compare these results to the Ann Arbor reusable takeout system.

SUMMARY OF NOTABLE LCA FINDINGS FOR DISHWARE AND CUPS

DISHWARE:

- **Paper products have higher impacts than reusables across all measures**- global warming, climate change, human toxicity, ecotoxicity, and eutrophication impacts than reusables and those impacts are often also higher than single-use plastics.[108]
- **LCAs consistently find that Global Waring Potential (GWP)- or climate impact- of reusables is lower than single-use.** PP clamshell and stainless steel tiffin GWP is lower than single-use bagasse and PLA, and even aluminum trays.[109] The break-even point for Global Warming Potential (GWP) between a reusable PP container and two single-use options (PLA and bagasse) is 4-6 uses. The reusables decreases GWP by 56% compared with single-use PLA and 69% compared with the single-use bagasse clamshell.[110]
- **Reusable foodware lowers water consumption.** Single-use PLA results in 4-12 times more water consumption than single-use bagasse or reusable PP.[111] Reusable plastic clamshells reused 50 times, and stainless steel tiffins reused 100 or 200 times, have significantly lower water consumption per use than single-use expanded polystyrene (EPS), PP, aluminum and bagasse (fiber) containers.[112]

CUPS:

Single-use cups have similar environmental impacts regardless of the material they are made of (whether bio-plastic, fossil-based plastic or paper). The break-even points for reusables compared to single-use range from 10 to 140 uses, depending on the material used, well within the normal lifespan of a reusable cup.[113]

- **For hot beverages, reusable cups** (e.g., ceramic cups, glass cups, reusable plastic cups, and melamine and bamboo cups) **are the best option** overall for the environment as long as washing of the reusable cups between uses is efficient.[114]
- **For cold drinks, reusable cups are also a better option** (e.g., stainless steel, polycarbonate, etc.) and have lower environmental impacts compared with any other single-use alternative.
- **All reusable cups have lower climate impacts than single-use.** 500 single-use paper cups with a PE liner and paper sleeve have the most GHG emissions (0.11kg CO2), and single-use plastic PET, EPS, PS, and PLA had half as much as paper, whereas a ceramic, stainless steel and glass cup had 0.01 or less CO2.[115]
- **Reusable ceramic cups have a lower water footprint than single-use paper cups.** The life-cycle impact of 500 paper cups consumes nearly 370 gallons of water, whereas the life-cycle impact of one ceramic cup used 500 times consumes only 53 gallons of water.[116]

The study is transparent regarding the data sources and the scope and definition of various inputs such as water consumption and electricity, and how impacts such as global warming potential (GWP), and end-of-life impacts are modeled. In the reuse system modeled, the customer received a reusable container when ordering takeout. The return options modeled include when the customer returns the container to the same location when ordering the next meal and when customers make an additional trip to return the container. The study considered the following container types, which are different in size and capacity: a reusable OZZI PP clamshell and a reusable GET PP bowl with silicone lid, vs. single-use PLA clamshell, single-use PP deli container, single-use aluminum pan with paper board lid, and a single-use bagasse clamshell.

The findings show that overall the reusable container system results in lower impacts across most environmental and cost performance metrics compared with single-use options. Some specific findings show for takeout clamshell options:

- The smaller OZZI reusable PP container outperforms the similar sized single-use PLA and bagasse containers across all life-cycle metrics, based on 20 use cycles.

