

# The Ubiquity of Plastic Packaging and its Investment Implications

PERSPECTIVES | October 2023

#### AUTHORS

RICHARD KUS, CFA U.S. Leveraged Finance Credit Research Analyst

JAMES MALONE, CFA ESG Specialist

DAVID KLAUSNER ESG Specialist

- A world inundated by plastic packaging waste—but limited alternatives demonstrates the distinction between sustainable management of ESG impacts and financial credit risks due to environmental or societal issues.
- We view issuers through two lenses, one of which determines <u>our ESG Impact</u> <u>Ratings</u>. For plastic packagers, this evaluation includes whether a product is the "least-worst" option for society, an issuer's breadth of disclosures, a product's sustainability, the plastic intensity of company operations, and efforts to reduce the drawbacks from plastic applications.
- The other lens is based on <u>credit materiality</u>. We generally seek issuers with products that are plastic for functional or technical reasons, businesses able to extend cash flow streams, and firms that proactively address the waste crisis.
- Our research not only underscores the complexity of the plastic packaging issue, but it also indicates that plastic packaging will remain in use for years to come, despite its undesirable ESG impacts. While environmental and societal issues can pressure valuations, from a credit perspective, the persistence of plastic packaging can lead to investment opportunities that adequately compensate for these risks.
- While we believe it is in plastic packaging firms' best interest to enhance their sustainability, clients maintain the ultimate choice of how they respond to the plastic packaging conundrum.

# **EVERYTHING EVERYWHERE**

If you're not touching plastic as you read this, it's probably within arm's reach. Already the most widely produced manmade material, plastic production has gone parabolic in recent years.<sup>1</sup> Nearly a quarter of all the plastic ever made was done so within the past five years, and estimates

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<sup>1</sup> https://www.oecd.org/environment/plastic-pollution-is-growing-relentlessly-as-waste-management-and-recycling-fall-short.htm

indicate production will again double or triple with a few decades. This surging volume has translated into massive amounts of waste that has reached every corner of the planet. Considering that it takes 500 years for plastic to biodegrade in an ocean, the material has particularly disastrous effects on marine biology, harming ecosystems that are critical for everything from food production to tourism. It also is responsible for serious human health effects, the extent of which we are only just beginning to understand given the recent, exponential surge in production.

While ample research exists on the prevalence of plastic and its myriad trappings, a comprehensive understanding of the situation also includes in-depth analysis of the tradeoff costs of using alternatives, such as glass or aluminum.

Indeed, within current consumer and business systems, plastics are ubiquitous for a reason. Given their affordability and convenience benefits, plastics are commonplace in most households. Furthermore, they play a central role in limiting lifecycle emissions given their light weight, relative strength, and resistance to physical and chemical degradation. Most alternatives come with their own drawbacks, which can be as severe as those of plastic or worse. Efforts to sustainably address the plastic crisis would require transformative changes to government policies, business models, and personal consumption patterns, including the way food is produced, transported, and sold. Other adjustments are behavioral, such as fostering a culture of greater re-use and more conscious waste avoidance.

The following sections address the problems with plastic packaging and the thorny tradeoffs of using alternative materials. The paper culminates with our perspective from the two lenses through which we view ESG: the impact that companies have on the environment and society through their products, services, and operations irrespective of financial materiality; and the financially material risks that companies face from environmental and social factors.

Viewing the implications of plastics' ubiquity through these two lenses is critical because, in this sector, they can be mutually exclusive.

While client choice determines the lens that is most pertinent for its respective portfolios, our assessment provides a comprehensive view of a material that affects nearly every corner of the planet and global economy.

# **SECTION 1: THE PROBLEM WITH PLASTIC PACKAGING**

Amongst the industrial sectors, packaging produces the largest volume of plastic globally. Plastic packaging currently represents roughly 40% of total plastic production and generates almost 50% of all plastic waste as it is almost exclusively designed for single use and is very difficult to recycle.<sup>2</sup> The waste situation appears bound to worsen given the insatiable demand for the material. If current production trends continue, it's estimated that total lifetime plastic production will more than triple from 9.5 billion tons today to 34 billion tons by 2050, with around 8 million tons of new plastic ending up in the oceans annually.<sup>3</sup>

When considering its uncontrolled growth, we see four key external effects from plastic packaging.

<sup>3</sup> https://wrap.org.uk/media-centre/press-releases/no-plastic-packaging-sell-fresh-uncut-produce-loose-says-wrap-report

The waste situation appears bound to worsen...It's estimated that total lifetime plastic production will more than triple from 9.5 billion tons today to 34 billion tons by 2050.

<sup>&</sup>lt;sup>2</sup> https://thisisplastics.com/plastics-101/rethink-plastic-packaging/

**Degradation of natural systems:** Plastic packaging consists of more than 60% of all waste collected in international coastal clean-up operations.<sup>4</sup> And it tends to stay around: plastics' prolonged degradation process creates lethal hazards that can block the breathing passages and stomachs of over 600 marine species, of which 15% are endangered.<sup>5</sup> Plastics are also consumed by several endangered land species, underscoring its impact throughout the planet's ecosystems.

