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Reports

Circular Claims Fall Flat:

Comprehensive U.S. Survey of Plastics Recyclability

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Plastic Resin Identification Codes[1]

A. Comprehensive U.S. Survey of Plastics Recyclability

1. Executive Summary

A comprehensive survey of plastic product waste collection, sortation and reprocessing in the United States (U.S.) was performed to determine the legitimacy of "recyclable" claims and labels on consumer plastic products. The survey is based on current conditions in October 2019 to January 2020 and U.S. Federal Trade Commission (FTC) Green Guides requirements for product claims and labeling.

Accurate recyclable claims and labels serve three valuable functions: truthful advertising to consumers, prevention of harmful contamination in America's recycling system, and identification of products for elimination or redesign to reduce waste and plastic pollution.

Key results of the survey include:

1. Only some PET #1 and HDPE #2 plastic bottles and jugs can be legitimately labeled as recyclable in the U.S. today.
2. Common plastic pollution items, including single use plastic food service and convenience products, cannot be legitimately claimed as recyclable in the U.S.
3. Plastics #3-7 have negligible-to-negative value and are effectively a category of products that municipal recycling programs may collect, but do not actually recycle. Plastic #3-7 waste collected in municipal systems across the country is being sent to landfills or incinerated.
4. Many full body shrink sleeves on PET #1 and HDPE #2 bottles and jugs make them non-recyclable.

Since China enacted policies limiting plastic waste imports, there have been significant changes in plastics acceptance policies of U.S. material recovery facilities due to declines in the demand for and value of collected plastic material. Post-consumer "mixed" plastics (plastics #3-7 and non-bottle plastics #1 and #2) have been most affected because China was the primary destination for those types of collected plastic wastes and there is minimal demand, value or reprocessing capacity for them in the U.S. Some material recovery facilities (MRFs) still accept mixed plastics but dispose of it or continue to export it outside of North America. Since collected mixed plastics are disposed of, incinerated or exported without verified recycling, acceptance of such a plastic item at a MRF alone is not sufficient and reasonable assurance to a customer that it will be manufactured into another item, as required by the FTC.[2]

Therefore, it is fair to assume that the standard for reasonable likelihood of a plastic item being recycled requires acceptance by municipal collection *and* U.S. domestic recycling/reprocessing capacity. Companies cannot legitimately place recycle symbols or "Check Locally" text on products made from plastics #3-7 because MRFs nationwide cannot assure consumers that valueless plastics #3-7 bales will actually be bought and recycled into a new product.

The results of this survey reflect the current conditions in early 2020, but may be affected in the future by changes in collected material value, Americans' access to recycling and domestic plastics reprocessing capacity. The economics of collecting, sorting and reprocessing plastic products are likely to worsen as expansion of plastic production lowers the cost of new plastic resin.

2. Key Takeaways for Companies Making and Selling Plastic-Packaged Products

In response to growing public concern on plastic pollution and excessive plastic waste generation, many corporations are making high profile, global commitments to make their products recyclable, reusable or compostable.[3] Companies are expanding the use of "recyclable" labels on plastic products at an aggressive pace.[4] Since claims and labels affect a consumer's purchasing decision, the claims and labels must not be misleading to be legal and provide the environmental benefits claimed.

Key outcomes from this comprehensive survey of U.S. collection, sortation and post-consumer plastic reprocessing facilities and recommendations for companies:

1. **Only PET #1 and HDPE #2 bottles and jugs, with acceptable shrink sleeves and labels, can be claimed as recyclable in the U.S. today**. The many other types of consumer plastic products and packaging are not recyclable and should not be claimed or labeled as such.

2. **Companies are liable and at risk now**. Companies that make "recyclable" claims in marketing materials or on products are liable for misrepresentation and need to ensure that the claims are accurate and not deceptive or misleading. Recyclable claims or labels on products other than PET #1 and HDPE #2 bottles and jugs are not accurate in the U.S. and expose companies to legal, reputational and financial liability risks.
3. **Companies need to develop their own recycling expertise**. Given the significant financial and brand risks associated with labeling products as recyclable, companies must have credible in-house expertise on the local recyclability of their products and must verify the accuracy of labels themselves. Outsourcing the decision and approval of product labels to external organizations does not protect companies from being held liable for misrepresentation if incorrect labels are used.
4. **Companies must be truthful and transparent in progress reports on pledge commitments.** In the U.S., public claims of progress on recyclable, compostable or reusable products are subject to the requirements of the FTC Green Guides. Companies who have made global commitments must produce progress reports that include the local recyclability of specific products that they sell in each market. Sufficient detail and transparency must be provided to prove claims of the progress made.
5. **Companies must take extended producer responsibility**. Companies that want their plastic products to be recyclable should make direct investments in collection, sortation and proven mechanical reprocessing of the specific type of plastic product. Companies cannot simply label their plastic products as "recyclable" and expect taxpayers to pay for the recycling systems to achieve it. Nor can they stall progress and rely on future development of unproven and problematic chemical recycling schemes. Just as companies invest in new product factories when they want to meet their profit goals, companies must similarly invest in collection, sortation and reprocessing to meet recyclable pledge goals.

Most types of plastic packaging are economically impossible to recycle now and will remain so in the foreseeable future. Companies must move beyond the outdated, failed approach of promoting recycling as the solution to excessive plastic waste and pollution. Furthermore, few U.S. cities have industrial composting facilities[5] required to treat compostable plastics and many compost facility operators don't want compostable plastics.[6] We cannot recycle or compost our way out of the growing plastic pollution problem. Instead of pretending that the trillions of throwaway plastic items produced each year will be recycled or composted, we must stop producing so many of them in the first place. To meet their "recyclable, reusable or compostable" pledge commitments, companies must become serious about employing reusable/refillable business models.

Governments and corporations are increasingly aware that their constituents and customers want choices that are better for the environment and our families now and the future generations to come, as demonstrated by legislative action[7] and pledges by companies[8] on plastic products.

To protect the health of humans and fellow creatures who share our planet, the urgent priority must be to eliminate single-use consumer plastic, and to invest in reusable, refillable and package-free approaches.

3. Survey Purpose and Drivers

This survey establishes a transparent, traceable review for the purpose of determining the legitimacy of "recyclable" claims and labels on United States (U.S.) consumer plastic products based on the current conditions in January 2020 and U.S Code of Federal Regulations 16 CFR 260 ("Green Guides") requirements for product claims and labeling. In the Green Guides, the Federal Trade Commission (FTC) requires that "Marketers must ensure that all reasonable interpretations of their claims are truthful, not misleading, and supported by a reasonable basis before they make the claims."[9] The FTC further states: "In the context of environmental marketing claims, a reasonable basis often requires competent and reliable scientific evidence. Such evidence consists of tests, analyses, research, or studies that have been conducted and evaluated in an objective manner by qualified persons."

The U.S. is grappling with two major plastic waste problems: plastic pollution and generation of excessive plastic waste that is disposed to landfills or incinerated with significant carbon emissions. In the past few years, there have been massive changes in America's recycling systems and an increase in plastic production that has reduced the cost of new plastic. The last comprehensive assessment of plastic waste recyclability was performed in 2015/2016[10] and is not representative of current market conditions, in part because of waste import restrictions imposed by China. An accurate and up-to-date analysis of the existing domestic collection and recycling/reprocessing capacity is needed now to determine the true recyclability of plastic consumer products.

3.1 Why do Truthful Claims and Labels on Plastic Products Matter?

Accurate recyclable claims and labels on consumer products serve three valuable functions:

1. **Honest Advertising to Consumers**: Claims and labels on products inform customers whether there is a potential environmental benefit to one product compared to another. Since claims and labels affect a consumer's purchasing decisions, the claims and labels must not be misleading to be legal.[11]
2. **Prevent Harm to America's Recycling System and Avoid Wasted Energy, Labor and Costs**: Incorrect recyclable labels cause consumers to mistakenly place an item in a recycle bin and cause contamination in municipal recovery facilities (MRFs). The contamination harms the ability of the MRFs to cost-effectively collect and sort other materials such as cardboard and paper that are easily ruined by contact with food-soiled packaging.[12] Energy, carbon emissions, labor and costs are wasted from collecting and sorting unwanted, worthless items through municipal sortation systems.[13]
3. **Identify Products for Redesign to Reduce Waste and Plastic Pollution**: Plastic consumer products that are not practically recyclable in municipal systems should be the first to be eliminated or redesigned, preferably to be refillable or reusable products, or be made from more environmentally advantageous materials.

Companies have marketed consumer products as having an environmental benefit, such as being recyclable, since the 1980s.[14] In response to growing public concern about plastic pollution and excessive plastic waste generation, many companies are making high profile, global commitments to make their products recyclable, reusable or compostable.[15] Product and packaging manufacturers are also pressuring MRFs to accept plastic to make them appear redeemable and avoid plastic bans. As the nation's largest waste collection and sortation company, Waste Management, stated in their 2018 Annual Report, "bans have increased pressure by manufacturers on our recycling facilities to accept a broader array of materials in curbside recycling programs to alleviate public pressures to ban the sale of those materials. However, with no viable end markets for recycling these materials, we and other recyclers are working to educate and remind customers of the need for end market demand and economic viability to support sustainable recycling programs."[16]

Companies that make "recyclable" claims in marketing materials or on products may face liability from consumers as well as from the FTC for misrepresentation and need to ensure that the claims are accurate and not deceptive or misleading. A class action lawsuit on recyclable claims on single use plastic products is currently pending against Keurig Green Mountain in U.S. Federal District Court.[17] Other corporations could face similar, significant financial and reputational risks from deceptive labels on their plastic products that are on store shelves now.

3.2 Massive Change in U.S. Plastic Recycling Markets

Since the mid-1990s, U.S. states and cities have sought to increase recycling of municipal solid waste to avoid disposal by landfill or incineration.[18] Due to low cost shipping and labor, the U.S. became reliant on China to accept plastic materials collected by U.S. municipal systems. Over time, the types of plastics accepted in municipal systems and labeled as "recyclable" grew from domestically recyclable PET #1 and HDPE #2 bottles and jugs to other types of plastics as cities and states emphasized "diversion" and companies sought to brand more of their plastic products as environmentally redeemable.

Changes in the global trade of plastics waste started in 2013 when China's Green Fence policy began restricting imports of contaminated materials. As shown on Resource Recycling's detailed timeline, China's National Sword policy followed in 2018 and the decline in exports of plastic waste and other post-consumer materials has significantly impacted America's municipal recycling collection systems.[19,20]

According to chemical industry experts at Independent Commodity Intelligence Services (ICIS), "This has completely changed the dynamics of the market. China is no longer a route for recycling and the expectation is that countries now deal with their own waste."[21] A representative of the Solid Waste Association of North America stated: "We're producing a lot of waste ourselves, and we should take care of it ourselves."[22]

Waste and recycling experts state that even before China's policy changes, "a lot of areas fooled themselves into thinking they were recycling when they were really not."[23] Export of plastic waste has declined sharply due to China's policies, import restrictions placed by other countries and concerns that many alternative receiving countries cannot provide assurance that the imported plastic waste will be safely and responsibly recycled into new products.

Since the documentary "Plastic China" debuted in China in 2014,[24] more than 60 investigations and articles have shown that millions of tons of exported plastic wastes have been dumped or burned rather than recycled.[25] In response, companies are shifting practices. For example, in 2019, Waste Management adopted a corporate policy to ship post-consumer plastics to only North American plastic recyclers/reprocessors.[26] Casella Waste Systems, the nation's fifth largest waste collection and sortation company, no longer exports residential plastics.[27]

3.3 Competition with Cheaper, Shinier New Plastic

It isn't just the decline in export options that is hurting plastic recycling. The competition with cheaper new plastic that generally has higher quality harms the market demand for recycled plastic. While some plastic waste items may be technically recyclable, the cost to do so is prohibitively high because product manufacturers prefer to buy higher quality new plastic at a lower cost. Back in 2015, the negative impacts of relatively cheap crude oil and natural gas were identified by Waste Management as a reason that customers preferred to buy cheaper new plastic than more expensive recycled plastic.[28]

The massive expansion of plastic production in the U.S., fueled by at least $200 billion of investment in 340 petrochemical projects,[29] is flooding the market and causing polyethylene prices to decline to historic lows - below prices last seen during the 2008 financial crisis.[30, 31] Plastic prices continued to decline in November and December 2019 as feedstock costs were lower, supply outpaced demand, and overall global demand slowed.[32] As a recycling veteran stated in his predictions for 2020: "With the surge in new virgin resin capacity coming online, prices for those resins are likely to go down and depress recycled resin prices."[33]

When MRFs lose money on collecting and sorting plastic or other material, it drives their decision to stop accepting it. Section 9 provides evidence found during the survey of the negligible value of plastic #3-7 materials and how it influences MRF decisions to restrict acceptance of plastics to PET #1 and HDPE #2 bottles and jugs.

3.4 Current Market Conditions for U.S. Post-Consumer Plastic Waste

America's post-consumer collection, sorting and reprocessing/recycling systems are now stressed, and in some cases failing due to excessive waste generation, contamination and severe declines in commodity values for collected cardboard, paper, metal, glass and plastic materials.[34,35]

Since China enacted the National Sword policy on January 1, 2018 limiting plastic waste imports, there have been significant changes in plastics acceptance policies of U.S. material recovery facilities due to declines in the demand for and value of collected plastic material. In Florida, the Department of Environmental Protection advises residents to only recycle plastic bottles and jugs.[36] The Oregon Refuse and Recycling Association also recommends that only plastic #1-2 bottles & jugs be collected.[37] Due to lack of markets, the Wisconsin Department of Natural Resources (DNR) has confirmed to stakeholders that mixed plastics (#3-7) can legally be disposed, even if the material has been sorted and baled.[38]

Current viable markets in the U.S. only exist for PET #1 and HDPE #2 plastic bottles and jugs. China was the primary destination for other types of plastic waste and there is minimal demand and reprocessing capacity for them in the U.S. In Summer 2019, More Recycling stated that: "Most West Coast materials recovery facilities (MRFs) are not equipped to sort plastics beyond PET and HDPE bottles. This material is often referred to as 3-7, but it includes small rigid plastic of all resins, as well as missed PET and HDPE bottles. It is this mix that is struggling to find a market in the wake of National Sword."[39]

MRFs are now adapting to these new market conditions and scaling back acceptance of plastic products.[40] As this survey reveals, many MRFs only accept the two types of post-consumer plastic items (PET #1 and HDPE #2 bottles and jugs) that are recyclable in the U.S. due to sufficient market demand and domestic reprocessing capacity. For example, the City of Erie, Pennsylvania now instructs residents to only recycle #1 and #2 plastic bottles and jugs, stating: "We cannot collect an item for recycling, unless we have an end user who is willing to purchase and recycle that item. China used to accept most of the #3, 4, 5, and 7 plastics, but it turns out that most of these plastics were not actually being recycled. They were mostly being burned for fuel."[41]

Some MRFs still accept plastics #3-7 and non-bottle #1-2 but dispose of it or continue to export it outside of North America due to the lack of domestic buyers and reprocessing capacity. In some cases, cities that have long term contracts with MRFs are forcing them to continue to collect plastics that have negligible domestic market demand and will be landfilled.[42,43] As contracts are reviewed for renewal and the public understands the true fate and negative costs of collecting unrecyclable materials, MRF acceptance policies will continue to consolidate to PET #1 and HDPE #2 bottles and jugs only.