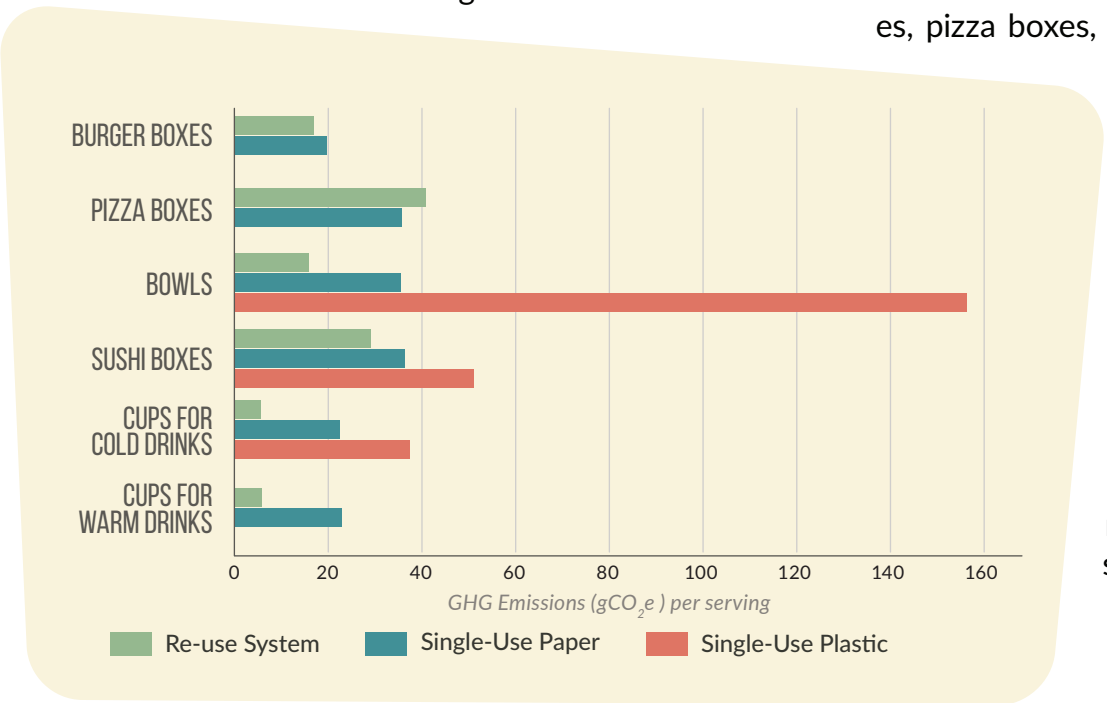
- The break-even point for GWP between the reusable OZZI PP container and two single-use options (PLA and bagasse) is 4-6 uses.
- There is a decrease in Global Warming Impact of 56% when compared with the single-use PLA clamshell and 69% compared with the single-use bagasse clamshell.
- The reusable container results in a decrease in primary energy use of 48% compared with the single-use plastic (made from polylactic acid — PLA) and a 27% decrease compared with the bagasse clamshell.
- The reusable has lower water impacts over its life cycle. The single-use PLA results in 4-12 times more water consumption than single-use bagasse or reusable PP.
- The reusable system results in an 81% decrease in waste.
- The reusable system is 25%-26% less expensive than single-use.

For takeout soup containers, the reusable PP soup container outperforms the single-use PP soup container across all impact categories, including a 50% decrease in primary energy and a 45% decrease in GWP. The larger OZZI PP reusable clamshell outperforms the similar sized single-use aluminum pan across all impact categories, including a 56% decrease in GWP and 15% decrease in primary energy.

Comparing the single-use container options (PLA, bagasse, and aluminum), the analysis found that the PLA container consumed the most water (3-4 times more) and the aluminum container had the most energy impact (34%-87%) and GWP (53%-116%).

The authors conclude that if customers adopt sustainable behaviors, such as only using one trip to return the container, the reusable system offers the best environmental and cost advantages over single-use options. They stress that return options must be convenient and suggest that city-wide systems that offer common containers and return to different locations are most likely to achieve the requisite convenience and efficiency.[118]

A study by Eunomia — Assessing Climate Impact: Reusable Systems vs. Single-use Takeaway Packaging (2023) —- commissioned by TOMRA, ZeroWaste Europe, and Reloop is a useful evaluation of existing LCAs for similar types of containers considered in the EPPA report. It looked at burger boxes, pizza boxes, bowls, sushi boxes, and cups for cold drinks and hot drinks through a GHG emissions lens. The study found that for all formats except pizza boxes, switching from single-use (both plastic and paper) containers to reusable ones has good potential to reduce GHG emissions.[119] The Eunomia study assumed only 25 uses for plastic cups. In real-world systems, higher numbers of reuse are demonstrated.