**Harm to human health:** Microplastics—i.e., debris of about five millimeters or less—have become a component of the human food chain. They're not only present in seafood, but they also exist in common table salt and tap water (not to mention the air).<sup>6</sup> As a result, recent studies have found that microplastics are detectable in nearly every human's bloodstream and vital organs with a variety of effects.<sup>7</sup> For example, long exposures to styrene, the main ingredient in Styrofoam, can cause nervous system damage, microplastics can contribute to male infertility, and polyvinyl chloride (PVC)—one of the most widely produced plastics globally that is used in everything from residential pipes to children's toys—is composed of the known human carcinogen vinyl chloride.<sup>8</sup>

Burning plastic—which remains common in developing countries and can occur in accidents, such as the Ohio train derailment in early 2023 that ignited tanks of vinyl chloride—can increase the risk of heart disease, asthma, emphysema, and nervous system damage.<sup>9</sup> Plastic combustion is worsened by developed countries' practice of sending their plastic waste to developing countries, exacerbating global inequities around pollution and health. The combined effect of the cocktail of toxins can produce more harmful effects than individual toxins on their own. Some of the most detrimental effects of plastic exposure tend to occur in weaker populations, especially children. Considering that most of the plastic ever produced was made in the last few years, the cumulative, long-term effects of exposure will continue to emerge in the coming years.

**Greenhouse gas emissions from production and end-of-life disposal:** Given the sheer volume of production, plastics are fast becoming one of the most significant uses of fossil fuels and their associated emissions. If current projections hold, by 2050, plastics could account for 2.8 gigatons of greenhouse gas emissions annually, up from less than 1 gigaton today.<sup>10</sup> This equates to more than 600 five-hundred megawatt (MW) coal plants and would use up almost 15% of the carbon budget allowable under a 1.5C climate scenario.<sup>11</sup> Even more concerning, these estimates are likely to undercount the overall climate impact of plastics, as research is only starting to emerge on emissions associated with photodegradation as well as plastic pollutions' effect on phytoplankton and zooplankton, both of which play an essential role in sequestering carbon in deep oceans.<sup>12</sup>

**Significant economic costs, particularly in developing economies:** Plastic pollution inflicts particular harm on countries that rely on coastal tourism. The direct economic cost from plastic pollution is estimated at \$13 billion per year, with \$1.3 billion of that borne by Small Island Developing States.<sup>13</sup> When considering the totality of the economic impacts of plastic waste on the oceans (including, for example, the secondary and tertiary impacts of plastic waste), a recent

<sup>&</sup>lt;sup>4</sup> https://oceanconservancy.org/news/international-coastal-cleanup-data-demonstrate-recyclability-crisis/

<sup>&</sup>lt;sup>5</sup> https://www.un.org/sustainabledevelopment/blog/2016/12/marinedebris/

<sup>6</sup> https://pubmed.ncbi.nlm.nih.gov/32119774/

<sup>7</sup> https://pubmed.ncbi.nlm.nih.gov/35367073/

<sup>&</sup>lt;sup>8</sup> https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/vinyl-chloride.pdf

<sup>&</sup>lt;sup>9</sup> https://www.unep.org/news-and-stories/story/plastic-bag-bans-can-help-reduce-toxic-fumes

<sup>10</sup> https://www.clientearth.org/latest/latest-updates/stories/plastics-a-carbon-copy-of-the-climate-

crisis/#:~:text=By%202050%2C%20the%20emissions%20from,the%20entire%20remaining%20carbon%20budget. <sup>11</sup> Ibid

<sup>&</sup>lt;sup>12</sup> https://www.ciel.org/project-update/plastic-climate-the-hidden-costs-of-a-plastic-planet/

<sup>13</sup> https://www.worldbank.org/en/news/feature/2018/06/08/planet-over-plastic-addressing-east-asias-growing-environmental-crisis#:~:text=The%20financial%20toll%20is%20huge,and%20jobs%20are%20under%20study.

study suggests the overall costs from plastic pollution in the oceans could be as high as \$2.5 trillion in social and economic impacts annually.14

## SECTION 2: ANYTHING BUT A STRAIGHTFORWARD TRANSITION

Plastic packaging's negative effects on the environment, climate, and human health underscore the need for many of its applications to transition away from the material. To do this effectively, the global economy would need to change dramatically-beginning with the food value chain. On the production side, more food would need to be grown locally, eliminating the need for long-distance transportation, and harvested just prior to consumption, eliminating the need for prolonged storage. Changes on the demand side would include consumers' need to shop more frequently, more consistent use of durable packaging, and an adjusted consumption mix, prioritizing foods with long shelf lives, such as beans, nuts, and grains, as well as seasonal fruits and vegetables.

