Draft National Strategy to Prevent Plastic Pollution

Part of a Series on Building a Circular Economy for All

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Table of Contents

Executive Summary

The *Draft National Strategy to Prevent Plastic Pollution*, which is part of EPA's Series on Building a Circular Economy for All, provides voluntary actions that can be implemented in the United States aimed at eliminating the release of plastic waste from land-based sources into the environment by 2040.[1] EPA endeavors to provide an innovative, equitable approach to reduce and recover plastic and other waste, as well as prevent plastic pollution from harming human health and the environment, particularly for communities already overburdened by pollution. Plastic pollution has accumulated over time and will continue to grow as plastic production increases. Therefore, the *Draft National Strategy to Prevent Plastic Pollution*, together with EPA's *National Recycling Strategy*, identifies how EPA can work collaboratively with stakeholders to prevent plastic pollution and reduce, reuse, recycle, collect, and capture plastic and other waste from land-based sources.

With input from stakeholders, EPA identified three draft objectives for the strategy:

- **Objective A:** Reduce pollution during plastic production
- **Objective B:** Improve post-use materials management
- **Objective C:** Prevent trash and micro/nanoplastics from entering waterways and remove escaped trash from the environment

The proposed actions under each objective support United States' shift to a circular approach that is restorative or regenerative by design, enables resources to maintain their highest value for as long as possible, and aims to eliminate waste in the management of plastic products.

Objective A: Reduce pollution during plastic production

Designing products for reuse and recycling, using less impactful materials, phasing out unnecessary products, and ensuring proper controls at plastic production facilities are important upstream actions that manufacturers or consumers can take that can reduce pollution throughout the life cycle of plastic products.

Proposed Actions:

A1. Reduce the production and consumption of single-use, unrecyclable, or frequently littered plastic products.

A2. Minimize pollution across the life cycle of plastic products.

1 See the U.S. submission for the second session of the UNEP Intergovernmental Negotiating Committee on plastic pollution: https://wedocs.unep.org/bitstream/handle/20.500.11822/41810/USsubmission.pdf?sequence=1&isAllowed=y.

Objective B: Improve post-use materials management

While EPA's *National Recycling Strategy* identified actions to improve recycling, further increases in circularity can be achieved through other pathways, such as reuse, refill and composting.

Proposed Actions:

- **B1.** Conduct a study of the effectiveness of existing public policies and incentives upon the reuse, collection, recycling, and conservation of materials.
- **B2.** Develop or expand capacity to maximize the reuse of materials.
- **B3.** Facilitate more effective composting and degradation of certified compostable products.
- **B4.** Increase solid waste collection and ensure that solid waste management does not adversely impact communities, including those overburdened by pollution.
- **B5.** Increase public understanding of the impact of plastic mismanagement and how to appropriately manage plastic products and other waste.
- **B6.** Explore possible ratification of the Basel Convention and encourage environmentally sound management of scrap and recyclables traded with other countries.

Objective C: Prevent trash and micro/nanoplastics from entering waterways and remove escaped trash from the environment

Interventions to address trash and microplastics that escape into the environment are necessary for long-term reductions of plastic and other waste in waterways and oceans.

Proposed Actions:

- **C1.** Identify and implement policies, programs, technical assistance, and compliance assurance actions that effectively prevent trash/microplastics from getting into waterways or remove such waste from waterways once it is there.
- **C2.** Improve water management to increase trash capture in waterways and stormwater/wastewater systems.
- **C3.** Increase and improve measurement of trash loadings into waterways to inform management interventions.
- **C4.** Increase public awareness of the impacts of plastic products and other types of trash in waterways.
- **C5.** Increase and coordinate research on micro/nanoplastics in waterways and oceans.

Next Steps

EPA is opening a 45-day public comment period with the release of this draft strategy. Due to the action-oriented nature of the draft strategy and the need for commitments to execute it, EPA will continue outreach and engagement during the comment period and during finalization of the strategy. Implementation of the strategy is expected to be an iterative process as resources, entities leading efforts, and needs change over time. EPA intends to help facilitate the implementation of actions in the strategy and will provide routine status updates to interested stakeholders.

EPA is seeking feedback on the following questions:

- Which actions are the most important and would have the greatest positive impact at the local, regional, national, and global levels?