Source: Eunomia (2023)

Debunking Industry's False Claims

FALSE CLAIM #1. SINGLE-USE PVAPER FOODWARE WHEN RECYCLED HAS LESS ENVIRONMENTAL IMPACT THAN REUSABLE FOODWARE.

Paper recycling isn't as great as it sounds. Paper fibers can only be recycled a few times before they degrade completely. Only about half of the pulp that goes into paper packaging is recycled.[120] Virgin fibers are almost always needed in recycled paper packaging for strength, such that in the EU, recycled content amounts to only 10% in paper packaging.[121]

Recycling paper packaging requires complex infrastructure that is not commonly in use.[122] Paper packaging is easily contaminated with food, making it unrecyclable, and when recovered for recycling most often gets sorted out and sent for landfill or incineration.[123] Many consumers will not correctly sort or recycle paper packaging products, which adds to contamination of the recycling stream.

PAPER CUPS ARE A FALSE SOLUTION TO PLASTIC POLLUTION

It is estimated that 250 billion cups are used and disposed of each year.[124]

- Throwaway paper coffee cups consume 32 million trees and 100 billion liters of water (43,000 Olympic swimming pools) annually, and emit as much greenhouse gas emissions as half a million cars.[125]
- Typically, paper cups are 95% paper and about 5% plastic, which is used in the liner.[126]

FALSE CLAIM #2: DISPOSABLE PAPER-BASED PACKAGING FOR FOOD COMES FROM SUSTAINABLY MANAGED FORESTS AND IS A SUSTAINABLE/RENEWABLE ALTERNATIVE TO DISPOSABLE PLASTICS.

In general, sustainable resource management is a good thing, but reducing resource consumption is better. Reusables mean fewer trees are needed to provide cups.

Sustainable forest certification doesn't mean industry practices are sustainable. The logging and paper industry overall degrades habitats and ecosystems, and emits significant amounts of CO2.[127] Many pulp and paper companies do not operate sustainably or ethically, and the industry is a significant driver of deforestation, greenhouse gas emissions, and human rights abuses.[128] The EPPA report assumes that "products are made solely from paper sourced from European renewable, certified, sustainable forest."[129] But according to the Environmental Paper Network, in a 20-year period, as paper product consumption in Europe increased by 22% to meet the rising demand for paper packaging, European forest pulp production, which rose only 9.8% in that period, could not keep up with demand and significant amounts of paper was sourced through imports of pulp from the Southern hemisphere — from forests that are not sustainably managed. To meet rising demand for paper, as food packaging moves away from plas-

tics, increased sourcing from non-certified forests outside of Europe and logging in European forests is intensifying, resulting in overlogging and deterioration of habitats, biodiversity, and the ability of forests to sequester carbon.[130]

Every year, 3 billion trees are cut down globally for paper-based packaging.[131] In the battle against climate change, trees are a primary defense. They capture carbon and the shading, habitat, and clean air they provide make it nearly inconceivable that they are used for toilet paper or a cup used once and thrown away.[132] Globally, we are losing forests that provide a range of environmental benefits including habitat and biodiversity, soil health, clean air, and carbon sequestration.[133] Intact forest landscapes around the world have shrunk 7.2% since 2000. Timber harvesting, including for papermaking, is responsible for 37% of this loss.[134]

FALSE CLAIM #3. RECYCLABLE PAPER FOODWARE HAS A LOWER WATER FOOTPRINT THAN REUSABLES.

The truth is that single-use paper cups require significantly more water over their life cycle than ceramic and glass cups, and almost as much water as stainless steel travel mugs over their lifetime.[135] For disposables, the primary water consumption occurs during resource extraction and manufacturing, whereas for reusables, it's the dishwashing. The more efficient the dishwashing system, the lower the water use for reusables. The water used in the growing phase of bio-based plastics and fiberware make them a worse choice in terms of water consumption.