However, in our existing structure, most of the alternatives and proposed solutions to the plastic packaging problem have proven ineffective or require unpalatable tradeoffs for most consumers.

Plastic packaging reduces food waste: Given that plastic packaging can be flexible, water repellant, and resistant to physical and chemical degradation, it can keep food fresh for longer by

protecting it from the air, which can hasten spoilage and oxidation, as well as prevent unwanted drying and undesirable moisture absorption. Consumers often overlook the environmental and climate impact of food waste considering it is natural and biodegradable. However, food waste alone generates about 10-20% of global GHG emissions, more than double the emissions from plastic packaging (Figure 1).<sup>15</sup> Furthermore, rigid plastic packaging can prevent waste during transportation when roughly 14% of all food produced is lost.16



#### Figure 1: CO<sub>2</sub> Emissions from Food Waste is About Double that from Plastic Packaging Production

Source: Journal of Industrial Ecology, June 2019

Food waste alone

emissions, more than double the

emissions from

formats.

plastic packaging

generates about 10-20% of global GHG

> The less food wasted, the lower the overall resource intensity of the food value chain. The emissions saved from plastic use can be particularly high for foods that are more emissions-

<sup>14</sup> https://www.ncelenviro.org/articles/first-in-science-the-economic-impacts-of-plastic-

pollution/#:~:text=Up%20to%20%242.5%20trillion%20is,pollution%20has%20on%20ecosystem%20services.

<sup>15</sup> https://www.usda.gov/media/blog/2022/01/24/food-waste-and-its-links-greenhouse-gases-and-climate-change

<sup>&</sup>lt;sup>16</sup> https://www.mdpi.com/2071-1050/11/1/264

intensive to produce. For example, the GHG emissions from beef production have been estimated to be 780x those linked to the plastic packaging used to protect and transport it to consumers. This implies that there is an especially strong opportunity for net GHG emissions reductions through packaging that can contribute to reducing food waste by extending shelf life.

Lower lifecycle emissions than alternative materials: Glass, steel, aluminum, and paper are often heralded as the solution to the plastic problem as they are not based on fossil fuels, and the recycling rates in most countries exceed 50%.<sup>17</sup> Yet, recent research suggests these alternatives don't just fail to improve the emissions profile of packaging, but they increase overall emissions above those of plastic. For example, a meta study examining over 70 life cycle assessments (LCAs are also involved in our ESG Impact Ratings as discussed in the following section) of plastic packaging and its alternatives found that carbon emissions from the production of plastic bottles are lower than all other equivalent materials, with glass being the worst from a carbon emissions perspective (Figure 2). This benefit is mainly driven by plastics' high strength-to-weight ratio, enabling lower fuel consumption during transit. So, while emissions from the production and disposal of plastic packaging are high, emissions associated with the transportation component of plastic packaging's value chain are extremely low.



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Source: Imperial College London

These types of LCAs will undoubtably evolve as the power and heat mix skews more towards renewables, electric transportation, and green production processes. But this will likely take years to materialize, implying that plastics are the lesser packaging evil over the short- to medium-term.

**Insufficient recycling limits the production of recycled plastic products:** Effective recycling can reduce the amount of plastic packaging waste and replace virgin feedstock in the production of plastic packaging, eliminating up to 80% of plastic production emissions.<sup>18</sup> Yet, despite recent efforts to improve recycling, current recycling rates of plastic packaging remain

<sup>17</sup> https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/aluminum-material-specific-data

<sup>18</sup> United Nations Environment Programme

between 14 - 18% globally and only 5-6% in the U.S.<sup>19</sup> Furthermore, by some definitions, no plastics are recyclable across the U.S.

Low recycling rates are driven by a few factors. First, mechanical recycling systems—the most resource- and energy-efficient method for plastics recycling—are largely incompatible with flexible plastic film as it is lightweight, comprised of multiple layers, and is easily entangled in revolving machinery. Second, the massive complexity of post-consumer recovery and separation, long-distance transportation, and processing and remanufacturing mean that recycled plastics are unlikely to make it to recycling plants in the first place given the convoluted process. Finally, recycling is often uneconomical. For instance, when low U.S. household recycling rates during the pandemic led to a spike in the price of recyclable plastics (Figure 3), many firms likely opted for virgin feedstock. More structurally, the supply of recycled plastic remains well below the demand—which points to investment opportunities as we explain in subsequent sections.

# Figure 3: Low Supplies of Recycled Resins Increase Costs and Reduce Use (Index December 2011=100)



Producer price index (rubber and plastic products: recyclable plastics)

Source: U.S Bureau of Labor Statistics

Material degradation or contamination also means that most recycled plastics are "downcycled," which is when a material is repurposed into a lower-quality item, such as carpets and buckets, that typically can't be recycled again. This limits an item's overall life cycle and its contribution to a more circular economy.