  Consider:

  - Which actions can best protect human health and environmental quality?
  - Which actions are most important to address environmental justice and climate impacts?
  - What are the key steps and milestones necessary to successfully implement the actions in the draft strategy?
- What are the most important roles and/or actions for federal agencies to lead?
- Is your organization willing to lead an action or collaborate with others to implement the actions?
  - What factors would your organization consider when determining whether to lead an action?
- What are potential unintended consequences of the proposed actions that could impact communities considered overburdened or vulnerable, such as shifts in production or management methods?
- What key metrics and indicators should EPA use to measure progress in reducing plastic and other waste in waterways and oceans?
- What criteria should processes other than mechanical recycling meet to be considered "recycling activities" (e.g., "plastics-to-plastics outputs are 'recycling' if the output is a product that could again be recycled into another product or to extent that it can achieve viable feedstock for new plastic materials")? How should health and environmental impacts be considered in these criteria?
- Are there other actions that should be included in the Strategy?
  - Should EPA expand the scope of the strategy to include sea-based sources?
  - Should specific types of plastic products be targeted for reduction or reuse in this strategy?
- Do you have any additional information or recommendations for EPA regarding these or other proposed actions in the draft strategy?

Introduction

Plastic products are both versatile and inexpensive, when considered outside of the context of their broader environmental and health impacts. Because they are both durable and lightweight, plastic products have found prominence in the construction, transportation, and packaging industries (OECD, 2022a). In addition, plastic innovations have contributed to many life-saving products that have revolutionized the health care industry. Despite some potential benefits, plastic pollution presents complex challenges to addressing the climate crisis and advancing environmental justice that will persist as its production and use increase as projected.

Over the last 20 years, the global annual production of plastic products has more than doubled despite insufficient waste management capacity globally, and as a result, plastic waste has also doubled. In 2019, roughly 23 percent of global plastic waste was either improperly disposed, burned, or leaked into the environment (OECD, 2022a). Plastic products account for approximately 85 percent of total global marine waste and between 70 and 80 percent of all waste that ends up in land and marine environments combined (UNEP, 2021; NASEM, 2022). Plastic products in the environment tend to break down over time to form very small pieces called microplastics, which can pose serious threats to wildlife and may potentially harm human health (NASEM, 2022). In 2022, the pervasiveness and persistence of plastic waste in the environment drove the United Nations Environmental Programme's (UNEP) Environmental Assembly (UNEA) to launch the development of an international, legally binding instrument on plastic pollution (UNEA, 2022).[2]

The United States plays a critical role in reducing global plastic pollution as a major global plastic producer and plastic waste generator. While regulation and solid waste management programs have shown success in reducing waste, a collaborative effort by stakeholders across the value chain of plastic products—including governments, environmental organizations, industry, academia, and the public—will be needed to build a more circular plastics economy and reduce plastic pollution across the life cycle. While EPA's *National Recycling Strategy* identified actions to improve the U.S. municipal solid waste recycling system, additional actions are needed to further increase circularity through other pathways. The *Draft National Strategy to Prevent Plastic Pollution* identifies actions EPA can implement, in collaboration with stakeholders, to eliminate the release of plastic waste into the environment by 2040.[3] This strategy, together with the *National Recycling Strategy*, satisfies Congress' direction to EPA in Section 301 of the Save Our Seas 2.0 Act (2020) to develop a strategy to improve post-consumer materials management and infrastructure for the purpose of reducing plastic waste and other post-consumer materials in waterways and oceans.

2 See Intergovernmental Negotiating Committee on plastic pollution: https://www.unep.org/about-un-environment/inc-plastic-pollution.

3 This strategy is aligned with the U.S. submission to the UNEP Intergovernmental Negotiating Committee on plastic pollution: https://wedocs.unep.org/bitstream/handle/20.500.11822/41810/USsubmission.pdf?sequence=1&isAllowed=y.

The Draft National Strategy to Prevent Plastic Pollution has three main objectives to address the production, consumption, and end of life stages of plastic products, in addition to addressing other solid waste materials of concern: (A) reduce pollution during plastic production, (B) improve post-use materials management, and (C) prevent trash and microplastics from entering waterways and remove escaped trash from the environment. There are multiple voluntary actions identified under each objective.

