PLASTICS IN FOOD SERVICE:
PROMOTING ALTERNATIVES

Plastics are energy and chemical-intensive to produce and most are created to be disposed of after minimal usage. **A lot of plastic waste ends up accumulating in our environment.**

Plastics are used in many categories of food service products, including but not limited to:

- **Customer Experience** such as dinnerware, takeout containers and single use condiments
- **Internal Operations** such as food purchase, storage & handling
- **Textiles** such as uniforms, tablecloths, napkins, carpets & upholstered furniture

Each of these is discussed further in this guide.

How Much Plastic is in Our Bodies?

The main exposure routes for humans include food, drinking water, and air inhalation. A study* published in 2021, found that the average person consumes around 883 tiny pieces of plastic, or about 4 micrograms each day. Some is excreted, but some is accumulating. The science isn't clear yet.

A study* published in 2025 indicates that the amount of plastic in the human brain has increased by 50 percent between 2016 and 2024, and that the brains of people who had dementia had three to five times more microplastics than those without dementia.

Definitions

Throughout this document, the term microplastics refers to all plastic particles less than 5 millimeters in size. Technically, particles less than1 micrometer (0.001 millimeter) are called nanoplastics.

Understanding where plastics are utilized in food service and how to minimize the purchase of single use plastics can save money and reduce waste generation, the use of harmful chemicals, and the amount of plastic entering the environment and water supplies.

WHY ARE PLASTICS HARMFUL?

Plastics, unlike natural materials, cannot biodegrade when they enter the environment. Instead, **they break down into ever smaller particles called microplastics and then get even smaller, known as nanoplastics**. In addition to being in the environment, including water bodies and the air, many microplastic particles become small enough to enter the food chain and cause harm to human health. Plastics contain chemical additives that enhance the functionality for different purposes and can add to toxicity. In the environment, these small plastics can bind to toxic chemicals such as heavy metals and organic pollutants and carry them into our bodies, causing adverse health effects. **Plastic has been found in almost every part of the human body** and scientists have determined negative health effects including increased risk of heart attack and stroke*.

Human exposure to plastics from food service can be from:

- Direct consumption of food impacted by microplastics
- Drinking water containing microplastics
- Breathing in and consuming microplastic fibers shed by plastic-containing textiles

CUSTOMER EXPERIENCE

Many disposable dinnerware and takeout packaging items are made of plastic. A 2021 study* found that nearly 95% of food packaging goes to waste after just one use. Some examples of common plastic items include:

- Take-out containers such as clamshells
- Disposable cups, plates, bowls, cutlery, etc.
- Plastic wrapped items such as a pre-made sandwich

When plastic foodware and packaging are used, microplastics can transfer from the packaging to the food product leading to direct consumption of plastic*. **Note that higher temperatures and longer durations of time can lead to greater amounts of plastics and their chemical additives in food.**

The main solution to extensive use of single-use disposables is to switch to reusables, even for takeout containers. While many dismiss the switch due to perceived cost increases, many restaurants, cafeterias, and other food service establishments find that it is cost effective, and often a savings. It is also important to consider the many co-benefits, including:

- Improved appearance of your facility – plastic disposables create litter in and outside the building
- Less trash to manage saves $$$ in terms of staff labor and disposal costs
- Decreased contamination of recycling and compost
- Increased customer appreciation and loyalty

Generally, Customer Experience uses of plastic can be grouped into three categories:

- **Dine-in Restaurants & Cafeterias**
- **Takeout Services**
- **Condiments & Accessories**

Each of these is discussed in the following sections.

Dine-in Restaurants & Cafeterias

Use of reusable dinnerware and serviceware might be a practical solution for dine-in services. Although it requires the purchase of the reusables and manual or mechanical dishwashing, it can still be cost effective. The purchase of the reusables and the cost of logistics to use them is typically offset in a short amount of time by the savings from not continuously purchasing the disposables combined with the reduction in the quantity of waste that needs to be managed.

For example, if a disposable coffee cup costs 5 cents each, and a ceramic mug costs $2, then the ceramic mug is equivalent to 40 disposable cups. Once the ceramic mug is reused 40 times it has paid for itself, and future reuse creates a savings in terms of purchasing that can add up to significant $$$ over months and years.