The break-even point for water consumption of reusables compared with single-use paper lined with plastic disposable cups are 20 uses of a ceramic mug, 250 uses for stainless steel, and about 250 for a PP and a polycarbonate (PC) cup.[136] 500 paper cups consume nearly 370 gallons of water throughout their lifecycle, whereas one ceramic cup used 500 times consumes over its lifetime only 53 gallons of water. At a 20% reuse rate for cups and food containers, based on existing returnable reusable cup systems in use today (CupClub and Uzaje), Europe would save 1.8 trillion gallons of water a year.[137]

FALSE CLAIM #4. REUSE SYSTEMS EXHIBIT LOW REUSE AND RETURN RATES, THEREFORE THEY WILL INCREASE PLASTIC WASTE AND CONSUMPTION.

This is based on industry reports that assume all reusables will be plastic and a lot of that plastic will be wasted due to low reuse and return rates, such as the Kearney/McDonald's No Silver Bullet report, which assumes three use cycles and 70% return rate, and the EPPA report that envisions a 50% return rate and only two reuse cycles.

Reuse and return rates in the real world, implemented with high ambition, achieve higher results than the fast-food industry's efforts. Existing systems, such as CupClub, report 283 uses and a 90% return rate. During the Closed Loop Partners NextGen cup pilots, they observed return rates above 90% and as high as 97%.[138]

Not all reuse systems use plastic. Reuse in takeout systems is in the formative phase of innovating, learning, and adapting, and many choose plastic cups and containers, but there are others opting for stainless steel, glass, and even ceramic. U.S.-based Usefull uses stainless steel, as does Foreverware in the Chicago and Minneapolis areas and Muuse, which operates in the U.S., Canada, Singapore, and Hong Kong. Okapi reusables only uses double-walled stainless steel cups for hot drinks and glass for cold drinks. They are currently in the San Francisco Bay Area, Seattle, Portland, Vancouver and Tahoe/Reno. Suppli in Toronto uses stainless steel containers.

FALSE CLAIM #5. REUSE FOR DINE-IN OR TAKEOUT COSTS MORE THAN SINGLE-USE.

In terms of the cost of a meal with reusables, the Kearney No Silver Bullet report estimates reuse requirements would make a meal eaten onsite 24 euro cents more expensive and a takeout meal 14 euro cents more costly. Furthermore, the added operating costs of managing reuse range from 1 billion euros to 20 billion euros. No sources are cited for these conclusions and there is no reference to cost savings from the reduced purchasing of disposable foodware and reduced waste disposal costs.

The truth is that reusables have consistently been shown to be cheaper for food service operators than single-use. One analysis estimated that converting 20% of global disposable plastic packaging to reusables presents a $10 billion business opportunity.[139] There are net cost savings, after the upfront investment in reusable foodware, from not purchasing disposables and reduced waste management and litter costs.[140] Real-world experience from ReThink Disposable, a technical assistance program offered by Clean Water Fund that helps businesses transition to reuse for onsite dining, demonstrates through work with over 600 food service operators that reuse saves businesses money 100% of the time. They estimate that the average annual cost savings range from $3,000-$22,000 per business.[141] The overall impact of reuse models depends on companies' willingness to collaborate, forge innovative partnerships, and develop new ways of collectively operating.[142]

LCAs and other modeling demonstrate high cost-savings potential for reuse in takeout food service. The ReThink Plastic alliance estimates 20% reusable packaging in the European takeout food sector could achieve a savings of 3.7 billion euros.[143] In the Hitt et al. study, the Michigan-based reusable takeout system modeled was 25%-26% less expensive than single-use.[144]

FALSE CLAIM #6. PAPER PACKAGING IS SAFER FOR HUMAN HEALTH THAN PLASTICS.

Paper packaging is not plastic-free. Most of the paper and cardboard packaging that is used in food service uses plastic to create water, grease, and flavor barriers. For example, 10% of the weight of one patented food wrap for a burger is plastic.[145] Paper and cardboard pulp that is shaped into packaging forms is often first coated in layers (in a process called "hotmelt lamination") with melted plastics.[146] Similarly, biobased and biodegradable plastic, such as PLA, is also used to coat paper and cardboard.[147] In addition, there are dispersive and emulsive coatings of paper and cardboard with the plastic mixed into a liquid solvent and coated on the paper, leaving a thin layer of plastic. It is applied in layers just like with hotmelt lamination.[148]