Plastic Waste Is Both a U.S. and a Global Challenge

Globally, plastic production continues to increase rapidly, and most plastic products are not reused or recycled at the end of their life. Over the last 20 years, global plastic production, consumption, and waste have increased steeply as innovations for plastic applications continue to rise. The Organisation for Economic Co-operation and Development's (OECD's) Global Plastics Outlook (2022b) projects plastic use and waste to almost triple by 2060, with half of all plastic products being landfilled. Furthermore, less than a fifth is projected to be recycled while leakage into the environment is estimated to double to almost 49 million tons[4] per year by 2060 (OECD, 2022b).

The United States plays a critical role in the global economy of plastic products. North America is a major producer of plastic products, producing 19 percent of global plastic products in 2015 (UNEP, 2018). The United States also uses more plastic products than other countries. According to the OECD, the United States consumed 18 percent of global plastic products in 2019, and plastic use per capita was higher than in any other country globally. The OECD estimated, on average, that a resident of the United States used approximately 1.8 times more plastic products than a resident of the European Union (EU) in 2019 (OECD, 2022a).

Much of the plastic that is produced will end up as waste. In 2018, only nine percent of plastic collected through municipal solid waste was recycled in the United States (U.S. EPA, 2020). In 2016, the United States had roughly 4.3 percent of the world's population but generated 10.5 percent[5] of global plastic waste (NASEM, 2022; OECD, 2022a). As shown in Table 1, the United States had the largest plastic waste footprint of any country in 2019, generating approximately 486 pounds[6] per capita (OECD, 2022a).

4 Converted from 44 million metric tons (OECD, 2022b).

5 Calculated from statistics provided in Global Plastics Outlook 1 (OECD, 2022a).

6 Converted from 220.5 kg/cap (OECD, 2022a).

Table 1: 2019 global plastic waste generation per capita (OECD, 2022a).

			Pounds per Capita
OECD	OECD America	United States	486
		Canada	392
		Other OECD America	128
	OECD Europe	OECD EUa countries	268
		OECD non-EU countries	208
	OECD Pacific	OECD Asia	152
		OECD Oceania	137
Non-OECD	Other America	Latin America	96
	Eurasia	Other EU	166
		Other Eurasia	117
	Middle East and Africa	Middle East and North Africa	83
		Other Africa	32
	Other Asia	China	103
		India	31
		Other non-OECD Asia	47

EPA's estimates of plastic products in the municipal solid waste stream show that plastic waste is growing. Plastic products in the U.S. municipal solid waste stream predominantly consist of containers and packaging, which includes some single-use products such as bags, wraps, and bottles (U.S. EPA, 2020). Plastic waste has increased continuously in the U.S. municipal solid waste system since 1960, with the greatest increases occurring between 1980 and 2000 (Figure 1) (U.S. EPA, 2020). Research suggests that plastic waste generation in the United States increased from 0.4 percent of total municipal solid waste generated in 1960 to 12.2 percent in 2018, reaching 13.2 percent in 2017 (U.S. EPA, 2020). These estimates do not include plastic waste from other sources, such as agricultural waste.

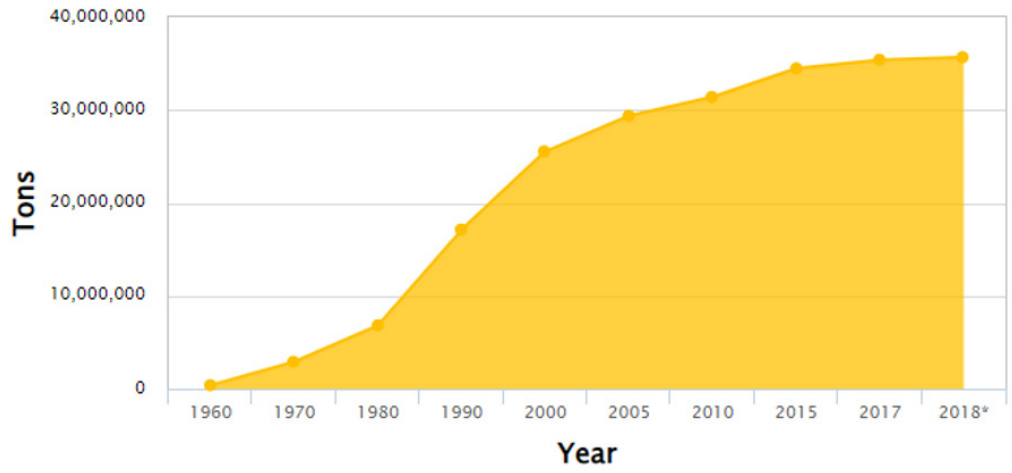


Figure 1: Total plastic waste in the U.S. municipal solid waste system since 1960 (U.S. EPA, 2020).