Furthermore, many consumers may be confused by the omnipresent three-arrowed recycling symbol, thus aren't aware of which plastics can be recycled and which cannot. This can promote "wish-cycling" of non-recyclable material, further increasing the complexity of sorting recycled plastics (see the Appendix for information on chemical recycling, biodegradable resins, and biofeedstock).

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# SECTION 3: THE ESG IMPACT OF U.S. PLASTIC PACKAGING MANUFACTURERS

<u>PGIM Fixed Income ESG Impact Ratings</u> are designed for investors who choose to allocate capital to companies that positively contribute to the environment and society. Our <u>ESG Impact Ratings</u> framework assesses how a company's products, services, and operations impact environment and society, regardless of whether we feel those impacts are immediately financially material to the issuer.

Our impact framework for assessing plastic packaging producers seeks to assign positive value to plastic products when they are the "least-worst" option available to meet society's needs. This approach is premised on the notion that packaging on its own, does not provide significant utility. It is a product that provides a service to items which society needs or values by protecting it from damage or loss and is often a key enabler for transportation.

Equally, our framework seeks to "down weight" companies that produce and sell products where better, less-harmful solutions are available (including minimizing or eliminating the use of packaging). Given the unlikely emergence of changes that would make the use, or avoidance, of plastic packaging more sustainable, we generally limit the scope of our impact assessment to the sector's role within the current system, except in situations where we view companies as actively promoting or impeding more systematic changes.

Nonetheless, many incremental efforts by plastic packaging companies—including those pertaining to material composition, chemical additives, and manufacturing processes—can still lead to meaningful improvements. The end-markets for plastic packaging are also diverse and can consequently influence its end-of-life treatment.

As a result, our proprietary impact ratings seek to incorporate these complexities by evaluating companies across two core dimensions: (i) the impact of the company's products and services, which encapsulates several of the following sub-categories and their respective positive and negative differentiators; and (ii) the damage from the creation process.

**Impact from Products and Services:** Unfortunately, most plastic packaging manufactures do not provide representative LCAs for wider stakeholders to fully gauge the impacts of their products. In some cases, manufacturers may not have visibility into how their products are used if they have diverse applications. For instance, a seller of flexible plastic packaging to a food retailer likely does not have visibility into which food its material is being applied (e.g., broccoli, a positive application, or apples, an application without notable preservation benefits). Independent LCAs can also be expensive to produce, and the results may present the product in an unfavorable light. Furthermore, most manufacturers do not disclose whether the product is recyclable in the countries/regions in which it is available, or provide estimations of the resource intensities of the product (e.g., carbon emissions, water use, etc.). The general lack of product

level disclosures, or selective disclosures, means that it is difficult to comprehensively understand the impacts from companies and their products.<sup>20</sup>

**End markets:** Absent lifecycle assessment disclosures at the product level, end-markets are a useful proxy to gauge the impact of a company's products. Within this context, we focus on the underlying necessity or discretionary nature of the product being packaged.

*Food and Beverage:* Companies serving this end market undoubtedly provide value by facilitating transportation and protection. Yet, it is important to draw a distinction between different subsegments. For example, we view exposure to the takeaway food and beverage subsector less favorably given the predominant use of single-use packaging and its non-essential nature (in most cases). In contrast, it is much more difficult to generalize about the necessity of plastic packaging within the packaged food sub-segment. There are millions of underlying products—from a jar of peanut butter to a bottle of olive oil—each originating from different locations with varying perishability properties. Unfortunately, we rarely receive detail on the precise products being addressed in the packaged food subsegment, thus the end-market proxy is of limited use.

*Health and Medical:* Plastic packaging plays a significant role in the safety and protection of drugs, medical devices, and materials. Plastic packaging (e.g., a blister pack containing medication) often provides essential hygienic properties that alternatives fail to achieve as effectively. As a result, we view companies exposed to this end market more positively.

*Consumer Goods:* This category encompasses the remaining end markets. Due to the diversity of underlying products, a generalized view on the impact is limited.

Positive Differentiators	Negative Differentiators
- Leelth and Medical revenues	- Food and Deverage Takenway revenues

Health and Medical revenues
 Food and Beverage: Takeaway revenues

Source: PGIM Fixed Income

**Recyclable, reusable, and compostable products:** Plastic packaging can be less harmful to the environment and society if it can contribute to a more circular economy. One of the most common ways plastic companies can achieve this is by ensuring that their products are recyclable, reusable, or compostable. In fact, many companies have begun to report and set targets to improve the share of their products that fit these labels. Although the classification definitions are critical details in these cases, they are rarely provided.

Under our impact assessment framework, it is critical that companies explain how they define products under these labels and that their definitions consider the practical likelihood of the packaging being recycled, reused, or composted. This view aligns with the rules set out by the U.S. Federal Trade Commission (FTC) for labelling a product as "recyclable," which stipulate that following conditions must be met:

- 1) Recycling facilities for a given type of packaging must be available to a "substantial majority" of U.S. residents, defined to be at least 60%; and
- 2) the collected product must be used in the manufacturing or assembly of a new item.