For a successful transition to reusables, it is important to consider the collection method, staffing, materials, and equipment needs and logistics. Some things to consider:

- Collection of reusables in the dining area and transport to the washing area – what is the best method?
- Operation scale – can the reusables be added to current dishwashing protocol? If not:
  - can an automatic dishwasher be added to the existing space?
  - would using a third-party service be feasible?

CASE STUDY: DINE-IN SWITCH TO REUSABLES

A restaurant with on-site dining as 88% of their business originally used all disposable containers, utensils and individual salt, pepper and sugar packets. When they switched to ceramic plates, stainless steel utensils and glass containers with metal lids they saw the following investments and savings:

- $322 upfront investment for reusable foodware
- $16,991 in total annual net cost savings
- 67,221 disposable items reduced per year
- 2.6 tons of annual waste reduction
- 2-month average pay-back period

CASE STUDY: DINE-IN GRADE SCHOOL CAFETERIAS

The Ten Towns Toolkit*, New Hampshire

The toolkit is designed to help towns take policy, engagement and infrastructure actions toward plastic waste reduction and zero waste strategies. The NH Network Plastic Working Group produced informational guides to support schools in switching to reusable trays and utensils. Case studies demonstrate that if schools switch to reusable stainless-steel utensils and trays, overall costs and the amount of waste generated both greatly decrease. The information guides encourage holding fundraisers and applying for grants to support the cost of purchasing reusables and the cost of a commercial dishwasher.

Takeout Services

Opportunities to switch to reusables for takeout use some variation of a deposit/return model. The customer pays a deposit that is credited when the reusable is returned. Typically, a credit card is also needed on file which is only charged if the reusable is not returned. There are generally three options for managing and washing reusables:

1. **Collect and wash** them at the same facility that issues them (see Deposit/Return case study)
2. **Band together** with other area restaurants to provide the same reusables, and then the customer can return them to any participating restaurant which then washes them (see Restaurant Collaboration case study)
3. **Use a third-party service** that provides the reusables and washes the returned items at a central off-site location (see Third Party Service case study)

*This last option (#3) can also work for dine-in and has been implemented at numerous K-12 school cafeterias**

WHAT YOU CAN DO:

- **Choose reusable dining ware and takeout containers!**
- When disposable is the only realistic option:
  - **Use compostables** made from fiber (not PLA plastic). Look for BPI-certified compostable products. Read the PFAS box below for key considerations.
  - **If you must use plastic**, choose products that are recyclable in the local system - see page 6
- **Encourage patrons** to bring their own reusable containers to manage their leftovers
- **Use sustainably produced** paper or compostable bags instead of plastic bags for takeout (and leftovers)
- **Consider a reusable takeout container program** similar to one of the highlighted case studies

Beware of PFAS!

Many molded fiber and paper disposable dinnerware are treated with chemicals such as Per- and Polyfluoroalkyl Substances (PFAS) to achieve water- and grease-resistant properties. PFAS are frequently called “forever chemicals” because they do not breakdown and build up over time in the environment, animals, and people. PFAS are associated with numerous negative health effects. A 2016 study* found 57% of disposable dinnerware products tested contained PFAS. To help avoid purchasing items containing PFAS:

- Look for “No/Low F” listed products in the Center For Environmental Health (CEH) Database of Single-Use Food Service Ware Products Tested for Fluorinated Additives published in 2021: https://docs.google.com/spreadsheets/d/1sNwuTxMwNMKfLo0B033OblXQzkja5nJwv_MNSEcr6HM/edit?usp=sharing
- Look for GreenScreen-certified products. GreenScreen maintains a database of its certified products at: https://www.greenscreenchemicals.org/certified/products-standards
- Look for BPI-certified compostable products. BPI maintains a database of its certified products at: https://bpiworld.org/find-certified-products

CASE STUDY: TAKEOUT RESTAURANT COLLABORATION

Shared Reusable Containers and App*

Multiple Massachusetts restaurants in the greater Boston area have partnered with a third-party company to manage reusable takeout containers. Customers download an app and use it to order takeout. When ordered through the app, the restaurants are alerted that the customer has requested a reusable container. The service is free to use, but payment details are collected and charged if the containers are not returned. The containers are returned to any participating restaurant and are washed by the receiving restaurant. The more restaurants that join the program, the more cost-effective the system. Three restaurants in the coastal area of New Hampshire partnered to implement a similar system in 2024*.