A recycler in Illinois highlighted plastics #3-7 as a problem, stating, “Anything like a yogurt container, fruit container or cottage cheese container — you name it, those are products you cannot get rid of right now. There’s no marketability, so I think you’re going to continue to see a trend of those being eliminated from recycling program.”[44]

When the city of Laramie, Wyoming stopped accepting plastics #3-7, a city council member said “This wasn’t a decision we made to reduce our recycling, there simply just is not a market for this plastic. If we want to counter this, then reduction is the only option. So quit using plastics 3-7 if you can.” [45]

ReThink Waste, a public agency that operates the Shoreway MRF in San Carlos, California, sums up the reality of plastics markets in Figure 1: “Plastics #1 & 2 are readily recyclable and are usually recycled in the U.S. Plastics #3-7 are all versions of hard plastic that are very difficult to recycle. There is currently no market for the material when it is deconstructed.”[46] The Shoreway MRF continues to accept plastics #3-7 but clearly states that the collected material is sent to landfill.

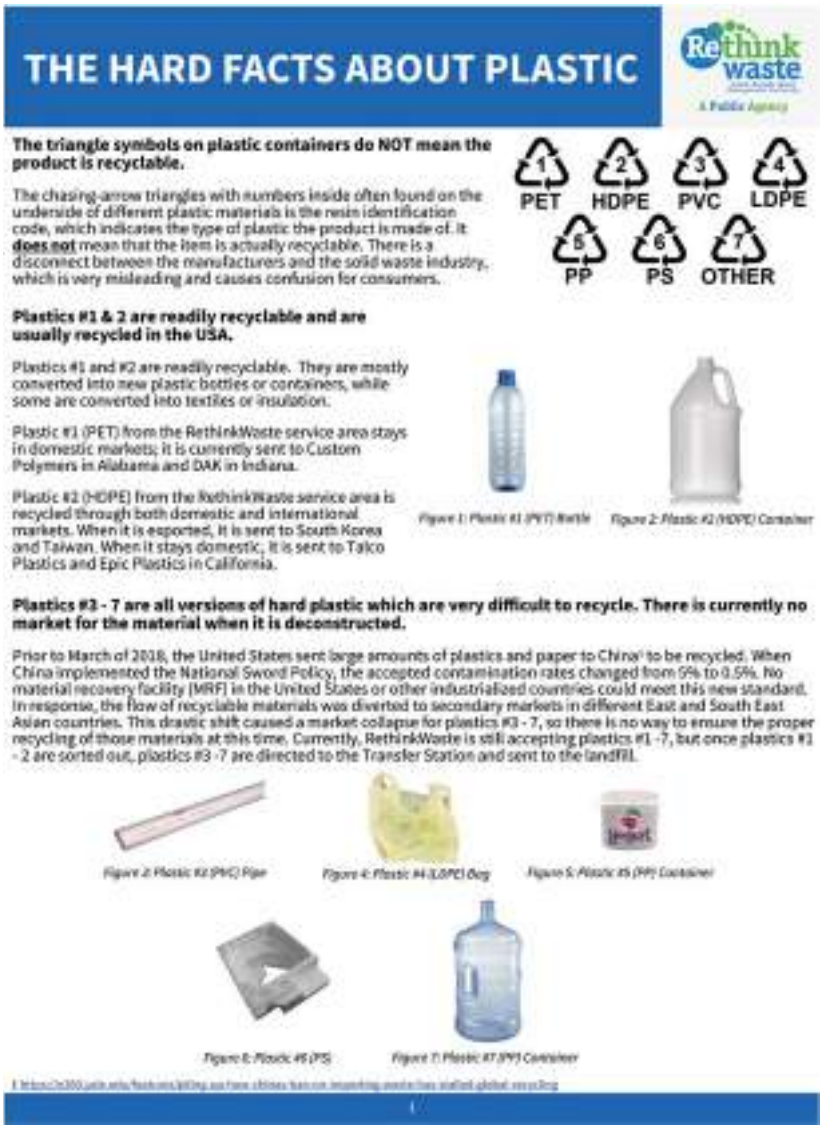


Figure 1: ReThink Waste – Shoreway MRF: The Hard Facts About Plastic[51]

According to the East Bay Express, environmental advocacy groups in California believe that local governments need to start being more transparent about what materials are actually recyclable and that cities should stop collecting non-bottle plastics in recycling bins altogether.[47]

3.5 Acceptance by a MRF is Not Proof of Recycling

The Shoreway MRF’s disposal of plastics to landfill is not unique. In January 2019, Washington State’s Department of Ecology advised citizens that “Commodities such as paper and plastic are piling up or being sent to landfills.”[48] In June 2019, an in-depth Guardian investigation revealed that “cities around the country are no longer recycling many types of plastic dropped into recycling bins. Instead, they are being landfilled, burned or stockpiled.”[49] In Blaine County, Idaho residents are told to recycle plastics items Nos. 1-5, but only #1 and 2 bottles are actually being recycled, with the rest being dumped in a landfill south of Salt Lake City.[50] Section 8 provides evidence found across the country of collected plastics being sent to landfill, incineration or stockpiled, but not recycled.

Since a substantial portion of collected plastics are disposed of, incinerated or exported without verification of recycling, acceptance of a plastic item at a MRF alone is not sufficient and “reasonable” assurance to a customer that it will be manufactured into another item, as required by the FTC in 16 CFR 260. Sufficient market demand and domestic recycling/reprocessing capacity must exist for a plastic product to be considered “recyclable.” Without market demand and domestic recycling/reprocessing capacity, the plastic material collected by the MRFs will not be bought by manufacturers and will not be recycled into another product.

In the FTC Green Guides Statement of Basis and Purpose section titled “Packages Collected for Public Policy Reasons but Not Recycled,” the FTC states: “The Commission agrees that unqualified recyclable claims for categories of products that municipal recycling programs collect, but do not actually recycle, may be deceptive. To make a non-deceptive unqualified claim**, a marketer should substantiate that a substantial majority of consumers or communities have**

access to facilities that will actually recycle, not accept and ultimately discard, the product. As part of this analysis, a marketer should not assume that consumers or communities have access to a particular recycling program merely because the program will accept a product."[52]

> Therefore, it is fair to assume that the standard for reasonable likelihood of a plastic item being recycled requires acceptance by municipal collection *and* U.S. domestic recycling/reprocessing capacity.

This FTC requirement puts the burden of proof on product companies to substantiate that MRFs that are accepting their recyclable-labeled products are selling plastic bales to reprocessors that are verifiably recycling the plastic bales into resin for manufacturing into new products.

3.6 Current Business Practices for Labeling Products as "Recyclable" are Outdated

A comprehensive study of the national access to municipal collection of post-consumer items for recycling was last performed in 2015/2016, by two consulting companies (RRS and Moore Recycling) contracted by The Sustainable Packaging Coalition (SPC); this pre-dated China's 2018 National Sword policy that severely impacted America's collection and recycling/reprocessing systems.[53] The study focused solely on the acceptance of items by of municipal collection but acknowledged that "It also must be realized that other questions must be answered in order to understand the full picture of recyclability." The study did not assess whether collected materials were disposed or exported to countries with poor waste management. Project sponsors included manufacturers and retailers that have interests in securing "recyclable" claims and labels for their products.[54]

Product, packaging and retail companies appear to be still employing the SPC 2015-6 access-to-collection data to substantiate claims and label products as "recyclable" in 2020. This approach is not accurate or valid because:

1. Acceptance of plastics #3-7 and non-bottle plastics #1-2 by MRFs has significantly decreased since 2015/2016 because the value of those types of plastic materials has declined to essentially zero. (RecycleMorePlastic.org reports the nationwide value of bales of "3-7 Bottles and Small Rigid Plastics" to be worth $0.003 per pound in December 2019).[55]
2. Acceptance of plastic materials at a MRF is not proof that materials will be recycled.
3. Export of plastic materials to countries with poor waste management is not proof that materials will be recycled.

In 2018, the Association of Plastic Recyclers (APR) published a survey of plastics acceptance at the largest municipality in each U.S. state and in Washington, D.C.[56] This survey was limited to 51 municipal recycling websites and was performed before the impacts of China's National Sword policy were seen at U.S. MRFs. Similar to the SPC Study, the APR survey is not valid for determining the legitimacy of recyclable claims and labels because it focused on acceptance only and is out of date.

Since the previous assessments of plastic waste recyclability are out of date, did not assess whether collected plastic was actually recycled and not representative of current market conditions, a comprehensive survey of all 367 operating MRFs in the U.S. and domestic collection and domestic recycling/reprocessing capacity was performed to determine the true recyclability of plastic consumer products in 2020.

4. Key Results

To meet the recycle label threshold required by the FTC Green Guides, it is fair to expect that Americans must have access to both collection/sortation and recycling/reprocessing of a specific item into plastic resin that could be used to manufacture another item. In this comprehensive survey, both types of facilities were assessed:

1. **Collection and sortation (MRF) facilities:** The 367 operating U.S. residential MRFs were surveyed for their publicly-posted lists of specific types of plastic products that are accepted in their curbside recycling bins. (Details provided in Section 7.1 - Survey of U.S. Material Recovery Facilities)[57]
2. **Plastic reprocessing capacity of facilities** that turn the collected/sorted material into plastic resin was assessed for total U.S. processing capacity of specific types of post-consumer plastics. (Details provided in Section 7.2 - Survey of U.S. Recycling/Reprocessing Capacity for Post-Consumer Plastic Waste)

Table 1 summarizes the survey results for plastic bottles, jugs, tubs and pods and provides an assessment of whether the specific product can legitimately be labeled as "recyclable" according to the requirements of the FTC Green Guides. (Details of the FTC Green Guides requirements are provided in Section 6). The columns are described in detail in the footnotes to the table.

Table 1: Plastic Bottles, Jugs, Tubs & Pods: American Population's Access to Municipal Collection & Likelihood of Recycling into New Product

Plastic Item	(A) % of Total (367) U.S. Material Recovery Facilities that Accept the Item	(B) Access (%) of American Population to Municipal Collection of the Item	(C) U.S. Reprocessing Capacity for Post-Consumer Plastic Type	(D) Likelihood of Collected Materials Being Recycled into New Products	(E) Can Product be Labeled as "Recyclable" per FTC Green Guides
PET #1 Bottles & Jugs[1]	100%	87%	Sufficient 22.5%	Reasonable	Yes
HDPE #2 Bottles & Jugs[1]	100%	87%	Moderate 12%	Reasonable	Yes
PP #5 Tubs	53%	31%	Low/Insufficient <5%	Not Reasonable	No
PP #5 or PS #6 Coffee Pods	0%	0%	Low/Insufficient <5%	Not Reasonable	No

Notes:

Column (A): % of U.S. Material Recovery Facilities that Accept the Item: % determined from 2020 U.S. MRF Survey (Details provided in Section 7.1)

Column (B): Access (%) of Total American Population to Municipal Collection of Item: Since about 50% of Americans have access to automatic curbside collection to MRFs and 37% have access to opt-in or drop-off municipal collection, the access for total population was determined by adjusting for Americans who have access to a particular type of municipal collection (Details provided in Section 7.3).

Column (C): Existing U.S. Reprocessing Capacity for Post-Consumer Plastic Type (Details provided in Section 7.2)

Column (D): Likelihood of Collected Materials Being Recycled into New Products: There must be adequate domestic processing capacity to create a reasonable likelihood that a collected plastic item will actually be recycled. (Details provided in Section 7.2)

Column (E): Overall assessment of whether the specific product can legitimately be claimed or labeled as recyclable based on Total Population Access (B) and Likelihood of Collected Materials being Recycled into New Products (D). The FTC Green Guides requires that a significant (>60%) portion of the Total American Population have access to municipal recycling to claim an item as recyclable.

(1) Bottles cannot have non-recyclable or non-sortable shrink sleeves.

Key Result A: Only plastic PET #1 & HDPE #2 bottles and jugs have sufficient domestic municipal collection and reprocessing capacity to provide consumers with reasonable assurance that a collected item will be recycled into another product.

PET #1 and HDPE #2 Bottles and Jugs: The 2020 U.S. MRF Survey showed that these items are accepted by 100% of MRFs. Based on up-to-date estimates (described in Section 7.3), 87% of the total American population has access to curbside and drop-off recycling service of some type. It is assumed that drop-off recycling center also accept PET #1 and HDPE #2 bottles and jugs. Therefore, the overall access to recycling by the total American population is 87% and significantly more than the 60% acceptance required by the FTC.