<sup>20</sup> An example of selective disclosure may be when a company cites the emissions savings from plastic packaging, but omits information required to assess the impact of its products on plastic waste, i.e., the percentage of a product made from post-consumer recycled content or the volume of its products that are recyclable.

The true test of whether a product category is recyclable, reusable, or compostable extends well beyond whether technical solutions exist. In 2023, only two sub-categories of plastic packaging products in the U.S. meet this legally mandated definition: (i) plastic bottles and jugs made from PET (polyethylene terephthalate) and (ii) bottles and jugs made from HDPE (high density polyethylene). Moreover, an item must also have a 30% domestic recycling rate to receive the "recyclable" classification (as the treatment of plastic waste shipped internationally is highly uncertain and often dumped or incinerated).<sup>21</sup> As a result, most plastic packaging in the U.S., even if technically recyclable, is landfilled, incinerated, or ends up in the natural environment. Until significant investments are made in U.S. recycling processes, our framework only rewards companies that can substantiate that their definition of "recyclable products" is, at a minimum, commensurate with the FTC's definition of "recyclable." We also adopt a similar approach for assessing companies' claims linked to compostable products (which are not often compostable due to the lack of dedicated collection and composting facilities).

Re-usable packaging products are considered to have the highest potential for mitigating plastic's negative impacts, mainly due to the reduction in virgin materials required over a lifecycle. Yet, even re-usable packaging is not without its drawbacks. For example, reusable plastic packaging can contribute to microplastic pollution and tends to incur higher water intensities (due to the need for regular washing), the latter of which we see as an acceptable tradeoff in most regions due to the comparatively high efficiency of waste-water recycling.

Companies that generate significant revenues from re-usable products are considered more favorably within our framework. As a result, companies with outsized exposures to products with circularity potential are viewed positively. When companies report the percentage of their products that are recyclable, compostable, or reusable, we consequently seek their definitions of terms for verification and categorization purposes.

Positive Differentiators	Negative Differentiators
Re-usable plastic packaging revenues	All other plastic packaging products
PET Bottles and Jugs revenues	
HDPE Bottles and Jugs revenues	
<ul> <li>Disclosure and targets linked to share of products that are recyclable, compostable or reusable (with qualifying definitions)</li> </ul>	

Source: PGIM Fixed Income

**Products made from post-consumer recycled (PCR) material:** The share of post-consumer recycled content is a critical factor in our assessments of the ESG impact of plastic packaging companies. The use of post-consumer recycled content reduces the need for virgin plastic production and is fundamental to making the use of plastic packaging more circular. Many plastic packaging companies have committed to increasing the percentage of their products from PCR feedstocks. However, companies have achieved limited progress toward these goals with most far behind schedule, citing difficulties in acquiring sufficient quality post-consumer materials (Figure 6).

<sup>21</sup> According to the definition used by the Ellen MacArthur Foundation's New Plastic Economy Initiative.

Progress towards achieving recycling targets in the U.S. and Europe remains limited and is often far behind schedule, primarily due to limited availability of recycled resins and health concerns regarding contaminated content.



Source: Ellen MacArthur Foundation



Source: PGIM Fixed Income

**Involvement in the recycling value chain:** Despite the massive volumes of plastic waste produced each year, shortages in suitable-quality, post-consumer plastic remain a significant barrier in scaling the use of PCR content for two primary reasons. First, low recycling rates relative to plastic demand limits the availability of recycled feedstock. Therefore, recycled PET (rPET) trades at a 10-20% price premium to virgin PET, forcing many companies to choose between higher input costs and failing to meet their targets (or even set them in the first place).<sup>22</sup> The second major challenge is linked to health and safety. Contamination of recycled material is an ever-present risk within recycling supply chains. For example, consumers may put both their engine-oil HDPE bottle along with their used beverage plastic bottles in the same recycling load, resulting in a toxic contamination of the food grade materials. This had led to most recycled plastics not being suitable for the largest markets of plastic packaging (food & beverage and health & medical markets).

Plastic packaging companies directly involved in helping to address these challenges by providing source separation, collection or recycling services are heavily rewarded within our framework.

 Material involvement in scaling up recycling supply chain (i.e., source separation, collection or recycling infrastructure) N/A

#### Source: PGIM Fixed Income

**Chemical transparency:** We also hold more favorable views of companies that are transparent in disclosing the types of chemicals used in their products and the relevant safety information. This information is critical for customers, workers, and other consumers who wish to take a proactive approach to managing potential risks from plastic exposures. We also recognize plastic packaging companies that are making tangible efforts to reduce the use of hazardous chemicals above and beyond basic regulation requirements, although this type of transparency and disclosure remains relatively rare.