The environmental and economic impacts of plastic products and their byproducts are felt across their life cycles, including their production, use, and disposal. In 2019, plastic products were responsible for 3.4 percent of global greenhouse gas emissions throughout their life cycles, with 90 percent of these emissions coming from the production and conversion of fossil fuels into new plastic products (OECD, 2022a). If the world continues with business as usual, greenhouse gas emissions associated with the life cycle of plastic products are expected to double by 2060 (OECD, 2022b). Without intervention, it is projected that by 2050 the global plastics industry will account for 20 percent of total oil consumption and up to 15 percent of global carbon emissions (World Economic Forum et al., 2016).

Figure 2: Pathways of land-based sources of plastic pollution (image courtesy of Santa Clara Valley Urban Runoff Pollution Prevention Program).

Plastic products that end up in waterways and oceans from U.S. land-based sources come from three primary sources: 1) plastic products that are littered, illegally dumped, or have otherwise escaped the solid waste management system; 2) plastic waste that the United States exports to other countries for recycling and are subsequently mismanaged; and 3) micro/nanoplastics from transportation, wastewater, and other sources. Land-based sources account for up to 80 percent of

plastic waste that pollutes waterways and oceans (NASEM, 2022). Figure 2 depicts the pathways of common land-based sources of plastic pollution, including litter from cars, trucks, and garbage and recycling bins; pedestrian litter; and illegal dumping activities. Plastic pollution from land-based sources includes littered items such as packaging (including flexible films), single-use products, durable consumer products, household products, and microplastics (such as tire wear particles and microfibers from textiles). An analysis conducted by Law et al. (2020) estimated that the United States contributed between 0.56 and 1.60 million tons[7] of plastic waste to the coastal environment in 2016.[8] This amount includes waste exported to other countries, making the United States' contribution to global plastic waste leakage larger than in previous estimates. The authors estimate that this range represents between 2.33 and 2.98 percent of the total amount of plastic waste generated in the United States (Law et al., 2020). In addition to land-based sources of plastic pollution, abandoned, lost, or otherwise discarded boating, fishing, or aquaculture gear are another primary source of plastic waste in waterways and oceans. This strategy addresses land-based sources of plastic waste that enter the environment and does not address sea-based sources of plastic pollution.

Circular economy is defined in the Save Our Seas 2.0 Act as "a systems-focused approach and involves industrial processes and economic activities that are restorative or regenerative by design, enable resources used in such processes and activities to maintain their highest values for as long as possible, and aim for the elimination of waste through superior design of materials, products, and systems (including business models)."

In addition to environmental impacts, there are growing health concerns related to plastic products. Some animal studies have raised concerns regarding endocrine-disrupting effects from chemicals that may leach out of plastics, including impacts on the reproductive system (NASEM, 2022). Microplastics have also been found in human placentas after birth, despite the use of a plastic-free birthing protocol (NASEM, 2022).

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. For the first time, EPA's 2022–2026 Strategic Plan includes a new strategic goal focused solely on advancing environmental justice and civil rights. EPA will center its mission on integrating justice, equity, and civil rights across the nation's environmental protection enterprise, including waste management. By doing so, EPA will advance the promise of clean air, clean water, and safe land to the many communities across the country that have not received the full benefits of EPA's decades of progress. Disparate impacts on communities affected by plastic, from production to waste, make environmental justice a central consideration within this strategy.

7 Converted to short tons from the metric tons reported in Law et al. (2020).

8 The Law et al. (2020) article did not look at microplastics from transportation, wastewater, and other sources.

Communities with environmental justice concerns, including disadvantaged communities, are disproportionately impacted by adverse health outcomes associated with the life cycle of plastic products. These communities can experience disproportionate burdens from production and waste management processes. Additionally, Indigenous communities that rely on natural resources for sustenance have been impacted by the extraction of natural resources used to manufacture plastic products, which can affect their quality of life, economy, and health (NASEM, 2022). Many "fenceline" communities in the United States—communities that surround chemical and petrochemical processing facilities—consist primarily of minority and low-income populations who suffer disproportionately from increased respiratory and nervous system diseases from exposure to toxic pollutants from production or hazardous waste facilities (NASEM, 2022) in addition to other social, economic, and ecological burdens they experience.