Polypropylene (PP#5) Tubs and Containers: The 2020 U.S. MRF Survey showed that these items are only accepted by 53% of U.S. MRFs. Based on up-to-date estimates for access to curbside and drop-off recycling, described in Section 7.3, only 31% of the total American population has access to collection of PP#5 tubs and containers. However, acceptance of the PP#5 tub by a MRF is not proof that the PP#5 tub will actually be recycled into a new product. PP#5 is typically collected as part of a mixed plastics #3-7 bale, which is not a "market-ready" bale as required by the Association of Plastic Recyclers (APR) in their definition of "recyclable" plastic.[58] The plastics industry acknowledges that individually most plastics #3-7 "are not available in the quantities necessary to justify investments in optical sorting and are difficult to sort manually due to a variety of resins used for a wide range of similar applications (i.e., creating 'look-a-like' materials and products). Therefore, most MRFs produce a mixed plastic, '#3-7' or 'pre-picked' bale that requires further sorting prior to recycling."[59] However, the economics to do that have proven to be insurmountable. A secondary plastics sorting facility

(QRS Recycling in Dundee, MD) opened in 2015 to separate mixed-plastic bales into individual resin and color streams but went bankrupt in 2017.[60]

Mixed plastic #3-7 bales, previously exported to China, now have negligible to negative value across the country and "cannot be effectively or efficiently recycled" in the U.S, according to a Kentucky-based recycler.[61] This survey found that some MRFs that still accept PP#5 tubs are known to send plastic waste to a landfill or incinerator. Some of the MRFs that accept PP#5 tubs are known to export plastic waste to countries in Asia (see Table 9), which, as detailed in Section 3, does not provide adequate assurance that the material is actually recycled into a new product.

Compounding the problem of recycling post-consumer PP#5 plastic items is that there are a limited number of plastic reprocessing facilities that will buy post-consumer PP#5 plastic. Analysis in Section 7.2 shows that there is less than 5% U.S. domestic reprocessing capacity for PP#5 post-consumer waste. The facilities are primarily in the south and east U.S., with the largest U.S. processor of PP#5 located in Alabama. Trucking collected PP#5 tubs and containers thousands of miles from the West Coast or North East to Alabama is problematic from a cost or carbon emissions perspective.

Since the FTC requires that "a marketer should substantiate that a substantial majority of consumers or communities have access to facilities that will actually recycle, not accept and ultimately discard, the product,"[62] companies cannot legitimately claim or label PP#5 tubs and containers as recyclable.

Lastly, the economics of collecting, sorting and recycling post-consumer polypropylene products are becoming even more stressed and do not provide a sufficient driver for a MRF to invest in collection or separation of PP#5 post-consumer products from mixed plastics #3-7 bales. A billion pounds of new polypropylene production aimed at the U.S. market is coming online in mid 2020 and the price of new polypropylene continues to decline.[63,64] In parallel, the value of collected post-consumer PP#5 is also declining.

The current (January 2020) average value of a post-consumer PP#5 bale is now between 5 and 6 cents/lb across the country.[65] This is a drop of more than 50% in market value since the summer of 2019.[66]

PP#5 and PS#6 Coffee Pods: The 2020 U.S. MRF Survey did not find evidence of acceptance of these items at MRFs. This is likely due to the fact that the pods are smaller than the 2 inch by 2 inch standard size requirement for sortation at MRFs.[67,68]

Key Result B: Many commonly polluted single use plastic items do not have sufficient acceptance by municipal collection or sufficient U.S. domestic reprocessing capacity to provide consumers with reasonable assurance that a collected item will be recycled into another product.

Table 2 summarizes the survey results for single use plastic food service and convenience items that are typically found in a list of top plastic pollution items collected during beach cleanups.[69] The 2020 U.S. MRF Survey found limited or no acceptance of any of these items at MRFs. It should be noted that the PET used in clamshells and trays is not the same as that used in a soda bottle.[70] The survey also showed low processing capacity for the types of materials that the items are made from.

Based on the lack of acceptance by municipal collection and low processing capacity, the assessment showed that none of these items can be legitimately claimed or labeled as recyclable in the U.S. Furthermore, when accepted by MRFs, it was found that these items are collected in mixed plastic bales that have negligible value and are known to be disposed to landfill, incinerated or exported without verification of recycling such that a consumer cannot "check locally" to determine if the item will be recycled.

Table 2: Top Plastic Pollution Items: American Population's Access to Municipal Collection & Likelihood of Recycling into New Product

Plastic Item	(A) Type of Plastic Commonly Used	(B) % of Total (367) U.S. Material Recovery Facilities that Accept the Item	(C) Access (%) American Population to Municipal Collection of the Item	(D) U.S. Reprocessing Capacity & Likelihood of Collected Materials Being Recycled into New Product	(E) Can Item be Legitimately Claimed or Labeled as "Recyclable" per FTC Green Guides
Plastic Clamshells	PET #1[1] PVC #3 PS #6	14%	7%	Low Reprocessing Capacity & Not Reasonable Likelihood of Recycling into New Product	No
Plastic Cups	PP #5 PS #6 Other #7	11%	5.5%	Low Reprocessing Capacity & Not Reasonable Likelihood of Recycling into New Product	No
Plastic Trays	PET #1[1] PP#5 Other #7	7%	3.5%	Low Reprocessing Capacity & Not Reasonable Likelihood of Recycling into New Product	No
Plastic Bag[2]	HDPE #2 LDPE #4	4%	2%	Low Reprocessing Capacity & Not Reasonable Likelihood of Recycling into New Product	No
Expanded Polystyrene (EPS) Food Service	PS #6	3%	1.5%	Low Reprocessing Capacity & Not Reasonable Likelihood of Recycling into New Product	No
Plastic Lids & Caps (Loose)	PP #5 PS #6	3%	1.5%	Low Reprocessing Capacity & Not Reasonable Likelihood of Recycling into New Product	No
Plastic Plates	PS #6	1%	0.5%	Low Reprocessing Capacity & Not Reasonable Likelihood of Recycling into New Product	No
Plastic Cutlery, Straws & Stirrers	PP #5 PS #6	1%	0.5%	Low Reprocessing Capacity & Not Reasonable Likelihood of Recycling into New Product	No
Plastic Food Wrappers & Pouches	Multiple Types & Layers of Plastic	0%	0.0%	Negligible Reprocessing Capacity & Not Reasonable Likelihood of Recycling into New Product	No

Notes:

Column (A): The plastic items may be made from more than one type of plastic.

Column (B): % of U.S. Material Recovery Facilities that Accept the Item: % determined from 2020 U.S. MRF Survey (Details provided in Section 7.1)

Column (C): Access (%) of Total American Population to Municipal Collection of Item: Since about 50% of Americans have access to automatic curbside collection to MRFs, the access for total population was adjusted by access to municipal collection (Details provided in Section 7.3).

Column (D): Likelihood of Collected Materials Being Recycled into New Products: There must be adequate domestic processing capacity to create a reasonable likelihood that a collected plastic item will actually be recycled. (Details provided in Section 7.2)

Column (E): Overall assessment of whether the specific product can legitimately be claimed or labeled as recyclable based on Total Population Access (C) and Likelihood of Collected Materials being Recycled into New Products (D). The FTC Green Guides requires that a significant (>60%) portion of the Total American Population have access to municipal recycling to claim an item as recyclable.

(1) The PET used in clamshells and trays is not the same as that used in a soda bottle.[71]

(2) Plastic bags accepted by municipal systems. This does not include plastic bags collected by drop-off at private retail operations because the FTC requirements are based on municipal collection systems.

Key Result C: Plastics #3-7 cannot be legitimately labeled as "recyclable" under FTC guidelines. Consumers cannot "Check Locally" to determine if a plastic #3-7 item will actually be recycled into a new product.

Acceptance by MRFs of plastics #3-7 does not prove that the plastic will be destined "for reuse or use in manufacturing or assembling another item" as required by the FTC. The comprehensive 2020 U.S. MRF Survey of 367 collection and sortation systems documents that while some MRFs still accept plastics #3-7, some of the collected plastics #3-7 are being landfilled or incinerated due to lack of domestic market demand and buyers. Additionally, some MRFs that accept plastics #3-7 are known to still export plastic waste to countries with poor waste management and without verification that the plastic will actually be recycled into a new product. Therefore, plastics #3-7 is a category of products that municipal recycling programs may collect, but do not actually recycle, and labeling of products made from those types of plastic may be deceptive.

Companies often place labels of large recycle symbols with small words "Check Locally" on products that less than the FTC's required "significant amount" (>60%) of Americans have access to recycle through a municipal collection system. "Check Locally" is often found on plastics #3-7 items. However, "Check Locally" is not legitimate because consumers cannot determine if their collected plastics will actually be recycled at a reprocessing facility. For example, if a resident checked on the local Salt Lake City recycling website, it states that plastic containers are accepted with photos including plastics #1-7.[72] But it has been reported that plastic waste collected through curbside recycling in Salt Lake City is sent to a cement kiln where it is burned for energy and not recycled.[73]

Companies cannot legitimately place recycle symbols or "Check Locally" text on plastics #3-7 because MRFs cannot inform consumers whether their collected plastics #3-7, which has negligible-to-negative market value, will actually be bought and recycled into a new product.

Key Result D: Many full body shrink sleeves on PET #1 and HDPE #2 bottles and jugs make them non-recyclable.

Many product companies are using full body shrink sleeve labels on plastic bottles to improve shelf appeal. Commonly used polyethylene terephthalate glycol (PETG) and polyvinyl chloride (PVC) shrink sleeves are known to prevent proper sortation of the bottles in MRFs and harm the operations of PET bottle recyclers/reprocessors.[74] Yet product companies continue to employ these types of shrink sleeves. The product companies are evidently aware that the shrink sleeves they use prohibit proper sortation and harm recycling of the plastic bottles because they place instructions on the bottles telling consumers to remove the shrink sleeves.

This is in violation of FTC Green Guides 16 CFR 260.12d that states: "**If any component significantly limits the ability to recycle the item, any recyclable claim would be deceptive. An item that is made from recyclable material, but, because of its shape, size, or some other attribute, is not accepted in recycling programs, should not be marketed as recyclable.**"[75] The FTC Green Guides do not allow companies to instruct consumers to remove an integral part of the product packaging to make it recyclable.

5. Conclusion and Forward Look

The comprehensive survey of U.S. post-consumer plastic product collection, sortation and reprocessing capacity determined that only PET #1 and HDPE #2 plastic bottles and jugs (without harmful shrink sleeves) can legitimately be claimed or labeled as recyclable. Recyclable labels on other consumer plastic products do not provide truthful advertising to American consumers and are a cause of contamination and inefficiency plaguing America's municipal collection and plastics recycling/reprocessing systems.

As scientific evidence of the harm caused by plastic pollution continues to mount, discussions about what to do about single use plastic are underway in the U.S. Congress and city halls and state capitals across the country, as well as in corporate board rooms. This survey demonstrates that many types of commonly used plastic packaging are not recyclable, and are being landfilled, incinerated, or exported without verification of recycling. All of these approaches have significant consequences for environmental and human health, which will continue to increase as long as these packaging materials are employed.

The results of this survey effort are valid now, but may be affected in the future by changes in collected material value, Americans' access to municipal recycling, and domestic post-consumer plastic reprocessing capacity. There are negative economic factors working against recycling: fixed and operating costs of MRFs continue to increase as the commodity values of collected materials continues to decline.[76] As municipal collection contracts come up for renewal and service prices increase to cover the revenue gap, additional municipalities are considering whether to end curbside recycling.[77,78,79] For example, in Brook Park, Ohio, the cost to process recyclables are going to skyrocket from $44/ton to $124/ton and city officials have begun considering options for managing the high cost including a possible moratorium on recycling.[80]

The economic driver for collecting, sorting and reprocessing post-consumer plastic products is likely to worsen as expansion of plastic production lowers the cost of new resin.

While new types of plastics reprocessing systems are being discussed,[81] chemical recycling processes are complicated, expensive and have not been proven at commercial scale to cost-effectively reprocess diverse post-consumer plastic waste and produce a resin that can be manufactured into another product. Furthermore, significant concerns persist about the energy and fresh water requirements and environmental impacts of chemical recycling systems.

Since the cost to recycle PET #1 and HDPE #2 is now higher than new plastic,[82] there is no guarantee that even PET #1 and HDPE #2 bottles and jugs will meet the "recyclable" definition in the future.

Moving forward, an updated annual analysis and transparent, traceable account of the current domestic collection, sortation and recycling/reprocessing capacity of post-consumer plastic products is required to determine legitimacy of recyclable claims.

B. Survey Basis, Approach, Detailed Results and Evidence Found

6. Legal Basis for Recyclable Claims on Products

6.1 FTC Green Guides (16 CFR 260)

In the U.S., claims and labels relating to environmental benefits of products are regulated at the national level by the FTC "Green Guides" established by the FTC pursuant to its authority under U.S. Federal Trade Commission Act.[83] Codified in the U.S. Code of Federal Regulations 16 CFR 260 (Guides for the Use of Environmental Marketing Claims), the Green Guides contain standards and examples to help companies understand what constitutes deceptive or misleading environmental advertising.[84] The Green Guides do not preempt state or local laws.

The FTC Green Guides are based on consumer understanding of environmental claims and require that "Marketers must ensure that all reasonable interpretations of their claims are truthful, not misleading, and supported by a reasonable basis before they make the claims."[85]

The Green Guides' requirements apply to labels, advertising, other forms of marketing in any medium directly or through implication. Claims on products, press releases, presentations and on company websites are covered.

The Green Guides state that "**A representation, omission, or practice is deceptive if it is likely to mislead consumers acting reasonably under the circumstances and is material to consumers' decisions.**"[86] The FTC can take action under the FTC Act if a marketer makes an environmental claim inconsistent with the guides. The FTC and courts employ a "reasonable consumer test" to determine how fair-minded consumers in a general audience are likely to interpret certain claims.[87] Whether a particular claim is deceptive will depend on the net impression of the advertisement, label, or other promotional material at issue. The FTC states that "A representation, omission, or practice is deceptive if it is likely to mislead consumers acting reasonably under the circumstances and is material to consumers' decisions."

The key requirements of the Green Guides related to "recyclable" claims and labels on products are summarized in this section.

1. **Substantiation of Marketing Claims Must Be Made *Before* Claims are Made (16 CFR 260.2)**
   The Green Guides require that "Marketers must ensure that their claims are supported by a reasonable basis **before** they make claims. A reasonable basis often requires reliable scientific evidence. Such evidence consists of analyses and research that have been evaluated in an objective manner."

2. **"Recyclable" Claims Require *Established* Programs for Collection, Separation and Recovery for Use in Manufacturing Another Item (260.12a)**
   The FTC requires *existing* programs to collect, separate and use the product in manufacturing another product. Material recovery facilities perform the collection and sortation function. Plastic recycling facilities reprocess the collected materials into plastic resin for use in manufacturing another product. Therefore, existing programs run by municipalities to collect and sort items at a MRF alone are insufficient to meet the "recycling" requirement. There must also be recycling/reprocessing capacity for the plastic item to turn it into resin that can be used by manufacturers.