Positive Differentiators	Negative Differentiators
<ul> <li>Public product level disclosure of use of toxic chemicals</li> <li>Disclosure of the use / non-use of toxic chemicals at the company level</li> <li>Commitments to not utilize toxic chemicals</li> </ul>	Controversies linked to toxic chemical usage in the issuer's products

#### Source: PGIM Fixed Income

**Damage from the creation process:** The other key dimension of our impact evaluation involves assessing how effectively plastic packaging companies minimize the negative impacts from the manufacturing and delivery of products and services. Factors incorporated into our operational assessments include: (i) the carbon intensity of the company's operations (scope 1-3); (ii) water usage; (iii) health and safety track record; (iv) toxic waste management; (v) labor issues; and (vi) indirect impacts through supply chains. We also believe including assessments of a company's plastic intensity of operations as well as its industry and public policy collaboration provides additional value to our framework.

**Plastic intensity of operations:** When considering whether a company is making credible efforts to reduce their products' plastic intensity, we look for product innovation and customer engagement that may lead to packaging solutions that are less plastic intensive. In cases where information is available, we also evaluate the normalized volumes of plastic packaging per million dollars of revenues, which helps determine if companies are using less plastic in delivering packaging solutions to customers over time.

Industry and public policy collaboration: Plastic packaging companies have a unique opportunity to be at the forefront of tackling the plastic crisis. Our ESG Impact Rating framework provides an uplift to issuers that are doing the most to partner with consumer goods companies to design packaging for optimal recycling capabilities. We look at the actions and formal commitments plastic packaging companies are taking to scale up domestic collection, sorting, and recycling capabilities through their industry partnerships, lobbying

activities, and investments. Equally, companies who are found to be directly or indirectly lobbying against public policy seeking to address the negative impacts of plastic packaging—or that engage in campaigns and/or marketing that appears designed to intentionally mislead the public—are penalized under our framework.

#### **U.S. Plastic Packaging Sector ESG Impact Performance Snapshot**

When reviewing U.S. plastic packaging issuers against our ESG impact framework, we find that most companies do not provide the disclosures necessary for a nuanced assessment. Amongst our coverage, publicly listed issuers tend to have better disclosures than smaller peers. Yet, across the board, disclosures linked to critical environmental and social KPIs and other information tend to be selective and abstract. For example, virtually all companies prominently cite the generalized emissions savings offered by plastics packaging due to its comparatively lightweight characteristics, but few provide information required to assess the impact of their products on contributing to plastic waste (e.g., percent of plastic derived from post-consumer recycled content and/or the percent of its products that are recyclable as observed in Figure 7). Furthermore, while the emissions savings offered by light-weighting is a material positive impact today, we expect the CO2 advantage of plastic will diminish over time due to the decarbonization of the U.S. transportation sector.

#### Figure 7: A Snapshot of Disclosure Availability Among 5 Major Plastic Packaging Firms

				% of products that are recyclable, reusable, compostable
5 major U.S. plastic packaging firms	Lifecycle assessment of impacts (product or category level)	% Post consumer recycled (PCR) content	Granular end-market exposures	(with accompanying definitions)
Issuer 1	Non-Disclosure	Regular Disclosure		
Issuer 2			Selective Disclosure	
Issuer 3				
Issuer 4				
Issuer 5				
5 major U.S. plastic packaging firms	Chemical transparency	Operational impacts (GHG emissions, water usage, health and safety)	Plastic intensity of sales	
Issuer 1				
Issuer 2				
Issuer 3				
Issuer 4				
Issuer 5				

Source: PGIM Fixed Income

Our ESG Impact Rating framework provides an uplift to companies that are doing the most to partner with consumer goods companies to design packaging for optimal recycling capabilities. Overall, a lack of appropriate data from issuers inhibits our ability to fully assess the impacts of plastic packaging companies' products and operations, which compels us to adopt a conservative approach to our ESG ratings given the extensive negative impacts linked to plastic packaging.

The net result of the preceding factors culminates with ESG Impact Ratings of 20-35 for most U.S. plastic packaging issuers under our coverage, placing them in the "Lagging/Mixed" category and making them ineligible for PGIM Fixed Incomes' flagship developed markets ESG funds (Figure 8). That said, our assessments could change based on issuers' operations, making them eligible for these portfolios at that point.

Ratings	Category	Category definition
85-100	Net positive	Positive impacts significant and negative impacts minimized
65-80	Advanced	Positive impacts evident and negative impacts materially reduced
40-60	Balanced	Positive impacts evident and credible efforts to reduce negative impacts
20-35	Lagging/mixed	Negative impacts significant and limited effort to reduce them
0-15	Net negative	Negative impacts significantly outweigh any positive impacts

Figure 8: PGIM Fixed Income's ESG Impact Ratings and Disclosure Assessments

Source: PGIM Fixed Income

The following section highlights how we integrate ESG factors into our relative value assessment of plastics producers, giving investors the tools to understand the financial impact of ESG considerations.