The microplastics that are released from paper packaging enter the human body, accumulating in the major organs, crossing the blood-brain barrier and into the uterus, with research pointing to risk of DNA damage, organ dysfunction, metabolic disorder, immune response, neurotoxicity, as well as reproductive and developmental toxicity.[149] Increased risk of heart attack and stroke due to microplastics exposure has been identified for people with heart disease.[150]

Paper is NOT free of harmful chemicals. Almost all paper foodware products contain plastics and harmful chemicals, including plastic resin coatings, plastics infused into the paper fibers, and perfluoro-alkinated (PFAS) chemicals added. PFAS, a class of chemicals known as "forever chemicals" due to their extreme persistence, are associated with risks of some cancers, reduced immune function, and developmental delays in children.[151] In addition, the

chemicals used in the plastics, which are known to migrate in the human body, present many significant health risks.[152]

Nearly all disposable food packaging materials contain toxic chemicals. There are 14,000 known food packaging chemicals in circulation, with 12,000 used intentionally in the manufacture of food packaging (regardless of material types), and 25% of them (3,601) have been found in humans. This is the result of migration out of food packaging into our bodies among other sources. Of those tested for safety, many have been found to cause cancer, endocrine disruption, and chronic disease in humans.[153]

Loopholes in regulatory processes mean that only 25% of the chemicals used in food contact have ever been tested for safe human exposure. The health impacts of most of these chemicals have not been evaluated and reported by producers, but research shows many of them pose significant hazards to human health, including carcinogenicity, mutagenicity, reprotoxicity, and/or persistence. With so much toxicity data missing, health scientists conclude that it is not possible to evaluate which food packaging types are safe for human exposure.[154] In terms of environmental impact, single-use cups made of paper are as toxic in the marine environment as plastic cups.[155]

FALSE CLAIM #7. REUSABLE PACKAGING RESULTS IN HEALTH AND HYGIENE RISKS.

Reusables are not new — they've been used in food service for hundreds of years — and there is no evidence of health hazards related to their use. For on-premises dining, restaurants have been using reusable utensils, plates, bowls, cups and glasses for far longer than disposables have been in use. For takeout, reusables are also not new. There is a longstanding history of reusable packaging used for generations around the world to transport dairy, meats, seafood, fruits and vegetables, grains, and other foods. Reusables are therefore not new in the consumer goods sector — including in food service.

Reusables in food service are well regulated in the U.S. by state food safety codes, which are based on guidance provided by the U.S. Food and Drug Administration (FDA) in the federal Food Safety Code.[156] State food safety codes require that food service operations meet strict washing and sanitizing requirements in order to prevent food-borne illnesses. Local health inspectors enforce these codes carefully.

With respect to the newly emerging business case of third parties providing reusable takeout containers and customers bringing their own reusable containers, the Food Safety Code has recently been updated to provide clear direction for local and state enforcement. In January 2025, new guidance was adopted by the FDA for filling takeaway containers both provided by retail operators and consumers, which will be referenced in the next update to the federal Food Safety Code.[157] Some states, including California, Illinois, Maine, and Washington, have already adopted provisions for the safe refill of customer-provided and third-party reusable containers in their state food safety codes.[158]

Protecting Progress and Moving Forward in U.S. and Canadian Reuse Policies

Strong policies create the conditions for scale, cooperation, and higher-functioning reuse systems. Organizations like EMF and the Sustainable Packaging Coalition (SPC), which include strong industry stakeholder influence, assert that putting policies in place that ensure a level playing field, foster sharing of reuse infrastructure, and de-risk initial investments are necessary for scaling reuse and driving higher functioning systems.[159] The SPC report states that "it is difficult to overstate the importance of policy — open loop reuse systems are unlikely to achieve economic viability without supportive policy mechanisms."[160] It mentions eight policy levers that can advance reuse, suggesting that companies need to advocate for them. These include reuse mandates for onsite dining and in closed loop systems, and for takeout using deposit systems.[161]

Photo credit: McDonald's in France, Miriam Gordon

In France, where reuse is required in on-premises food service, McDonald's reports that 92% of their onsite reusable containers are returned and they are used an average of 29 times. McDonald's only does this because the law requires them to. They do not want it to spread to other countries."[162]