§ 260.12 Recyclable claims.

(a) It is deceptive to misrepresent, directly or by implication, that a product or package is recyclable. A product or package should not be marketed as recyclable unless it can be collected, separated, or otherwise recovered from the waste stream through an established recycling program for reuse or use in manufacturing or assembling another item.

Figure 2. FTC Green Guides 16 CFR 260.12a

3. **At Least 60% of Americans Must Have Access to Recycling Facilities for a Product to be Labeled as "Recyclable" (260.12b1)**
To legitimately claim a product as "recyclable," the FTC requires that recycling facilities be available to a "substantial majority" of Americans, defined to be at least 60 percent. The FTC states that "Marketers should qualify all recyclable claims for products that do not meet the 60 percent facility availability threshold. The lower the levels of access to appropriate facilities. The more strongly the marketer should emphasize the limited availability of recycling for the product."[88]

> (b) Marketers should clearly and prominently qualify recyclable claims to the extent necessary to avoid deception about the availability of recycling programs and collection sites to consumers.
>
> (1) When recycling facilities are available to a substantial majority of consumers or communities where the item is sold, marketers can make unqualified recyclable claims. The term ''substantial majority,'' as used in this context, means at least 60 percent.

Figure 3. FTC Green Guides 16 CFR 260.12b1

4. **"Qualified" Recycling Claims May be Made for Limited Recycling Access (260.12b2)**
The FTC requires that when recycling facilities are available to less than a substantial majority of consumers or communities where the item is sold, marketers should qualify all recyclable claims. "Qualified" allows use of the recyclable symbol but requires additional wording describing the limitations. The lower level the access, the more limitation text required.

> (2) When recycling facilities are available to less than a substantial majority of consumers or communities where the item is sold, marketers should qualify all recyclable claims. Marketers may always qualify recyclable claims by stating the percentage of consumers or communities that have access to facilities that recycle the item. Alternatively, marketers may use qualifications that vary in strength depending on facility availability. The lower the level of access to an appropriate facility is, the more strongly the marketer should emphasize the limited availability of recycling for the product. For example, if recycling facilities are available to slightly less than a substantial majority of consumers or communities where the item is sold, a marketer may qualify a recyclable claim by stating: ''This product [package] may not be recyclable in your area,'' or ''Recycling facilities for this product [package] may not exist in your area.'' If recycling facilities are available only to a few consumers, marketers should use stronger clarifications. For example, a marketer in this situation may qualify its recyclable claim by stating: ''This product [package] is recyclable only in the few communities that have appropriate recycling facilities.''

Figure 4. FTC Green Guides 16 CFR 260.12b2

5. **"Check Locally" Not Allowed by the FTC (260.12b2 Example 4)**
The use of a label with the instruction to consumers to simply "Check Locally" is not approved in the FTC Green Guides. In an example in the Green Guides, the FTC states: "A paperboard package is marketed nationally and labeled either ''Recyclable where facilities exist'' or ''Recyclable: Check to see if recycling facilities exist in your area.'' Recycling programs for these packages are available to some consumers, but not available to a substantial majority of consumers nationwide. **Both claims are deceptive because they do not adequately disclose the limited availability of recycling programs.**"

6. **Products Cannot be Labeled Recyclable if they have a Component that Significantly Limits the Ability to Recycle the Item (260.12c,d)**
The FTC does not allow a product to be labeled "recyclable" if it contains a non-incidental component that "limits the ability to recycle the item." As described in Section 10, full body shrink sleeves on plastic containers often make the product not sortable in a MRF or non-recyclable by plastics reprocessors.

The FTC Green Guides make no allowance for requiring customers to cut off labels or separate major components of an item.

> (c) Marketers can make unqualified recyclable claims for a product or package if the entire product or package, excluding minor incidental components, is recyclable. For items that are partially made of recyclable components, marketers should clearly and prominently qualify the recyclable claim to avoid deception about which portions are recyclable.
>
> (d) If any component significantly limits the ability to recycle the item, any recyclable claim would be deceptive. An item that is made from recyclable material, but, because of its shape, size, or some other attribute, is not accepted in recycling programs, should not be marketed as recyclable.[48]

Figure 5. FTC Green Guides 16 CFR 260.12c,d

7. **Incineration is Not Recycling (260.12d)**
   In an example, the FTC states: "A container can be burned in incinerator facilities to produce heat and power. It cannot, however, be recycled into another product or package. Any claim that the container is recyclable would be deceptive."

   The FTC Green Guides make no allowance for collecting a waste as a "recyclable" material when the end fate of the material is destruction through burning (e.g. via sales to a cement kiln to burn for energy) or combustion (e.g. via pyrolysis to fuel that will then be combusted in vehicles).

8. **FTC Requires the Collected Items Be Recycled**
   In the FTC Green Guides Statement of Basis and Purpose section titled "Packages Collected for Public Policy Reasons but Not Recycled," the FTC states: "The Commission agrees that unqualified recyclable claims for categories of products that municipal recycling programs collect, but do not actually recycle, may be deceptive. To make a non-deceptive unqualified claim, a marketer should substantiate that a substantial majority of consumers or communities have access to facilities that will actually recycle, not accept and ultimately discard, the product. As part of this analysis, a marketer should not assume that consumers or communities have access to a particular recycling program merely because the program will accept a product." [89]

   This FTC requirement puts the burden of proof on product companies to substantiate that MRFs that are accepting their recyclable-labeled products are selling plastic bales to reprocessors that are verifiably recycling the plastic bales into resin for manufacturing into new products.

6.2 Deceptive Recyclable Claim Case: Keurig Plastic Coffee Pods

In September 2018, a class action lawsuit was filed by an individual consumer in California against Keurig Green Mountain, Inc., ("Keurig") over recyclability claims and labels on their single use beverage plastic pod products.[90] As shown in Figure 6, the plaintiff alleged that Keurig's "recyclable" single-serve plastic coffee pods were mislabeled as such because they are not in fact recyclable, due to their size, composition, and the lack of a market to reuse the pods.

> 2. This Complaint seeks to remedy Defendants' unlawful, unfair and deceptive business practices with respect to the advertising, marketing and sales of plastic single serve pods that contain coffee and that are labeled as "recyclable" (the "Products").1 The Products are advertised, marketed and sold as recyclable. However, even if consumers take the many steps required to place the Products in their recycling bins, they are not in fact recyclable because most municipal recycling facilities are not properly equipped to capture such small materials. Furthermore, even where such facilities exist that are capable of segregating the Products from the general waste stream, the Products usually still end up in landfills anyway as there is no market to recycle the Products.

Figure 6 – Deceptive Complaint in Smith vs. Keurig Class Action Lawsuit (September 28, 2018)[91]

In June 2019, the District Court denied Keurig's motion to dismiss the case.[92] Table 3 summarizes the key points in the District Court's decision and relevance to general issues of product labeling. In October 2019, the case moved to Discovery phase.[93]

Table 3: Key Points in the District Court's decision[94]

U.S. Federal District Court Ruling	Relevance to Product Labeling
III.A.2 Plaintiff does not allege that she was injured by her inability to recycle the Pods, but rather that she suffered economic injury due to Defendant's mislabeling because she paid more than she would have paid had she known the Pods were not recyclable. The complaint here adequately alleges both materiality and that the **mislabeling altered Plaintiff's course of action**.	This judgement indicates that (1) labels on products affect consumer purchasing decisions and (2) incorrect labels can cause economic injury.
III.A.1: The complaint alleges that the disputed Pods are not recyclable at any MRF. If that is true, a "check locally" disclaimer could be misleading, as the disclaimer would falsely lead customers to believe that there was any point in "checking locally."	This judgement indicates that it is deceptive to instruct consumers to "check locally" if the consumer cannot determine if a plastic item will actually be recycled after collection by a MRF.
III.A.3: Keurig wrongly assumes that Plaintiff's injury is merely the inability to recycle. However, Plaintiff's alleged injury is not that she was unable to recycle the Pods, but instead that she was misled to believe they were recyclable due to Defendant's mislabeling.	This judgement indicates that the harm to consumers is in labeling of product and the fault resides with the product manufacturer. The inability to recycle a product is not the fault of the municipal collection/sortation system or plastic recycler/reprocessors.
III.B: The Green Guides state that if a product is rendered non-recyclable because of its size or components—even if the product's composite materials are recyclable—then labeling the product as recyclable would constitute deceptive marketing. See id. § 260.12(d).	This judgement indicates support for deceptive claims against bottles with full body shrink sleeve labels that prevent sortation or harm plastic recycling/reprocessing equipment.
III.B: Defendant further contends that it would be unduly burdensome to require Keurig to constantly monitor the number of MRFs at which the Pods are recyclable and revise its labeling accordingly.	This argument by Keurig shows lack of commitment to improving the recyclability of their products or reducing contamination in America's recycling system.

7. Survey of Plastic Waste Collection/ Sortation and Reprocessing: Technical Approach and Detailed Results

To meet the "recyclable" label threshold required by the FTC Green Guides, Americans must have access to both collection/sortation *and* recycling/reprocessing of a specific item into plastic resin that could be used to manufacture another item. In this comprehensive survey, both types of facilities were assessed:

1. **Collection and sortation (MRF) facilities:** The 367 operating U.S. residential MRFs were surveyed for their posted lists of specific types of plastic products that are accepted in their curbside recycling bins. (Details provided in Section 7.1 - Survey of U.S. Material Recovery Facilities)[95]
2. **Plastic reprocessing facilities** that turn the collected/ sorted material into plastic resin were surveyed for total U.S. processing capacity of specific types of post-consumer plastics. (Details provided in Section 7.2 - Survey of U.S. Recycling/Reprocessing Capacity for Post-Consumer Plastic Waste)

It is insufficient for Americans to have access to collection/ sortation of an item if there is insufficient recycling/ reprocessing capacity to produce resin to manufacture/ assemble a new item from the material. Similarly, if there is sufficient reprocessing capacity but insufficient collection/ sortation facilities and operations, then an item may not reasonably be considered recyclable.

The policies of two U.S. major recycling industry associations, Institute of Scrap Recycling Industries (ISRI) and the Association of Plastic Recyclers (APR), agree with the position that collection alone is not recycling. According to an article in ISRI's Scrap magazine, "ISRI has long held that for a product to be recyclable, it must be both technologically and economically feasible to recycle." In the same article, APR's President stated, "There must be consumer access to a recycling program, a recycler must be able to process the material, and there must be an end market."[96]

7.1 Survey of U.S. Material Recovery Facilities

7.1.1 SURVEY METHODOLOGY AND PUBLIC TRANSPARENCY

A comprehensive, objective survey of acceptance of plastic items at U.S. Residential MRFs for curbside recycling was performed from October to December 2019 and reverified in January 2020. The survey was performed and verified by technically qualified volunteers of The Last Beach Cleanup:[97] two registered professional chemical engineers and a recycling industry expert. The technical experts involved have no conflicts of interest related to legitimate recyclable labels for plastic products that would influence the assessment or results. The acceptance information was found in the public

domain and is publicly shared to promote transparency and establish a traceable account of facts related to plastic "recyclable" claims and labels. The details of the survey were captured in a spreadsheet that is publicly available for downloading on The Last Beach Cleanup website. A copy of the 2020 U.S. MRF Survey spreadsheet version (dated Februrary 9, 2020) that was the basis for the metrics stated in this report is provided in Attachment 1 to this document.

MRF Survey Basis and Verification: A comprehensive listing of "Commingled Residential MRFs" was published by The Recycling Partnership in the public domain on their website in Fall 2019.[98] The map provided the names and locations of approximately 370 MRFs in the U.S. The Recycling Partnership attributed the data to Resource Recycling, a news source in the U.S. recycling industry.[99] The information in the Recycling Partnership MRF map was manually extracted and compiled into the 2020 U.S. MRF Survey spreadsheet. The operational status of each MRF was verified through public domain searches. Approximately 17 MRF sites were found to be incorrect because they were duplicate listings, no longer in operation or no longer Residential MRFs. An additional 15 operating MRFs were identified through review of waste/recycle company websites and other information. A list of corrections was submitted to The Recycling Partnership on January 23, 2020 with a suggestion that their map be updated. The final count of operating U.S. MRFs surveyed was 367. Links to MRF information were captured on the 2020 U.S. MRF Survey spreadsheet. Links to videos about the MRFs were captured when found.

Survey of Plastic Item Acceptance: A "MRFshed" approach was employed to survey the acceptance of plastic items by Americans who have access to curbside recycling. A MRFshed is defined "as a group of communities that funnel material into the same materials recycling facility (MRF)."[100] Through web searches, each MRF was investigated for the public disclosure of items accepted for curbside recycling. About one-third of the MRFs provided information on acceptance of plastic items at their facility. When MRF acceptance information was not found, a search of websites of a local city or county that directs recycling to a specific MRF was performed. If information could not be found for the specific MRF or local municipality, recycling guidance provided by the MRF owner (e.g. Republic Services' Recycling Simplified[101] guidelines to customers) was captured. The acceptance guidance provided by MRFs and local municipal governments ranged from complicated "wizard" search tools to easily understandable text and photos. Where there was inconsistency between text and photo guidance, all items listed or shown were considered accepted. This approach was intentionally conservative to avoid bias.

Evidence of Disposal of Collected Plastic Materials
News and internet searches were performed to document evidence of disposal to landfill or incineration of collected plastic materials. The information provided by Waste Dive in the "How recycling is changing in all 50 states" website was reviewed.[102] A summary of the evidence found is given in Table 8 and links are also provided in the 2020 U.S. MRF Survey spreadsheet.

Evidence of Export of Collected Plastic Materials to Countries with Poor Waste Management
News and internet searches were performed to document evidence of export of plastic waste to countries that are not equipped to safely and securely recycle post-consumer plastic waste. An analysis of the U.S. Census Bureau database of plastic waste exports was performed to quantify the amount of plastic waste shipped by each state in 2019 (through November) to countries with poor waste management.[103] A summary of the evidence found is given in Table 9 and links are also provided in the 2020 U.S. MRF Survey spreadsheet.