# SECTION 4: THE RISKS AND OPPORTUNITIES OF PLASTIC PACKAGING ISSUERS AMIDST A PLASTIC WASTE CRISIS

The tradeoffs of plastic packaging extend to one's perspective of the aspects involved. For example, are end-of-life issues more important than minimizing emissions from transportation? Indeed, consumers may view the tradeoffs differently by potentially weighing ESG or health impacts from plastic use against its relatively low-cost and convenience. As we turn to the lens that focuses on traditional credit implications, plastics' numerous tradeoffs underscore the decisions involved with investing in such a landscape.

The valuation overhang across the sector reveals investment opportunities that may exist for credit investors who can effectively assess relevant ESGrelated issues and their influence on credit performance. In addition to linkages between ESG impacts and ESG credit factors (which are often less than many assume) as well as the shortcomings of plastic alternatives, credit risks from ESG situations are often manageable and may present investors with fair compensation for assuming them. In cases pertaining to traditional fixed income portfolios, allocation decisions are not based on avoiding such risks, but ensuring that we understand them and are being paid a sufficient credit spread as compensation.

#### **Overstatement of Secular Challenges**

Despite the frequent, weaker-than-expected correlation between ESG impacts and financial materiality (or possibly because of misperceptions that it is stronger), we believe that ESG concerns negatively affect investor sentiment toward the plastic packaging space. The resulting valuation overhang across the sector reveals investment opportunities that may exist for credit investors who can effectively assess relevant ESG-related issues and their influence on credit performance.

From a credit standpoint, plastic packaging companies tend to manage elevated leverage levels well, making them interesting credit investments. Despite the growing awareness of plastics' harms, we believe the demand outlook for plastic packing is likely to remain robust due to four sobering truths. First and foremost, plastic packaging is often the cheapest solution available. Second, companies and customers value the performance and convenience of plastic packaging vs. alternatives. Third, the false perception that most plastic packaging is recycled. Fourth, despite citizens' support (Figure 9), regulations that could reduce the U.S. demand for plastic packaging remain conspicuously limited.

Figure 9: The Public Generally Supports Global Rules to End Plastic Pollution. (% of average of citizens' support to end plastic pollution in selected countries)



Source: Ipsos Global Advisor, Plastic Free Foundation, WWF

That said, some states have begun to ban entire categories of plastic packaging, such as expanded polystyrene (Styrofoam) and plastic bags. This is a trend we expect could proliferate across other states as this form of plastic packaging presents significant environmental risks and tends to have "less worse" alternatives available.

The plastic packaging sector tends to generate stable growth with relatively low capital intensity, resulting in a relatively high level of consistent, unlevered free cash flow. While it is possible that regulatory pressures may ultimately cause demand to shrink over the long term, we believe there will be a long tail to this deterioration. Furthermore, the sector may be prone to periods of volatility as the market can overstate the secular challenges faced by the industry, causing investors to shun the space, valuations to contract, and attractive investment opportunities to arise for those focused on fundamentals.

#### Examining the valuation impact

The issues surrounding plastic packaging producers can lead to expectations for reduced demand, which can limit future free cash flow, increase discount rates, and, consequently, reduce overall valuations. This is visible in the public valuation differences between plastic packaging issuers, such as Berry Global or Sealed Air, and peers perceived to be more sustainable, such as Ball Corp. or Crown Holdings. It is also apparent in the disparity between public valuation multiples and private transaction multiples in the space.

While we believe ESG-related secular pressures are more of an equity concern, there can be spillover effects for debt investors. Pressured equity valuations increase credit risk by raising the proportion of debt relative to the total value of the business. This is particularly acute for issuers with higher leverage levels. As a result, issuer steps to either extend the runway of the cash flow streams or demonstrate that the business is not secularly pressured should improve in terms of both valuations and overall credit risk.

From an incentives standpoint, it appears the market is approaching the point where it is in issuers' best interest to focus more on bolstering their sustainability credentials and demonstrating clear progress on ESG related factors. This progression should not only be positive from an environmental perspective, but it should also result in higher valuations—thus improved credit metrics—over time. Hence, this is an area of focus as we consider investments in the space.

#### **Identifying Overweights**

Based on these views, we look for investment opportunities in issuers with solid fundamentals, products with functional or technical reasons to be plastic, and concerted efforts to address the plastic packaging challenges previously addressed.

**Solid fundamentals with strong cash flows that drive credit-profile improvement:** We look for issuers that are exposed to more defensive, recession-resilient end markets, such as food & beverage, cleaning & healthcare, and wellness & nutrition. We also value those that are exposed to higher-growth areas (flexible packaging vs. rigid packaging where applicable) and/or have leading market positions. Further, we look for businesses with low capital intensity (most plastic packagers spend 3-5% of revenue on capex compared to glass packagers in the 7-12% area) which facilitates cash flow. Taken together, these factors provide comfort with companies' ability to generate consistent unlevered free cash flow, which can help them manage their credit profiles amid potential long-term sustainability or regulatory challenges—an aspect of the industry that we think is misunderstood by the market at times.