Condiments & Accessories

Most single use serviceware have no recycling market due to their small and irregular shape, inconsistent plastic material and flimsy nature, so they end up in the trash or in the environment as litter. A study* reports that the United States use nearly one trillion disposable food service products each year. Some examples of single use serviceware include:

- Condiments (like ketchup, mustard and soy sauce)
- Bread wrapped in plastic, a butter packet, or pre-packaged chips
- Utensils
- Straws
- Stirrers
- Beverage lids

Many single use items are provided automatically whether the customer wants them or not. Only providing what the customer actually needs saves the service provider $$$ and minimizes waste and pollution. Allow customers to specify what serviceware for takeout and delivery meals they require when ordering their meal either verbally or in your online ordering system – and then **make sure to follow their instructions** when preparing their order. Another option for restaurants where most customers pick up their order at the counter, such as a bakery or lunch deli is to have a self-service station where they can choose only the serviceware they actually need.

CASE STUDY: TAKEOUT DEPOSIT/RETURN

EcoWare & Reuse Pass at the University of Vermont

All on-campus dining facilities have implemented a takeout system that uses only reusable containers. The EcoWare program is the only way to take food out of the dining halls. It is free to all students, staff, and faculty, But everyone needs to register and receive their unique ReusePass QR code on their mobile device. Before swiping into the dining hall, users inform the cashier that they are getting a takeout meal and checkout the needed EcoWare containers by scanning their ReusePass and the cashier scans the QR code on the container(s).

The empty container(s) need to be returned within 3 days to the return bin in any EcoWare dining location. The dining team then scans, washes, and sanitizes the containers. If containers are not returned after 5 days, the users account is subject to a $5 charge per container. The EcoWare containers are leak-resistant, BPA-free, dishwasher/freezer safe, and can be used up to 300 times. They are made from plant-based (PLA) plastic containing 20-30% recyclable materials.

Ask About Single-Use Items

In 2022, the State of Washington implemented a law that requires food service providers to verbally ask which single-use items customers want or have customers select the items from a self-service counter instead of automatically including these items in orders.

Counter service dining rooms and cafeterias should be equipped with bulk and reusable serviceware stations with options such as metal utensils, reusable cups and refillable condiment containers. Access to single-use serviceware such as straws, stirrers and disposable beverage lids should be limited at dine-in services and only provided when asked for. Some ideas for reusable serviceware include:

- Metal utensils
- Large refillable condiment dispensers at a self-service station for items including ketchup, mustard, sugar, salt, pepper, soy sauce, syrup, spices
  - Provide sauce cups made of paper or metal
  - Another option is to place refillable bottles on each table (made of glass if possible)
- Coffee-creamer and milk pitchers
- Reusable food trays or baskets

WHAT YOU CAN DO:

- Swap all single-use dine-in serviceware to larger reusable and bulk alternatives
- **Do NOT automatically** provide serviceware with takeout and delivery orders
  - Institute a system that allows customers to request the serviceware they require for that meal

INTERNAL OPERATIONS

There are opportunities for plastic reduction when purchasing and storing food. Take the time to review plastic use from the point of purchase to consumption.

Purchasing

Many foods are packaged and transported in plastic. Start by scrutinizing the food packaging from your supplier(s):

- What comes in plastic packaging?
- Can you purchase items in bulk to reduce packaging?
- Does your supplier have reusable crates that can be returned after deliveries?
- For foods that must be packaged in plastic, can it be in plastic that can be recycled in your local system or is there an option for compostable containers?
- If plastic packaging is unavoidable with your current supplier, is there a different supplier that could help reduce your plastic footprint?

Storage & Handling

Next, consider how food is stored during and after preparation:

- What containers are food stored in? How are they sealed? Do you use plastic wrap?
  - Can you **store food in glass or stainless steel containers** with silicone lids?
- If you can compost, can single-use plastic gloves be replaced with BPI-certified compostable gloves?