Survey of Largest U.S. Material Recovery Facilities
In addition to the comprehensive survey of all 367 operating U.S. Residential MRFs, the 65 largest U.S. MRFs[104] were analyzed to ensure that there wasn't a bias in the results based on population access and mass throughput capacity of the facilities. The acceptance rates by the largest 65 MRFs were found to be in alignment in acceptance rates of all 367 U.S. MRFs. Since the largest MRFs are typically better funded than most MRFs and able to invest in expensive advanced sortation, the largest MRFs accepted slightly more types of plastics.

Customer "Check Locally" Enquiries to MRFs
Researchers and interested stakeholders involved in the 2020 U.S. MRF Survey found that they were customers of MRFs that accepted plastics #3-7 in their recycling bins. The researchers and stakeholders called five MRFs and enquired, as legitimate customers, about the destination and final fate of their plastics #3-7 and non-bottle plastics #1-2 if they put them in the recycle bin. The MRF representatives could not provide credible information to their customers on where, how or if the non-bottle plastics were actually recycled. While this was a selected sampling, it indicates that few MRFs that accept low value plastics #3-7 can credibly inform customers, who are attempting to "check locally" whether the collected plastics will be processed into new products.

Use of the Survey: The 2020 U.S. MRF Survey results may be quoted with attribution to Greenpeace. The information in the Survey spreadsheet may be quoted with attribution to the original source of the information (provided by links in the spreadsheet). The spreadsheet itself is the intellectual property of The Last Beach Cleanup and may not be reproduced without express written consent.

Table 4: Plastic Items: Acceptance for Municipal Collection by U.S. MRFs & Evidence of Disposal or Export to Countries with Poor Waste Management

Plastic Item	Acceptance at U.S. MRFs (367 Total)	Acceptance at Largest 65 U.S. MRFs (65 Total)	Non-Bottle Plastics: Acceptance by MRFs with Evidence of Disposal or Export of Collected Mixed Plastics
PET #1 Bottles & Jugs	366 (100%)	65 (100%)	
HDPE #2 Bottles & Jugs	367 (100%)	65 (100%)	
PP #5 Tubs	196 (53%)	37 (57%)	192 of 196
Plastic Clamshells	51 (14%)	8 (12%)	51 of 51
Plastic Cups	41 (11%)	9 (14%)	41 of 41
Plastic Trays	25 (7%)	6 (9%)	25 of 25
Plastic Bags	13 (4%)	2 (3%)	13 of 13
Styrofoam Food Service	10 (3%)	0 (0%)	10 of 10
Plastic Lids & Caps (Loose)	11 (3%)	6 (9%)	11 of 11
Plastic Plates	4 (1%)	1 (2%)	4 of 4
Plastic Cutlery, Straws & Stirrers	2 (1%)	0 (0%)	2 of 2
Plastic Food Wrappers & Pouches	1 (0%)	1 (2%)	Pilot MRF Program Only[105]
PP #5 or PS #6 Coffee Pods	0 (0%)	0 (0%)	Not accepted by MRFs

Survey Updates: Submissions by MRFs and local governments are welcomed to update or correct the information found and presented. Links to publicly available information are required to revise the traceable account. Since external links may change at any time, we request notification of a broken link. Please send updates with links to lastbeachcleanup@gmail.com.

7.1.2 2020 U.S. MRF SURVEY RESULTS

Table 4 summarizes the acceptance of plastic items by municipal MRF collection and corresponding evidence of disposal or export of plastic waste by MRFs. MRFs that still accept non-bottle plastics may be disposing or exporting the collected low-value mixed plastic waste.

7.2 Survey of U.S. Recycling/Reprocessing Capacity for Post-Consumer Plastic Waste

Material recycling/reprocessing facilities that process the collected/sorted material into plastic resin for use in manufacturing or assembling another item are required to be "established" by the FTC for an item to be labeled as recyclable. Since export markets are closing and do not provide sufficient assurance of recycling, sufficient domestic recycling/reprocessing capacity must exist for the plastic material collected by the MRFs to be recycled. The plastics industry publishes limited information on the capacity of U.S. plastic recyclers/reprocessors for specific types of post-consumer plastic waste. Estimates of U.S. domestic post-consumer plastic recycling/reprocessing capacity are made to determine if sufficient capacity exists to assure customers that a plastic product has a sufficient likelihood of actually being recycled into a new product if it is accepted by a MRF. The estimates are summarized in Table 5 and detailed in Sections 7.2.1 - 7.2.7.

Table 5: Summary of Estimates of Current 2020 U.S. Recycling/ Reprocessing Capacity for Post-Consumer Plastic Waste

Plastic Type	Estimate of Current U.S. Recycling/ Reprocessing for Post-Consumer Plastic Waste
#1 PET	22.5%
#2 HDPE	12%
#3 PVC	Negligible
#4 LDPE/LLDPE	Less than 5%
#5 PP	Less than 5%
#6 PS	Less than 1%
#7 Other	Negligible

7.2.1 USEPA 2017 PLASTIC RECYCLING RATES

Recycling rates for plastic items provide a basic indication of recycling capacity because production rates are a portion of production capacity. The most recent USEPA recycling rates (2017) for U.S. post-consumer plastics are summarized in Table 6.[106] The "recycled" material includes a significant amount of exported material. In 2017, 931 million kg of plastic waste was still sent to China and Hong Kong.[107] Since China's National Sword restrictions began on January 1, 2018, current 2019-2020 recycle rates are estimated to be lower, particularly for plastics #3-7, due to the significant decrease in plastic waste exports.[108] Nevertheless, the 2017 data provides an order-of-magnitude indication of U.S. reprocessing capacity.

Table 6: 2017 U.S. EPA Facts and Figures about Materials, Waste and Recycling[109]

USEPA 2017 Solid Waste Data	Total Post-Consumer Plastic Waste (Thousand Tons)				Total Plastics in Containers & Packaging (C&P) (Thousand Tons)			
Resin Type	Total Plastic Waste	% by Resin Type	Total Recycled	Total % Recycled	C&P Plastic Waste	% by Resin Type	C&P Recycled	C&P % Recycled
#1 PET	5,010	14%	910	18.2%	3,650	25%	910	24.9%
#2 HDPE	6,150	17%	580	9.4%	3,740	26%	580	15.5%
#3 PVC	960	3%	Negligible	0.0%	430	3%	Negligible	0.0%
#4 LDPE/LLDPE	8,080	23%	340	4.2%	3,880	27%	340	8.8%
#5 PP	8,000	23%	50	0.6%	1,840	13%	50	2.7%
#6 PS	2,350	7%	10	0.4%	570	4%	10	1.8%
#7 PLA	90	0%	Negligible	0.0%	20	0%	Negligible	0.0%
Other resins	4,730	13%	1,070	22.6%	360	2%	Negligible	0.0%
Total Plastics	35,370	100%	2,960	8.4%	14,490	100%	1,890	13.0%

7.2.2 2020 U.S. DOMESTIC REPROCESSING CAPACITY FOR POST-CONSUMER POLYETHYLENE TEREPHTHALATE (PET) PLASTIC #1 WASTE

Available data indicates that the current U.S. domestic reprocessing capacity for post-consumer PET plastic waste is approximately 22.5% of the total post-consumer PET plastic waste generated. This estimate is supported by the 18.2% recycling rate reported by the USEPA in 2017 and other evidence. Therefore, there is **sufficient likelihood** that post-consumer PET waste collected by MRFs is recycled/reprocessed into plastic resin for manufacturing of new products in the U.S. It is reasonable for U.S. consumers to believe that PET bottles and jugs that are collected by municipal systems will be recycled/reprocessed into a new product.

Evidence supporting this estimate:

1. The National Association for PET Container Resources (NAPCOR) reported that at the end of 2017 there were 22 PET recycling/reprocessing plants operating in the U.S. with total annual nameplate capacity of 2,255 million pounds capacity.[110]
2. As shown in Table 6, the U.S. produced 5.01 million tons (10 billion lbs) of PET waste in 2017. Therefore, existing U.S. domestic capacity for recycling/reprocessing PET waste is estimated to be about 22.5%.

7.2.3 U.S. DOMESTIC REPROCESSING CAPACITY FOR POST-CONSUMER HIGH DENSITY POLYETHYLENE (HDPE) PLASTIC #2 WASTE

Available data indicates that the current U.S. domestic reprocessing capacity for post-consumer HDPE plastic waste is approximately 12% of the total post-consumer HDPE plastic waste generated. This estimate is supported by the 9.4% recycling rate reported by the USEPA in 2017 and other evidence. Therefore, there is **moderate likelihood** that post-consumer HDPE waste collected by MRFs is recycled/reprocessed into plastic resin for manufacturing of new products in the U.S. It is reasonable for U.S. consumers to believe that HPDE bottles and jugs that are collected by municipal systems will be recycled/reprocessed into a new product.

Evidence supporting this estimate:

1. The Association of Plastics Recyclers (APR) reported the total U.S. HDPE postconsumer reclamation capacity was 1,418 million pounds with 25 recycling/reprocessing plants operating in the U.S.[111]
2. As shown in Table 3, the U.S. produced 6.15 million tons (12.3 billion lbs) of HDPE waste in 2017. Therefore, existing capacity U.S. domestic capacity for recycling/reprocessing HDPE waste is estimated to be about 12%.

7.2.4 U.S. DOMESTIC REPROCESSING CAPACITY FOR POST-CONSUMER HIGH POLYVINYL CHLORIDE (PVC) PLASTIC #3 WASTE

The USEPA data in Table 6 indicates that the current U.S. domestic reprocessing capacity for post-consumer PVC plastic waste is negligible. When it is accepted by a MRF, plastic #3 is typically collected as part of a mixed plastics #3-7 bale. There is negligible value for mixed plastic #3-7 bales across the country and the collected mixed plastics are often disposed to landfills or destroyed by incineration. Therefore, there is **negligible likelihood** that post-consumer PVC waste collected by MRFs is recycled/reprocessed into plastic resin for manufacturing of new products in the U.S. It is not reasonable for U.S. consumers to believe that PVC products that are collected by municipal systems will be recycled/reprocessed into a new product.

7.2.5 U.S. DOMESTIC REPROCESSING CAPACITY FOR POST-CONSUMER LOW DENSITY POLYETHYLENE (LDPE) PLASTIC #4 WASTE

The USEPA data in Table 6 indicates that the current U.S. domestic reprocessing capacity for post-consumer LDPE plastic waste is less than 5%. When it is accepted by a MRF, plastic #4 is typically collected as part of a mixed plastics #3-7 bale. Therefore, there is **low likelihood** that post-consumer LDPE waste collected by MRFs is recycled/reprocessed into plastic resin for manufacturing of new products in the U.S. It is not reasonable for U.S. consumers to believe that LDPE products that are collected by municipal systems will be recycled/reprocessed into a new product.

7.2.6 U.S. DOMESTIC REPROCESSING CAPACITY FOR POST-CONSUMER POLYPROPYLENE #5 PLASTIC WASTE

Available data indicates that the current U.S. domestic reprocessing capacity for post-consumer polypropylene plastic waste is approximately 2-5% of the total post-consumer plastic waste generated. This conservative estimate is supported by the low (0.6%) recycling rate reported by the USEPA in 2017 and other evidence. When it is accepted by a MRF, plastic #5 is typically collected as part of a mixed plastics #3-7 bale. Therefore, there is **low likelihood** that post-consumer polypropylene waste collected by MRFs is recycled/reprocessed into plastic resin for manufacturing of new products in the U.S. It is not reasonable for U.S. consumers to believe that polypropylene products that are collected by municipal systems will be recycled/reprocessed into a new product.

Evidence supporting this estimate:

1. Polypropylene is reportedly "one of the least recycled post-consumer plastics, at a rate below 1 percent for post-consumer recovery."[112]
2. KW Plastics (Alabama) is reported to be the largest processor of U.S. post-consumer polypropylene plastic waste. According to Plastics News,[113] KW has extrusion capacity to reprocess 650 million pounds of plastics a year, split about evenly between polyethylene and polypropylene. Plastics News also reports that post-consumer plastics is 87% of KW Plastics reprocessing. Therefore, KW Plastics capacity for post-consumer polypropylene plastic waste is estimated to be about 283 million lbs. As shown in Table 6, the U.S. produced 8 million tons (16 billion lbs) of polypropylene waste in 2017. Therefore, KW Plastics has the capacity to process 1.8% of U.S. post-consumer plastic waste.
3. Assuming that KW Plastics processes about one half of post-consumer polypropylene plastic waste, the total current U.S. capacity to recycle/reprocess polypropylene plastic waste is estimated to be less than 5%.

7.2.7 U.S. DOMESTIC REPROCESSING CAPACITY FOR POST-CONSUMER POLYSTYRENE (PS) PLASTIC #6 WASTE

The USEPA data in Table 6 indicates that the current U.S. domestic reprocessing capacity for post-consumer polystyrene plastic waste is less than 1%. When it is accepted by a MRF, plastic #6 is typically collected as part of a mixed plastics #3-7 bale. Therefore, there is **low likelihood** that post-consumer polystyrene waste collected by MRFs is recycled/reprocessed into plastic resin for manufacturing of new products in the U.S. It is not reasonable for U.S. consumers to believe that polystyrene products that are collected by municipal systems will be recycled/reprocessed into a new product. As an example, the City of San Antonio still tells citizens to place polystyrene foam food containers in recycling bins even though the local MRF can't recycle it and views it as harmful contamination.[114]

7.2.7 U.S. DOMESTIC REPROCESSING CAPACITY FOR PLASTIC #7 WASTE

Plastic waste #7 includes multiple types of plastics "other" than plastics #1-6, including bio-based plastics such as polylactic acid (PLA) plastic. The USEPA data in Table 6 indicates that the current U.S. domestic reprocessing capacity for "other" plastic waste is negligible. When it is accepted by a MRF, plastic #7 is typically collected as part of a mixed plastics #3-7 bale. Therefore, there is **negligible likelihood** that post-consumer plastic #7 waste collected by MRFs is recycled/reprocessed into plastic resin for manufacturing of new products in the U.S. It is not reasonable for U.S. consumers to believe that plastic #7 products that are collected by municipal systems will be recycled/reprocessed into a new product.