**Plastic as the functionally or technically preferred material:** Issuers using plastic as the optimal production material (technically or functionally) leads to meaningfully lower regulatory risk as alternatives are often limited or untenable. Further, there is an offsetting societal benefit

We look for investment opportunities in issuers with solid fundamentals, products with functional or technical reasons to be plastic, and concerted efforts to address the plastic packaging challenges. that counters the negative environmental impact associated with plastic as the substrate. Plastic in these products is unlikely to be substituted for, and, as a result, the credit profiles of these companies exhibit less secular risk and present higher valuations relative to their earnings.

While these businesses tend to be modestly more capital intensive given the research & development involved with product innovation, this is more than offset by the reduced probability of declining demand in the future. Furthermore, investors are generally more comfortable modeling a longer tail of cash flows. Although these issuers tend to trade at a greater valuation, we continue to regard it as an attractive area for potential investments.

Attempts to address ESG issues: The last differentiator we look for are explicit efforts to address, at least in part, some of the ESG challenges presented by plastic packaging. While these issuers still produce plastic packaging and contribute to environmental issues, companies making such efforts are attempting to reduce their impact and position themselves for a more sustainable future, helping to shift the cost-benefit equation, if sometimes only modestly.

These issuers can improve sustainability metrics in a few different ways, such as:

- Committing to a target percentage of their products (often at or near 100%) that are to be either recyclable, reusable, or compostable by a target date;
- Committing to a target percentage of PCR or PIR resins in their products;
- Investing in recycling systems and infrastructure to improve the use of PCR or PIR resin;
- Designing packaging and labeling to be mono-material to facilitate easier recycling;
- Consistently innovating packaging designs to reduce its weight (and therefore the associated resin use), while maintaining strength and barrier capabilities.

For example, our analysis of Plastipak Packaging finds that it continually attempts to reengineer its packaging to reduce the amount of material utilized while maintaining its strength and barrier capabilities. Furthermore, the company manufacturers its bottles from either 100% PET or PE to improve the ease of recycling and is expanding its product offerings made from various levels of recycled content (e.g., 25% recycled content water bottles). Given the challenges of sourcing recycled material and consumers' desire for sustainable products, the company has invested in its own domestic and international collection and recycling capacity.

As the example above demonstrates, we believe it is now in plastic packagers' self-interest to support and invest in programs or policies that could result in more robust development of plastic recycling systems and infrastructure. More specifically, plastic packaging companies should increasingly invest in developing their supply of recycled material. This emphasis would not only reduce secular impacts, but it would also provide a competitive advantage over peers. Indeed, packagers that can effectively source recycled material and help consumer packaged goods companies (e.g., Coca Cola and PepsiCo.) meet their recycled content commitments will have a clear competitive advantage over those that cannot.

#### Pulling it all together

We believe some of the better investment opportunities in the plastic packaging space are in issuers that have been taking action to mitigate their ESG risks and impacts. While not without

We believe it is now in plastic packagers' self-interest to support and invest in programs or policies that could result in more robust development of plastic recycling systems and infrastructure. risk, these issuers should be better prepared to meet the ESG challenges associated with plastic packaging over time. As an example, a particularly positive story would be a plastic packager that has high exposure to the healthcare end market where its products are not easily substitutable for alternative substrates. The issuer in the example would also be focused on reducing the amount of plastic in its products and innovating to make the packages more easily recyclable. These factors would give us increased confidence in the issuer's credit profile and allow us to view the credit risk from ESG concerns more favorably. When applying a financial materiality ESG lens, we combine this credit view with an evaluation of the potential returns on a credit investment and make investment decisions accordingly.

### CONCLUSIONS

The research in this paper reiterates the serious, significant concerns regarding the use of, and the growth in, plastic packaging. However, those findings also illustrate the need for nuanced consideration of the societal and environmental benefits from the use of plastic packaging in several applications. This will require companies to significantly improve their disclosures, which are currently largely selective in nature.

In some cases, we believe the valuation and credit profile of plastics packaging companies can benefit from efforts to address their negative impacts. But we have found many other cases where an issuer is potentially causing negative ESG impacts, yet still presents an attractive investment opportunity. Therefore, it cannot be assumed that managing the financially material ESG risks of plastic packaging bonds will also result in sustainable management of ESG impacts, or vice versa.

Ultimately, investors' perspectives and values will determine whether they seek only to maximize risk adjusted returns, or to adopt a dual approach with both impact and return objectives. In either case, we strive to incorporate any credit material ESG risks into our fundamental credit ratings. And for the latter group taking a dual approach, we've built our proprietary ESG impact ratings as a tool for investors that wish to apply an additional impact objective.

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Source(s) of data (unless otherwise noted): PGIM Fixed Income as October 26, 2023.

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