Policy Drives Innovation in Business Models. To date, policy progress is being made in the U.S. and Canada at the local level and has resulted in some early introductions of reusable foodware policy at the state level. Having policies in place to ensure that businesses transition to reuse sets the conditions that help reuse businesses succeed. RECUP is a great example. In 2021, Germany enacted an amendment to its packaging law that required takeout foodservice operators to offer a reusable option to customers by 2023, which positioned RECUP to scale dramatically. The fact that RECUP and other reusable takeout services were gaining a foothold in German cities predisposed the Minister of the Environment to support such a policy.[163] At the time the law was enacted, RECUP/REBOWL already had 12,000 affiliated partners and cafes.[164]

Policy Progress in the U.S. and Canada. Since the City of Berkeley adopted the first reusable foodware policy in the world in 2019, 29 reusable foodware policies have been enacted locally in California and more than 50 policies in the U.S. and Canada.165 The most consistently-adopted policy requires reusables for on-premises dining. It's starting to have an impact as McDonald's in Berkeley is serving onsite diners with some reusables.

To block this progress, the fast-food industry will need to work locally or at the national level through policies that preempt local action. California alone is the world's fifth largest economy. Its influence is a threat to an industry that has demonstrated a commitment to holding fast to the disposable model.

Industry-Funded Reuse Pilot in the U.S. Provides Data That Could be Used to Block Progress. A 2024 three week pilot of reusable cups in Petaluma, California, sponsored by the Next Gen Consortium (McDonald's, Starbucks, Yum! Brands, Wendy's, KFC, Taco Bell, Pizza Hut, Peet's among others) and Closed Loop Partners[166] raises concerns that McDonald's and the fast food industry are once again piloting low performing systems whose data can be used in technical analysis to show that reusables have higher greenhouse gas emissions or water impacts than paper. At the outset, the project seemed designed to fail, with no incentive for customers to return the cups[167] and with all customers receiving drinks in reusable cups, even those who didn't ask for one (many of whom were just stopping on their way to another locale). Sure enough, the project yielded a 51% return rate, yielding a probable two use cycles per cup, similar to the pilot programs on which McDonald's based its European study.

Local Governments and Activists Must Be Prepared and Continue to Lead. We offer this report to aid local governments and activists in the U.S. and Canada in standing up to false data and misleading information as well as strong-arm tactics of industry lobbyists. Make no mistake: McDonald's and the paper packaging industry are coming to the U.S. in 2025 to block progress in the reuse space. They did it in the EU, and will be setting their sights on preventing progress on reuse in the U.S. and Canada. With the planet's resources dwindling rapidly and climate change accelerating and causing devastating impacts on communities across the globe, it's time for an end to the throwaway culture. It's time for vigilance in ensuring that the fast-food and paper industries do not "Hamburglar" reuse.

Photo Credit: Michael O'Heaney- McDonald's in the City of Berkeley, California

Summary – Debunking Industry's False Claims

FALSE CLAIM #1. SINGLE-USE PAPER FOODWARE WHEN RECYCLED HAS LESS ENVIRONMENTAL IMPACT THAN REUSABLE FOODWARE.

THE TRUTH.

- Recycling paper packaging requires complex infrastructure which is not commonly in use.
- Paper packaging is easily contaminated with food, making it unrecyclable, and when recovered for recycling most often gets sorted out and sent for landfill or incineration.
- Many consumers will not correctly sort or recycle paper packaging products.
- Paper fibers can only be recycled a few times before they degrade completely. Only about half of the pulp that goes into paper packaging is recycled.
- Every year, 3 billion trees are cut down globally for paper-based packaging. In the battle against climate change, trees are a primary defense.
- Paper packaging is not plastic-free. Most of the paper and cardboard packaging that is used in food service uses plastic to create water, grease, and flavor barriers.
- Switching from plastic to paper can increase some environmental impacts, while lowering others.