Lastly, consider if there is often wasted food. Preventing the overproduction of food can directly translate to:

- Fewer food handling and packaging plastics used such as single-use gloves, plastic wrap, and containers
- Saves $$$ from lower food purchase and waste management costs
- Saves $$$ by using less water, energy and staffing resources

WHAT YOU CAN DO:

- **Review food packaging from suppliers** and:
  - Purchase items in bulk to reduce packaging (if it won't lead to wasted food)
  - Use containers that suppliers can take back
  - Choose food containers that are recyclable or compostable in the local system
- **Choose compostable food service gloves** that are BPI-certified
- **Use non-plastic reusable containers** instead of disposable plastic storage options
- **Use containers with silicone lids** in place of plastic wrap

UNDERSTANDING PLASTIC RECYCLING

Just because something is labeled with a recycling symbol does not mean that it is recyclable!

Unfortunately, a lot of plastic has no feasible market and cannot be accepted in the recycling bins. If you have to use disposable plastic containers, make sure to only purchase items made from plastic that can be accepted for recycling by the local system.

Make sure your food service establishment:

- **Recycles as much as possible and does its own recycling correctly**
- **Only purchases packaging & takeout containers that are truly recyclable**

Consider the recyclability of all takeout items when purchasing wholesale or from a distributer:

- Clear clamshell containers and other items made from #6 plastic are **NOT** recyclable
- Most recycling facilities do **NOT** want BLACK plastic of any kind.
- Avoid small plastics-items smaller than 2 inches by 2 inches are **NOT** recyclable
- Only purchase clear, white, or non-black colored plastic takeout containers made from #1, #2 or #5 plastic

1 PETE 2 HDPE 5 PP

Unfortunately, many things that seem like they "should" be recyclable are not. **Just because something is plastic, doesn't mean it's recyclable.**

Plastics that are **NOT** recyclable include:

- Type 3 – Polyvinyl Chloride (PVC)
- Type 6 – Polystyrene (PS)
- Type 7 – Mixed (Other)

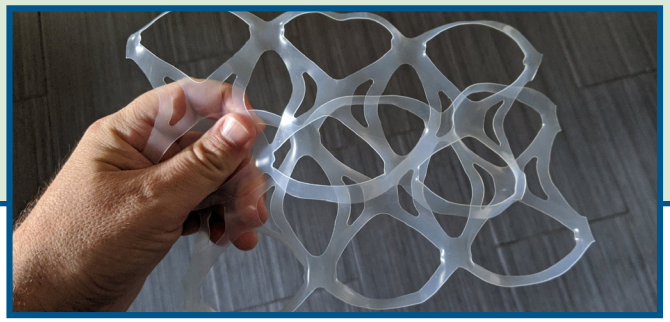
Foodservice Plastic Types that are Generally Recyclable

PLASTIC TYPE	USED TO MAKE
1 PETE Type 1 Polyethylene Terephthalate (PET or PETE)	• Bottled water and soda bottles • Food packaging such as peanut butter, oil and dressing containers • Some takeout food containers
2 HDPE Type 2 High Density Polyethylene (HDPE)	• Food packaging such as milk containers • Some cleaning product containers
5 PP Type 5 Polypropylene (PP)	• Some takeout food containers • Food packaging such as yogurt cups • Cloudy plastic containers such as baby bottles

What to Do About Plastic Bags, Films & Other Flexibles

4 LDPE

Flexible plastics are made from Type #4 – Low Density Polyethylene (LDPE). Examples include thin-film plastic store/take out bags, thin-filmed food packaging such as bread bags, cling film, trash bags and six-pack rings. Plastic bags, films and other flexibles should NEVER be put in regular recycling collection bins. They cause many problems at recycling facilities, including jamming up equipment. Work with your recycling hauler to see if they can take them separately. Or you can collect them and take them yourself to collection bins at most grocery and big box stores.



TEXTILES

Many fabrics contain plastic, including synthetic fibers such as polyester, nylon, rayon, acrylic and spandex. Examples of textiles used at food service establishments that may contain plastics include:

- Uniforms
- Tablecloths & napkins
- Upholstered chairs, booths & other furniture
- Carpets

When fabrics made with synthetics are washed, some of the plastics are shed as microplastics into the wash water that is discharged. If your facility is on a sewer system, the treatment plant cannot remove all the microplastics and it enters the environment in the discharging water and through sludge disposal. If you wash on-site or use a professional cleaning service, the microplastics are still discharged and enter the environment.

When larger items such as upholstered furniture or carpets are soiled, spot cleaning will limit the amount of microplastics released compared with washing the entire surface. When replacing furnishings or flooring, consider materials such as wood or tile. Cleaning these surfaces is easier and reduces the release of microplastics

When are PFAS in Textiles?