7.3 Current U.S. Access to Municipal Collection and Sortation

To legitimately claim a product as "recyclable", the FTC requires that recycling facilities be available to a "substantial majority" of Americans, defined to be at least 60 percent. The FTC focuses on "community-based" recycling systems, rather than privately operated mail-back or retail store take-back programs, in determining recycling availability.

The SPC 2015/2016 Centralized Study on Availability of Recycling employed three levels of access to municipal collection to determine availability of recycling for plastic products: automatic curbside collection, opt-in or subscription curbside collection and drop-off collection centers.[115]

In the four years since the 2015/2016 study was performed, many U.S. communities have reduced or eliminated municipal recycling services offered to residents, as documented by Waste Dive's website "How recycling has changed in all 50 states."[116] Table 7 provides an updated estimation of Americans' access to collection services for recycling in 2020. The 2020 estimation basis is shown and described below the table.

Table 7: Access to Collection Services for Recycling: 2020 Update Estimation

American Population Access to Municipal Collection for Recycling	Total U.S. Population 2015/2016[117]	(A) Total U.S. Population Winter 2019/2020 (estimated)	Estimation Basis: Change from 2015	(B) PP#5 Tub Acceptance (Recycling Not Assured)	PP#5 Acceptance Basis	Total US PP#5 Tub Acceptance (A x B)
Automatic Curbside Collection	53%	50%	-5%	53%	2020 U.S. MRF Survey	27%
Opt-In/Subscription for Curbside Collection	20%	18%	-10%	10%	No value for plastics #3-7	1.8%
Drop Off Access to Collection	21%	19%	-10%	10%	No value for plastics #3-7	1.9%
No Access to Collection for Recycling	6%	13%		0%		69%
Total Access to Collection for Recycling (Collected materials may not actually be recycled)	94%	87%				31%

Automatic Access to Curbside Collection Systems:

Automatic access to curbside collection refers to collection provided at a residence or apartment complex as a part of municipal waste collection that is trucked to a MRF. The 2015/2016 SPC Report estimated that 53% of Americans had this type of access to recycling.[118] Due to the decline in commodity value and increase in service fees charged, the number of municipalities providing curbside collection has declined over the past four years.

For the purpose of this 2020 assessment, a decline of 5% in automatic access to curbside collection sites was estimated based on news reports from across the country.

Opt-In/Subscription Collection Systems:

According to SPC, "an opt-in program is one provided by a community or its contractor in which residents must sign up and, in some cases, pay an additional fee to participate in recycling" and 20% of Americans had access to this type of collection in 2015/2016.[119]

The number of opt-in/subscription service contracts has fallen over the past four years, as documented by Waste Dive's website "How recycling has changed in all 50 states."[120] Opt-in/subscription service contracts have dramatically risen in cost due to the decline of all materials commodity values.[121] For the purpose of this 2020 assessment, a decline of 10% in opt-in/subscription service contracts was estimated.

Opt-in/subscription collection systems are more selective on the items accepted than MRFs. Opt-in/subscription want valuable PET and HDPE bottles and jugs because they are most easily baled and sold to domestic buyers. For the purpose of this 2020 assessment, it was estimated that 10% of opt-in/subscription service contractors accept PP#5 tubs and containers to bale and sell to recyclers/reprocessors.

Drop Off Collection Systems:

According to SPC, "drop-off recycling refers to a program where residents bring recyclables to a collection point away from their residence" and 21% of Americans had access to this type of collection in 2015/2016. The number of drop-off collection sites has also fallen over the past few years. Drop-off collection sites are commonly located in rural areas, often run by volunteers and have struggled to survive due to the decline of all materials commodity values.[122] For the purpose of this 2020 assessment, a decline of 10% in drop-off collection sites was estimated.

Drop-off collection systems are more selective on the items accepted. Drop-off collection systems want valuable PET and HDPE bottles and jugs because they are most easily baled and sold to domestic buyers. For example, the two collection sites in Albany, Georgia, accept "only plastic soda bottles and clear milk jugs."[123] In Norman, Oklahoma acceptance policy was changed to plastic bottles and jugs only due to the lack of market demand for plastics #3-7.[124] In Thomas, West Virginia, the drop-off centers now do not accept any type of plastic.[125] For the purpose of this 2020 assessment, it was estimated that 10% of drop-off sites accepted PP#5 tubs and containers to sell to recyclers/reprocessors.

8. Evidence of Collected Plastic Disposal and Export to Countries with Poor Waste Management

Extensive evidence of collected plastics waste being disposed or exported to countries with poor waste management was found during the U.S. MRF Survey. This evidence shows that consumers cannot "Check Locally" to determine if an item accepted for collection by a MRF will be bought by a recycler/reprocessor to be manufactured into a new product.

The detailed survey of U.S. MRF's acceptance of plastic items revealed:

a. **Table 7:** While some MRFs still accept plastics #3-7 and non-bottle plastics #1 & 2, there is extensive evidence that collected plastics are being landfilled or incinerated due to lack of market demand.

b. **Table 8**: Some MRFs that accept plastics #3-7 and non-bottle plastics #1 & 2s are known to export plastic waste outside of North America to countries with poor waste management without verification that the plastic will actually be recycled into a new product.

While there is strong evidence that exported plastic wastes are not all recycled but are often dumped or burned in receiving countries, many U.S states continue to export plastic waste to countries with poor waste management.[126] Figure 7 shows the largest state exporters of plastic waste to countries with poor waste management in 2019.

Table 8: Evidence that Collected Plastic Waste is Not Recycled: Disposed, Incinerated or Stored

State	Material Recovery Facility (MRF)	Evidence of Collected Plastic Material Not Recycled (Sent to Landfill, Incinerated or Stored)
Nationwide	Waste Management MRFs	The nation's largest waste hauler and MRF operator, Waste Management, states that collected plastics that have no market demand will be responsibly disposed.[127]
Arizona	Tucson MRFs	Most Nogales recyclables end up in landfills.[128]
Arizona	Arizona MRFs	MRFs in Arizona are sending some collected materials to landfills.[129]
California	California MRFs	Collected plastic #3-7 is being sent to landfill.[130]
California	San Diego MRFs	City of San Diego does not tell citizens the destination of plastics #3-7.[131]
California	Los Angeles MRFs	Waste haulers in the RecycLA program are required to collect plastics that have no market value and cannot be recycled.[132]
California	ReThink Waste Shoreway MRF	MRF states that plastics #3-7 are collected and sent to landfills.[133]
California	Manhattan Beach	Per the City's current Franchise Agreement, the City's hauler is required to accept plastics #1-7 in the recycling container. However, actual market value of certain plastics and recycling feasibility is subject to change.[134]
California	California MRFs	Recyclables are being dumped to landfill.[135]
Colorado	Colorado MRFs	Waste Management is stockpiling plastics #3-7 because there are no buyers.[136]
Connecticut	Willimantic MRF	Recyclables that are not bought or are contaminated are sent to an incinerator.[137]
Florida	City of Clearwater MRF	Collected recyclables were trucked to nearby incinerator instead of being recycled.[138]
Florida	MARPAN MRF	Marpan states that they send non-recyclable items to landfill.[139]
Florida	Florida MRFs	Materials collected for recycling that have no markets are landfilled.[140]
Florida	Lee County MRF	MRF is co-located with an incinerator.[141]
Florida	Palm Beach MRF	MRF is co-located with an incinerator. MRF sent collected plastics to incinerator.[142]
Georgia	Athens Clarke County MRF	Atlanta MRF expert says a lot of plastic cannot be recycled in U.S. and is landfilled.[143]
Georgia	Athens-Clarke County	Plastics #3-7 is sold to Greenmine Inc who has declared bankruptcy.[144,145]
Georgia, South Carolina, Tennessee, Texas	Pratt MRFs	Pratt Industries operates its own waste-to-energy plant. Unrecyclable residues are sent to the plant.[146]
Idaho & Utah	Idaho & Utah MRFs	Plastics #3-5 landfilled due to lack of buyers.[147]
Iowa	Cedar Rapids MRF	Mixed rigid plastics are now landfilled.[148]
Illinois	Keep North Illinois Beautiful Collection	Stockpiled over 400,000 tons of plastics due to lack of buyers.[149]

State	Material Recovery Facility (MRF)	Evidence of Collected Plastic Material Not Recycled (Sent to Landfill, Incinerated or Stored)
Indiana	Tri-State MRF	Plastics #3-7 have had to be sent to landfill due to lack of buyers.[150]
Maryland	Maryland MRFs	The bulk of collected plastic waste is sent to incineration.[151]
Massachusetts	Massachusetts MRFs	Some of Massachusetts collected recyclables are landfilled.[152]
Massachusetts	Zero Waste Solutions MRF	Low value plastic waste is planned to be burned.[153] Facility is storing collected material.[154]
Michigan	American Waste Traverse City	"Inferior plastics" are shredded and burned as a coal additive.[155]
Minnesota	Polk County MRF	Polk County MRF is co-located with an incinerator.[156]
Missouri	City of Columbia MRF	Plastics #3-7 are often sold at zero or negative values. "Even so, it's hard to find a buyer for these materials. Right now, there are about 30 tons of plastics outside of the facility waiting to be shipped".[157]
Nebraska	FirstStar Recycling MRF	FirstStar participates in the Hefty Energy Bag program that collects and burns plastic waste.[158]
Nevada	Republic Services	Collected plastics #3,4,6 & 7 are sent to landfill.[159]
New Jersey	Atlantic Coast Recycling	Recycled material is headed to landfills because there is no place willing to take it. Atlantic Coast Recycling stated that 10 to 25% of its collected material is now being recycled.[160]
New Mexico	Friedman Recycling	More collected material is deemed unrecyclable and disposed to landfill.[161]
New York	New York State MRFs	Mixed plastics #3-7 reportedly heading for landfill in state due to lack of buyers.[162]
North Carolina	North Carolina MRFs	In violation of contract, materials collected for recycling were shipped to Portsmouth, VA instead of being recycled.[163]
Ohio	Athens-Hocking MRF	AHRC is sending unwanted plastics to landfill.[164]
Ohio	Cleveland MRF	Cleveland recyclables have been sent to landfill.[165]
Ohio	Ohio MRFs	Recycler is sending collected plastic to landfill.[166]
Pennsylvania	Pennsylvania MRFs	Plastics with no local buyers are sent to landfill.[167]
South Carolina	North Augusta MRF	Collected materials that are not bought for recycling are sent to landfill.[168]
South Carolina	Pratt MRF	Collected plastics #3-7 being sent to landfill.[169]
Tennessee	Memphis MRF	"Tons of Memphis recyclables being sent to the dump."[170]
Texas	Texas MRFs	Collected materials without local markets going to landfill.[171]
Texas	Pratt Industries Denton MRF	MRF told city officials that plastics #3-7 have always been hard to shop to recycling companies. They called the city in March 2019 to say items like spray bottles, condiment squeeze bottles, yogurt tubs, reusable plastic keepers and plastic cups and plates were going to the landfill instead of being recycled.[172]
Utah	Salt Lake City MRF	Plastic waste collected through recycling systems is being burned in cement kilns and is not recycled.[173]
Utah	Utah MRFs	As much as 50 percent of what Draper residents think is being recycled actually ends up in the dump.[174]
Utah	Utah MRFs	Plastic scrap stockpiles reportedly growing in Utah.[175]
Utah	Utah MRFs	50% of collected materials going to landfill. Recommendation to collect plastic bottles & jugs only.[176]
Vermont	Vermont MRFs	Portion of plastics #3-7 cannot be recycled.[177]
Virginia	Portsmouth MRF	Plastic waste collected for recycling sent to incineration.[178]
Washington	Washington MRF	WA State Department of Ecology stated that plastics are piling up or being sent to landfill.[179]
Wisconsin	Wisconsin MRFs	The Wisconsin DNR has confirmed to stakeholders that mixed plastics (#3-7) can legally be disposed, even if the material has been sorted and baled.[180]
Wisconsin	Green Circle Recycling MRF	Unsellable plastic waste is sent to waste-to-energy plant.[181]
Wyoming	Wyoming Residents	Waste Management is stockpiling plastics #3-7 because there are no buyers.[182]

Table 9: Evidence that Collected Plastic is Exported Outside of North America to Countries with Poor Waste Management

State	Material Recovery Facility (MRF)	Evidence of Plastic Waste Exports Without Proof of Recycling
Arkansas	Marck Recycling	Marck Recycling website: Brokerage Services – "We utilize our connections with domestic and international mills to broker recyclable commodities for large manufacturers, city recycling centers and other facilities."[183]
Arizona, Colorado, New Mexico	Friedman Recycling	Friedman Recycling exports collected materials to Southeast Asia.[184,185]
Arizona	Tucson MRFs	Tucson is still selling most of its plastic, glass and paper overseas — to Taiwan, Indonesia, India and still some to China.[186]
California	California MRFs	California MRFs export collected plastic materials to Southeast Asia.[187]
California	Allan Company MRFs	Companies like Allan Company look "anywhere else in the world" to ship collected materials, including Vietnam, Indonesia, other parts of Asia."[188]
California	Burrtec MRFs	Burrtec exports collected materials to international markets.[189]
California	Caglia MRF	Caglia exports collected materials to worldwide markets.[190]
California	Cal Waste Recovery Systems MRFs	Cal-Waste Recovery Systems has brokers looking for new markets, like Mexico, Vietnam and wherever it can ship.[191]
California	EDCO MRFs	EDCO exports collected materials to Asian countries.[192]
California	Green Waste Recovery MRF	Green Waste exports plastic waste to Asian countries.[193]
California	Monterey Peninsula MRFs	Monterey Peninsula MRFs are exporting collected materials to countries such as Taiwan, Thailand, Indonesia and Vietnam.[194]
California	Potential Industries MRF	Potential Industries exports collected materials around the world, including to Asia.[195]
California, Washington	Recology MRFs	Recology exports 42% of collected materials, including plastics.[196]
California	Tri-CED Community Recycling	Tri-CED is exporting materials to Pakistan, Indonesia, India and Vietnam.[197]
California	Westrock MRFs	Westrock operates an international brokerage for collected materials.[198]
Colorado	GFL Alpine Recycling	Alpine exports materials to Asia.[199]
Connecticut	City Carting and Recycling	Company's video states that they export collected materials around the world.[200]
Connecticut	Oak Ridge MRFs	Oak Ridge exports to "whichever markets will take it."[201]
Georgia	Westrock MRFs	Westrock is a plastic waste exporter for materials they collect and broker for waste exports for other companies.[202]
Iowa	Mid America MRF	Mid America states that ship plastic wastes to both domestic and international recyclers.[203]
Illinois	Midwest Fibers MRF	Midwest Fibers exports collected materials to India and Vietnam.[204]
Illinois	Resource Management Companies MRFs	RMC exports collected materials to Asia. RMC is a major export broker.[205]
Massachusetts	E.L. Harvey MRF	E.L. Harvey exports some plastics overseas.[206]
Massachusetts	Green Works MRF	Green Works exports collected materials overseas.[207]
Massachusetts	Zero Waste Solutions MRF	Material will reportedly be sold to Thailand, Pakistan, India, Vietnam, Indonesia, Turkey and China.[208]
Maryland	Montgomery County MRF	Montgomery County exports collected materials to India.[209]
Michigan	RRRASOC MRF	Plastic materials are exported to Asia.[210]
Missouri	WCA MRF	WCA exports 30% of collected materials outside of the U.S.[211]
New Jersey	Bayshore MRF	Bayshore MRF serves the "global recycling market."[212]
New Jersey	Cape May MRF	Cape May MRF exports collected materials to Thailand and Vietnam.[213]
North Carolina	American Recycling of Western North Carolina MRF	MRF exports collected materials to international markets.[214]
North Carolina, South Carolina	Sonoco MRFs	Sonoco exports collected materials "to countries all over the world."[215]