FALSE CLAIM #2: DISPOSABLE PAPER-BASED PACKAGING FOR FOOD COMES FROM SUSTAINABLY MANAGED FORESTS AND IS A SUSTAINABLE/ RENEWABLE ALTERNATIVE TO DISPOSABLE PLASTICS.

THE TRUTH.

- Sustainable forest certification doesn't mean industry practices are sustainable. The logging and paper industry overall degrades habitats and ecosystems and emits significant amounts of CO2.
- Globally we are losing forests which provide a range of environmental benefits including habitat and biodiversity, soil health, clean air, and carbon sequestration.

FALSE CLAIM #3. RECYCLABLE PAPER FOODWARE HAS A LOWER WATER FOOTPRINT THAN REUSABLES.

THE TRUTH.

- Single-use paper cups require significantly more water over their life cycle than ceramic and glass cups but almost as much water as stainless steel travel mugs over their lifetime. In a Starbucks study, ceramic reusables reduced water consumption by 64% compared to disposable paper cups.
- The life-cycle impact of 500 paper cups consumes nearly 370 gallons of water whereas one ceramic cup used 500 times consumes over its lifetime only 53 gallons of water.
- At a 20% reuse rate for cups and food containers, based on existing returnable reusable cup systems in use today (CupClub and Uzaje), Europe would save 1.8 trillion gallons of water a year.

FALSE CLAIM #4. REUSE SYSTEMS EXHIBIT LOW REUSE AND RETURN RATES THEREFORE THEY WILL INCREASE PLASTIC WASTE AND CONSUMPTION.

THE TRUTH.

- In France, where reuse is required in on-premises food service, McDonald's reports that 92% of their onsite reusable containers are returned and they are used an average of 29 times.
- Reuse in takeout systems are very much in the formative phase of innovating, learning, and adapting. While many of them are choosing plastic cups and containers, there are many others opting for stainless steel, glass, and even ceramic.
- Reuse and return rates in the real world, implemented with high ambition, achieve higher results than the fast food industry's efforts. Existing systems, such as CupClub, report 283 uses and a 90% return rate. During the Closed Loop Partners NextGen cup pilots, they observed return rates above 90% and as high as 97%. Vytal and Recirclable achieve 98% returns.

FALSE CLAIM #5. REUSE FOR DINE-IN OR TAKE-OUT COSTS MORE THAN SINGLE-USE.

THE TRUTH.

- The economics are clear. Reusables are always cheaper for food service operators than single-use. Having converted over 600 businesses to reusables in a voluntary technical assistance program, ReThink Disposable reports all businesses save money- the range on average is between $3,000 and $22,000 per year per business.
- Converting 20% of global disposable plastic packaging has been estimated to present a $10 billion business investment opportunity.
- LCAs and other modeling demonstrate high cost-savings potential for reuse in the food service sector.

FALSE CLAIM #6. PAPER PACKAGING IS SAFER FOR HUMAN HEALTH AND THE ENVIRONMENT THAN PLASTICS.

THE TRUTH.

- Nearly all disposable food packaging materials contain toxic chemicals.
- Paper is NOT free of plastics or harmful chemicals.
- Single-use cups made of paper are as toxic in the marine environment as plastic cups.
- Loopholes in regulatory processes mean that only 25% of the chemicals used in food contact have ever been tested for safe human exposure, but research shows many of them pose significant hazards to human health, including carcinogenicity, mutagenicity, reprotoxicity, and/ or persistence.

FALSE CLAIM #7. REUSABLE PACKAGING RESULTS IN HEALTH AND HYGIENE RISKS.

THE TRUTH.

- Reusables in food service are well regulated in the U.S. by state food safety codes and local health inspectors based on guidance provided by the federal Food and Drug Administration (FDA)in the federal Food Safety Code.
- Reusables have been used in food service for centuries- they are not new and there is no evidence of health hazards related to their use.
- With respect to the newly emerging business case of third parties providing reusable take-out containers and customers bringing their own reusable containers, the U.S. Food Safety Code has recently been updated to provide clear direction for local and state enforcement.
- Some states, including California, Illinois, Maine, and Washington have already adopted provisions for the safe refill of customer-provided and third party reusable containers in their state food safety codes

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THE STORY OF

STUFF

PROJECT