Many fabrics and carpets are treated with per- and polyfluoroalkyl substances (PFAS) to achieve water- and stain-resistant properties. PFAS are frequently called "forever chemicals" because they do not breakdown and build up over time in the environment, animals, and people. PFAS are associated with numerous negative health effects. Since most PFAS are considered proprietary ingredients, manufactures do not disclose their use of PFAS. When PFAS-treated fabrics and carpets are washed, PFAS is released into the water. **The best way to avoid releasing PFAS and microplastics into the environment is to opt for untreated, natural fabrics** such as cotton, hemp or linen when purchasing uniforms, table linens, carpets, and other soft goods.

Washing Textiles

If you can't stop using textiles made with plastic, consider using a front-loading washing machine. A study* about washing synthetic textiles found that top-loading washing machines caused more microfiber shedding as compared to front-loading alternatives. Many front-loading machines also use less water resources and energy to run as compared to a top-loader: ENERGY STAR certified front-loading machines use about 45% less energy and 50% less water than a top load agitator washer*

WHAT YOU CAN DO:

- **Don't buy** uniforms, tablecloths, napkins, carpets or other textiles that are made from synthetic fibers including polyester, nylon, rayon, acrylic and spandex
  - Look for untreated, natural fabrics like cotton, hemp or linen
  - Avoid fabrics labeled as water-, stain- or oil-resistant as these are likely treated with toxic chemicals
- **Choose wood furniture** with cushions made from natural fabric (that is not treated to be water-, stain- or oil-resistant) rather than upholstered furniture
- **Consider replacing** all plastic-containing textiles with natural, untreated options
- **Consider wood or tile** flooring instead of carpet
- **When buying** a new rug or carpet, opt for natural fibers and avoid all carpets with water- or stain-resistant treatment
  - Wool is a natural fiber that has natural water- and stain-resistant properties (note that wool carpet can be more expensive than carpets made from plastics such as acrylic, polypropylene, and polyester)
- Rather than wash the entire carpet, **try to spot treat** with plain soap and water or other all natural stain removal remedies

KEY TAKEAWAYS

Switching to reusables is almost always cost effective and saves $$$

- The one-time cost of purchasing reusables is quickly **offset by eliminating** the continuous cost of purchasing disposables
  - Plastic Free Restaurants will pay for some or all of the cost of purchasing reusables if you are replacing disposable plastics – really! https://www.plasticfreerestaurants.org
- **Less trash to manage saves $$$** - frees up staff time and increases employee satisfaction – and lowers disposal costs
- To save $$$ and for an eclectic look – **shop for reuseables at secondhand stores**

Reusables are not just for dine-in – there are containers and systems for takeout

Switch to bulk containers (glass or metal if possible) for condiments and things like sugar and milk – either on the table or at a self-service station for counter takeout

- **Avoid disposable packets** and other small disposables – they are NOT recyclable and generate a lot of litter
- Provide disposable **condiments/utensils** with takeout **ONLY IF** the customer specifically requests them

If you continue to use plastic – make sure:

- To only **purchase containers that can be recycled** in your local system – generally #1, #2, or #5 plastics
- **DO NOT buy BLACK plastic** – find different takeout containers
- **NEVER purchase #6 plastic** (polystyrene) – including the clear clamshells and lids for aluminum containers
- **Plastic utensils are NOT recyclable**

Eliminating/Reducing disposables has many "hidden" benefits:

- **Reduced litter** in and around your facility
- **Less trash to manage** saves $$$ - reducing labor and disposal costs
- **Decreased contamination** of recycling and compost
- **Upgraded customer experience** - increasing customer appreciation and loyalty

CASE STUDY: TAKEOUT

Third Party Services*

Third party services supply reusable dinnerware and/or takeout containers, collect them, wash them at a centralized off-site facility, and resupply the facility (when there to collect the dirty ones). It operates similarly to a linen service that many restaurants and institutions are already familiar with. Generally, the economics work best at a larger scale due to the collection and transport logistics – for example, at school or company cafeterias – but there are services catering to a group of restaurants. To-date, third party services are mainly available in larger cities and college towns, but the idea is spreading!

*For references and more information, visit www.newmoa.org/projects/plastics-in-consumer-products-food-service

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