State	Material Recovery Facility (MRF)	Evidence of Plastic Waste Exports Without Proof of Recycling
New York	New York City MRFs	The Guardian reports that the final destination of some NYC collected recyclables is Asia or India.[216]
New York	County Waste MRF	Facility is exporting collected materials to Asia.[217]
New York	Rockland County MRF	Rockland County exports collected materials to India.[218]
Rhode Island	RIRRC MRF	RIRRC MRF exports collected materials around the world.[219]
Washington	Seattle MRFs	City representative stated that 60% of Seattle's plastic waste is exported overseas.[220]
Washington	Pioneer Recycling MRF	Pioneer Recycling Services sells collected materials to the global market.[221]

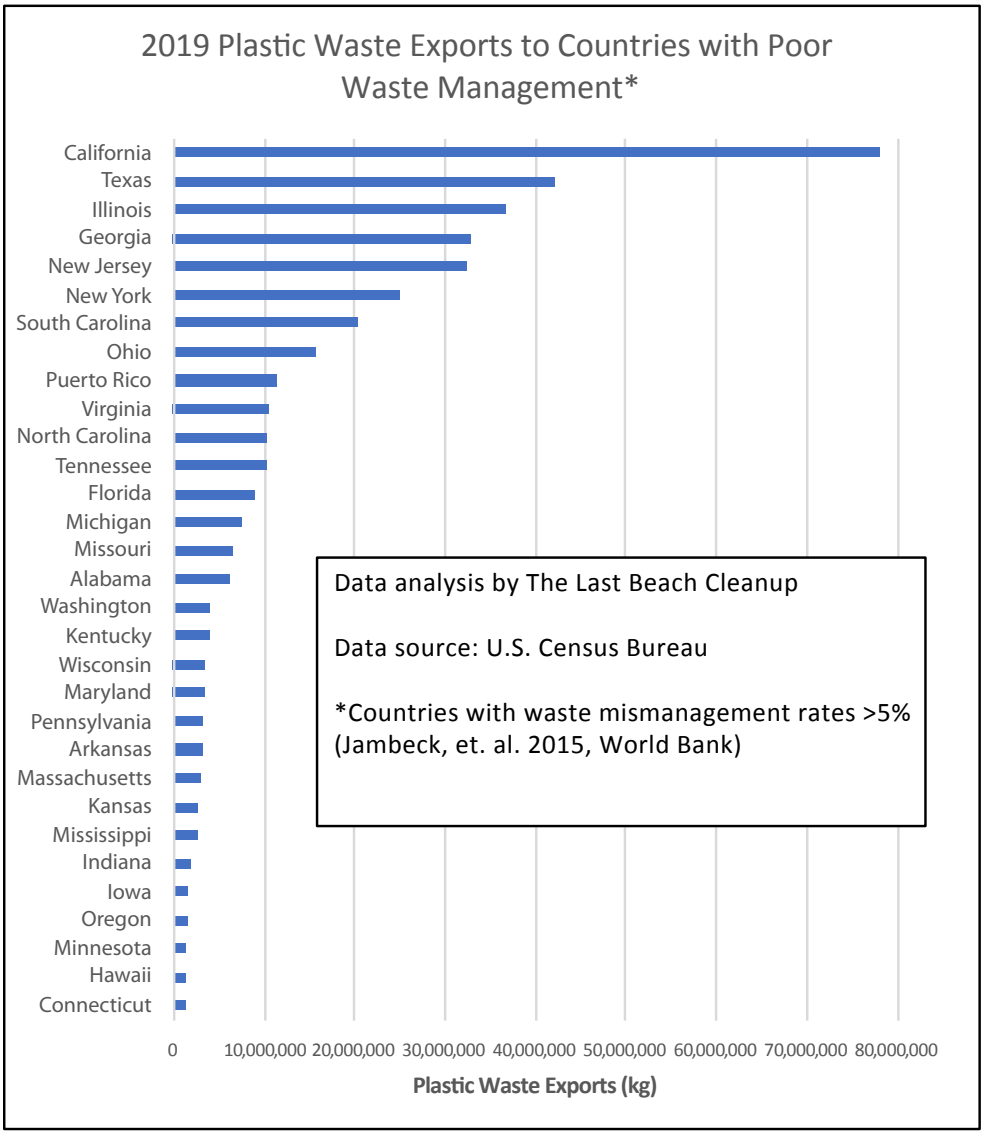


Figure 7: Largest state exporters of plastic waste to countries with poor waste management in 2019[222]

9. Evidence of Negligible Value of Plastic #3-7 Waste

The financial value of collected plastic waste drives a MRF to decide whether to accept it for collection in municipal systems. According to industry website recyclemoreplastic.org, the nationwide value of plastic "3-7 Bottles and Other Small Rigid Plastic" was $0.003 per pound in December 2019.[223] This negligible value is an insufficient economic driver for MRFs to collect and sort this type of plastic. RecyclingMarkets.net reports negative values of commingled plastics #3-7 in several regions of the country in January 2020, including the Pacific Northwest, Southwest and Southeast U.S.[224] When materials have negative value, the MRF must pay for the bales to be taken away.

Table 10 summarizes evidence of negligible value of plastics #3-7 and non-bottles plastics #1-2 found across the country.

Table 10: Evidence of Negligible Value of Plastics #3-7 and Non-Bottle Plastics #1-2

State	Evidence of Negligible Value of Plastics #3-7 and Non-Bottle Plastics #1-2
Arkansas	The Baxter Bulletin reported that plastic #1 & 2 containers are the only plastics with sufficient value to be viably recycled.[225]
Arizona, Colorado, New Mexico	Friedman Recycling stated that there was not a viable market for plastics #3-7.[226]
Arizona	Norton Environmental is only collecting plastic #1 & 2 bottles, jugs and jars because there are no buyers for other types of plastics.[227]
California	Low value, mixed plastics are extremely hard to recycle.[228]
California	Gold Coast Recycling only accepts plastic bottles & large rigid plastics. The MRF states: "If there aren't buyers for certain types of low-quality plastics, then they cannot be recycled."[229]
California	Sacramento stops accepting plastics #4-7 due to lack of value and difficulty of recycling.[230]
Colorado	Angel of Shavano Recycling stops accepting plastics #3-7 due to lack of buyers.[231]
Connecticut	Recycling plastics is a money loser.[232]
Illinois	No market for plastics #3-7 in southern Illinois.[233]
Kansas	No market for plastics #3-7 in Kansas.[234]
Maine	Only plastic #2 accepted. No market for plastics 1, #3-7 in Maine.[235]
Maryland	Mixed plastics is effectively worthless and the WM MRF plant pays subcontractors to haul it away.[236]
Michigan	State of Michigan states that plastics #3-7 are difficult to recycle.[237]
Michigan	Michigan recycler states that "Markets have collapsed." Cites plastics #3-7 as recyclables that don't have domestic buyers.[238]
Missouri	Plastics #3-7 are often sold at zero or negative values. "Even so, it's hard to find a buyer for these materials."[239]
New Hampshire	No market for plastics.[240]
Nebraska	Nebraska Recycling Council recommends that MRFs eliminate plastics #3-7 due to lack of markets.[241]
New Jersey	Atlantic County, NJ not accepting plastics #3-7 due to lack of market.[242]
New Jersey	There are no local markets for plastics #3-7 in New Jersey.[243]
North Carolina	NC Department of Environmental Quality states that mixed plastic #3-7 bale is worth $0.00 to $0.01 per pound in the state.[244]
North Carolina	Plastics #3-7 have a negative value. "You have to pay to get rid of them."[245]
Oklahoma	Oklahoma Department of Environmental Quality states that all plastic wastes have no value.[246]
Oregon	Oregon Refuse and Recycling Association recommend that only plastic #1-2 bottles & jugs be collected. They recommend that plastics #3-7 not be collected.[247]
Pennsylvania	PA recyclers cannot find domestic buyers for plastics #3-7 and are eliminating them.[248]
Utah	No buyers for mixed plastics #3-7 in Utah.[249]
Virginia	Plastics #3-7 are no longer accepted because there are no buyers.[250]
Washington	WA State Department of Ecology recommends collection of only plastic bottles & jugs #1 & 2 due to lack of markets and contamination.[251]
Wisconsin	Due to lack of markets, the Wisconsin DNR has confirmed to stakeholders that mixed plastics (#3-7) can legally be disposed, even if the material has been sorted and baled.[252]

10. Evidence of Shrink Sleeves and Deceptive Labeling

Many product companies are increasingly using full body shrink sleeve labels on plastic bottles to improve shelf appeal and increase sales. Commonly used polyethylene terephthalate glycol (PETG) and polyvinyl chloride (PVC) shrink sleeves are known to prevent proper sortation of the bottles in MRFs and harm operations of PET bottle recyclers/reprocessors.[253] Yet product companies continue to employ these types of shrink sleeves. The product companies are evidently aware that the shrink sleeves they use prohibit proper sortation and harm recycling of the plastic bottles because they place instructions on the bottles telling consumers to remove the shrink sleeves. One example is provided in Figure 8.

Figure 8: Expanded Image of Full Body Shrink Sleeve Label on HDPE #2 Bottle

This labeling practice is not compliant with the FTC Green Guides and is deceptive in two ways:

1. **The FTC requires that components of a product cannot limit the recyclability of the product**. FTC Green Guides 16 CFR 260.12d states: "If any component significantly limits the ability to recycle the item, any recyclable claim would be deceptive. An item that is made from recyclable material, but, because of its shape, size, or some other attribute, is not accepted in recycling programs, should not be marketed as recyclable."[254]
2. **The FTC Green Guides does not allow for a company to instruct a consumer to remove an integral component to make a product recyclable**.

To become compliant with FTC Green Guides requirements, product companies must change to labels that do not harm sortation and plastic recycling/reprocessing and do not require removal by customers. Alternative, non-harmful labels are commercially available.[255]

10.1 Harms Caused by Full Body Shrink Sleeves

Several types of full body shrink sleeves on PET #1 and HDPE #2 bottles make them not sortable by optical scanners at MRFs. When the bottles are not correctly sorted, they may contaminate another material stream or be lost to the waste "residuals" stream.

PETG and PVC shrink sleeves are harmful to PET bottle recyclers because the PETG and PVC shrink sleeves cannot be separated in mechanical recycling water "sink-float" tanks. PETG and PVC materials have a specific gravity greater than one, so they sink along with PET (1.38 sp. gr.) in the tank. But the PETG and PVC labels have a lower melting point than PET. When the combined flake mixture is melted to form resin, the PETG or PVC melts first, causes clumps and harms PET drying equipment. Experts report that shrink sleeve labels can also bleed ink into wash water and stain flakes, reducing the quality of the recycled plastic.[256] Mechanical de-labelers are expensive and not effective. The PETG and PVC shrink sleeve label contamination causes material yield loss. In the 2018 United States National Postconsumer Plastic Bottle Recycling Report, sleeve labels on PET bottles were identified as a cause of poor bale yields.[257]

10.2 Recycling and Retail Industry Design Guidelines

Use of full body shrink sleeves is prohibited in the Design® Guides published by the Association of Plastic Recyclers (APR) and Walmart for recyclable plastic products. APR and other recycling organizations have clearly communicated to product designers that certain types of full body shrink sleeves should not be employed on products, yet many companies ignore the guidance and put the burden on consumers to remove the shrink sleeve.

Plastic recyclers and the world's largest retailer agree that full shrink sleeve labels cause sortation and recycling/reprocessing of plastic bottles:

1. **The Association of Plastic Recyclers (APR) Design® Guide for Plastics Recyclability**[258]

   APR publishes a design guide to "help package design engineers at consumer brand companies and converters create packaging that is fully compatible with plastics recycling systems in North America." APR notes that contamination in the recycling stream by poor package design impacts recyclers and the brands themselves.

   The APR Design® Guide provides detailed specifications to plastic product manufacturers, including requirements for label coverage and materials. In several 2019 public webinars, APR provided design guidance to product companies.[259] Figure 9 shows the APR guidance that labels on bottles exceeding 85% side coverage may cause the item to be sorted incorrectly. Figure 10 states that PETG sleeve labels impact the quality and efficiency of the PET recycling process.

Figure 9: Not Recyclable Guidance by APR on Label Coverage[260]

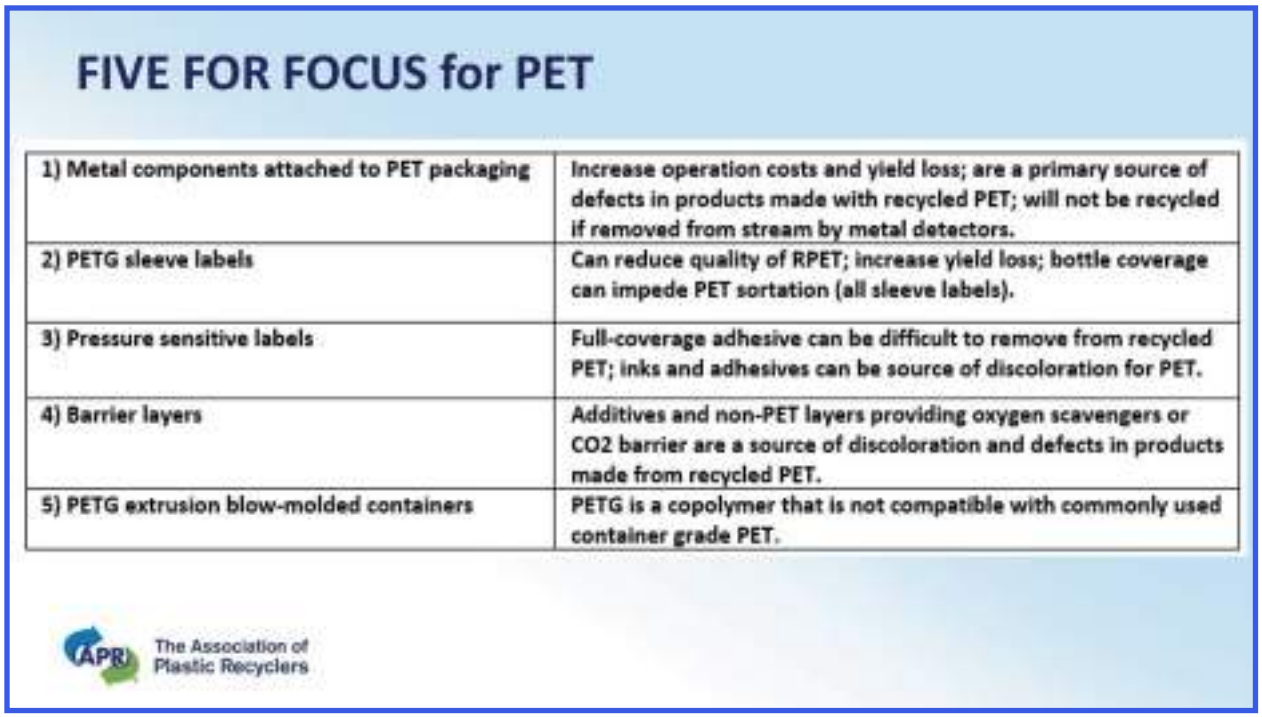
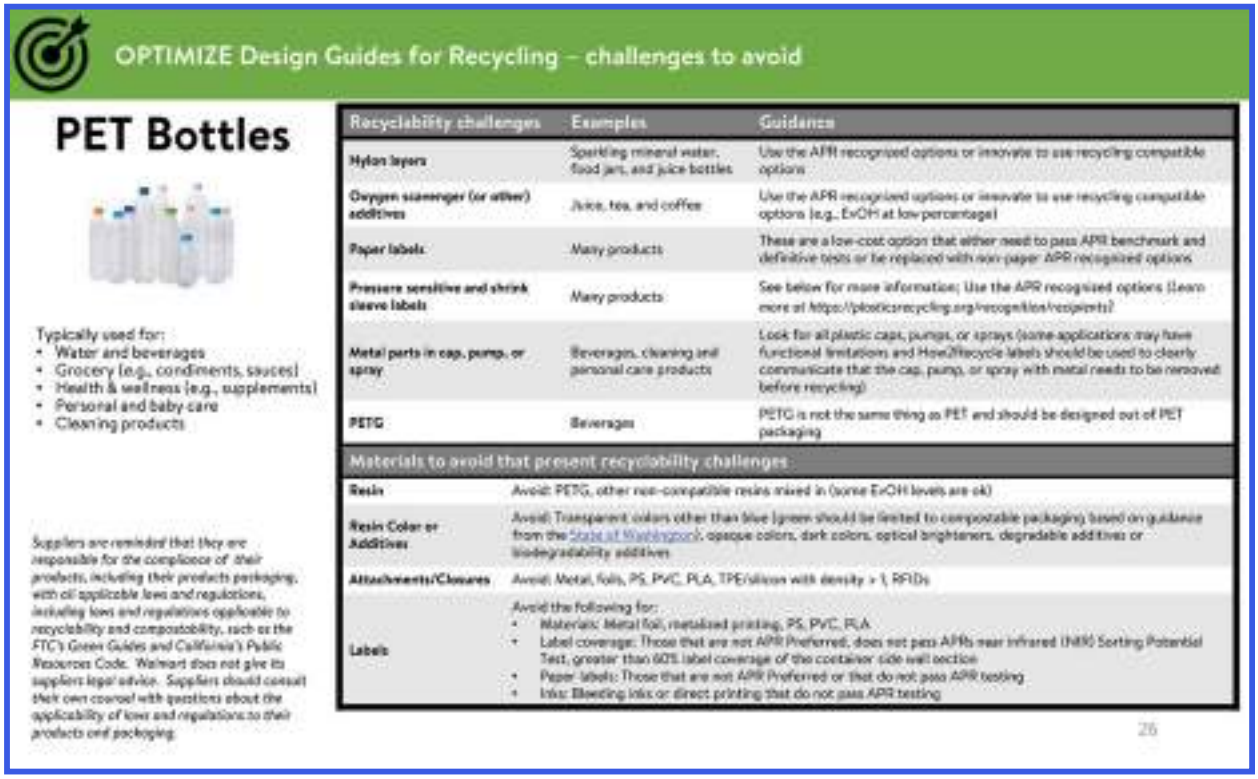


Figure 10: Problematic Design Components on PET Packaging[261]

2. **Walmart's Packaging Design Guidelines**

Walmart's "The Recycling Playbook" provides guidance for designing PET #1 and HDPE #2 bottles and jugs for recyclability. As shown in Figures 11 and 12 below, Walmart instructs product manufacturers to not employ PETG labels on PET bottles and restrict shrink sleeve labels to 60% coverage on both types of bottles.[262]



OPTIMIZE Design Guides for Recycling – challenges to avoid

PET Bottles

Typically used for:
- Water and beverages
- Grocery (e.g., condiments, sauces)
- Health & wellness (e.g., supplements)
- Personal and baby care
- Cleaning products

Suppliers are reminded that they are responsible for the compliance of their products, including their products packaging, with all applicable laws and regulations, including laws and regulations applicable to recyclability and compostability, such as the FTC's Green Guides and California's Public Resources Code. Walmart does not give its suppliers legal advice. Suppliers should consult their own counsel with questions about the applicability of laws and regulations to their products and packaging.

Recyclability challenges	Examples	Guidance
Nylon layers	Sparkling mineral water, food jars, and juice bottles	Use the APR recognized options or innovate to use recycling compatible options
Oxygen scavenger (or other) additives	Juice, tea, and coffee	Use the APR recognized options or innovate to use recycling compatible options (e.g., EvOH at low percentage)
Paper labels	Many products	These are a low-cost option that either need to pass APR benchmark and definitive tests or be replaced with non-paper APR recognized options
Pressure sensitive and shrink sleeve labels	Many products	See below for more information; Use the APR recognized options (Learn more at https://plasticsrecycling.org/recognition/recipients)
Metal parts in cap, pump, or spray	Beverages, cleaning and personal care products	Look for all plastic caps, pumps, or sprays (some applications may have functional limitations and How2Recycle labels should be used to clearly communicate that the cap, pump, or spray with metal needs to be removed before recycling)
PETG	Beverages	PETG is not the same thing as PET and should be designed out of PET packaging
Materials to avoid that present recyclability challenges		
Resin	Avoid: PETG, other non-compatible resins mixed in (some EvOH levels are ok)	
Resin Color or Additives	Avoid: Transparent colors other than blue (green should be limited to compostable packaging based on guidance from the State of Washington); opaque colors, dark colors, optical brighteners, degradable additives or biodegradability additives	
Attachments/Closures	Avoid: Metal, foils, PS, PVC, PLA, TPE/silicon with density > 1, RFIDs	
Labels	Avoid the following for: • Materials: Metal foil, metalized printing, PS, PVC, PLA • Label coverage: Those that are not APR Preferred, does not pass APRs near infrared (NIR) Sorting Potential Test, greater than 60% label coverage of the container side wall section • Paper labels: Those that are not APR Preferred or that do not pass APR testing • Inks: Bleeding inks or direct printing that do not pass APR testing	

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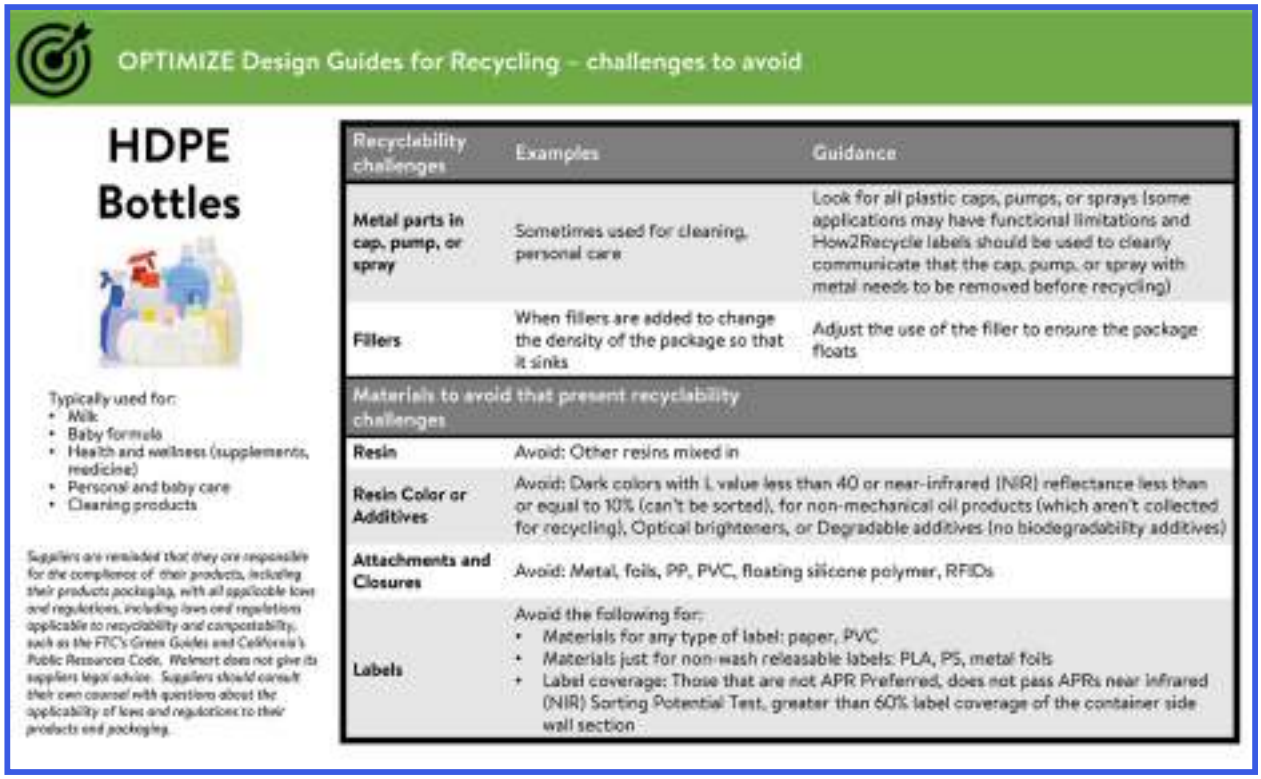
Figure 11: Walmart OPTIMIZE Design Guide for PET Bottles



OPTIMIZE Design Guides for Recycling – challenges to avoid

HDPE Bottles

Typically used for:
- Milk
- Baby formula
- Health and wellness (supplements, medicine)
- Personal and baby care
- Cleaning products

Suppliers are reminded that they are responsible for the compliance of their products, including their products packaging, with all applicable laws and regulations, including laws and regulations applicable to recyclability and compostability, such as the FTC's Green Guides and California's Public Resources Code. Walmart does not give its suppliers legal advice. Suppliers should consult their own counsel with questions about the applicability of laws and regulations to their products and packaging.

Recyclability challenges	Examples	Guidance
Metal parts in cap, pump, or spray	Sometimes used for cleaning, personal care	Look for all plastic caps, pumps, or sprays (some applications may have functional limitations and How2Recycle labels should be used to clearly communicate that the cap, pump, or spray with metal needs to be removed before recycling)
Fillers	When fillers are added to change the density of the package so that it sinks	Adjust the use of the filler to ensure the package floats
Materials to avoid that present recyclability challenges		
Resin	Avoid: Other resins mixed in	
Resin Color or Additives	Avoid: Dark colors with L value less than 40 or near-infrared (NIR) reflectance less than or equal to 10% (can't be sorted), for non-mechanical oil products (which aren't collected for recycling), Optical brighteners, or Degradable additives (no biodegradability additives)	
Attachments and Closures	Avoid: Metal, foils, PP, PVC, floating silicone polymer, RFIDs	
Labels	Avoid the following for: • Materials for any type of label: paper, PVC • Materials just for non-wash releasable labels: PLA, PS, metal foils • Label coverage: Those that are not APR Preferred, does not pass APRs near infrared (NIR) Sorting Potential Test, greater than 60% label coverage of the container side wall section	

Figure 12: Walmart OPTIMIZE Design Guide for PET Bottles

3. **ASTRX Material Flow Study**[263] (ASTRX is an initiative of The Recycling Partnership and the Sustainable Packaging Coalition)[264]

   In 2019, Applying Systems Thinking to Recycling (ASTRX) collected information on material flows by interviewing MRFs that sort recyclable materials and recyclers/reprocessors that aggregate and convert materials. "The objective was to learn whether there are packaging types, materials or contaminants that present significant challenges for MRFs and the different material-type reprocessors, where specifically within the system they cause problems, and why."[265] Full body shrink sleeves were identified as a top problem to both MRFs and plastic recyclers/reprocessors. In MRFs, full shrink sleeves were reported to cause sortation issues and degradation of value of PET and HDPE bales. Plastic recyclers/reprocessors reported that full shrink sleeve are causing "contamination in plastic bales that decreases bale yield; operational issues with de-labeler equipment requiring a lot of maintenance; sortation issues: the sorter sees the label and thinks it's opaque and rejects the bottle."

Attachment 1
2020 U.S. MRF Survey Spreadsheet

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