The business-as-usual approach to managing plastic waste is unsustainable. According to Pew Charitable Trust's report, Breaking the Plastics Wave (2022), the cost of managing plastic waste from now until 2040 will be $70 billion greater than it could be if the world adopted a fully circular approach. Other economic risks related to plastic waste include physical damage to ships and fishing assets, reduced fish catches from declining fish stocks, loss of property values, and reduced income to the tourism industry (Pew, 2022). Environmental and health impacts are also expected to increase due to an increase in plastic products and microplastics in aquatic environments (OECD, 2022b). Because of these concerns, there is a global consensus that a unified, comprehensive approach is needed to tackle the plastic pollution problem. In March 2022, the United Nations Environment Assembly launched the process to develop an international, legally binding instrument to reduce plastic pollution.

Increasing the Circularity of Plastic Products Can Reduce Plastic Pollution

The United States has an opportunity to show leadership in reducing plastic pollution. New and innovative approaches are necessary to reduce and recover plastic materials and improve economic, social, and environmental impacts. Figure 3 illustrates the flow of materials in a circular economy. It distinguishes between stock management of finite materials and renewables flow management. Specifically, the right side of the diagram (stock management) illustrates how finite materials and products, such as plastic products are ideally kept in use for as long as possible in a circular economy via practices like sharing, reusing, remanufacturing, and recycling. To reduce plastic pollution and increase the circularity of plastic products, a coordinated effort across the entire value chain—including federal, state, local, and Tribal governments; environmental organizations; industry; academia; and the public—is necessary.

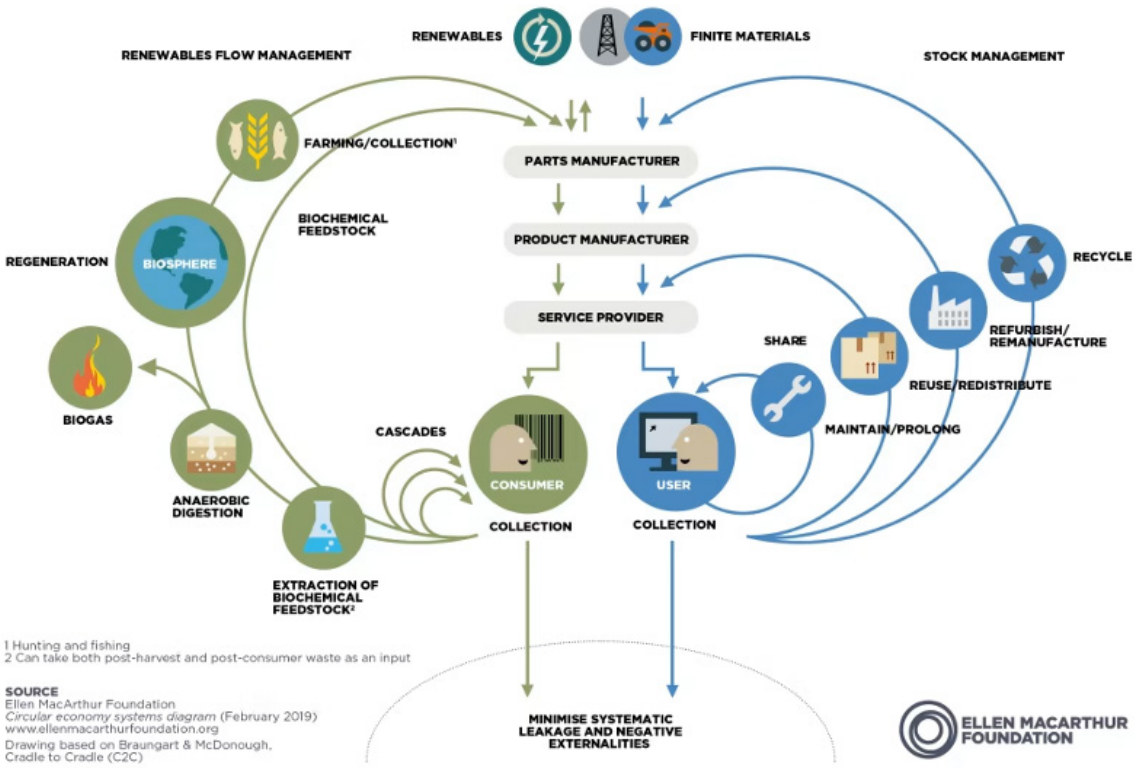
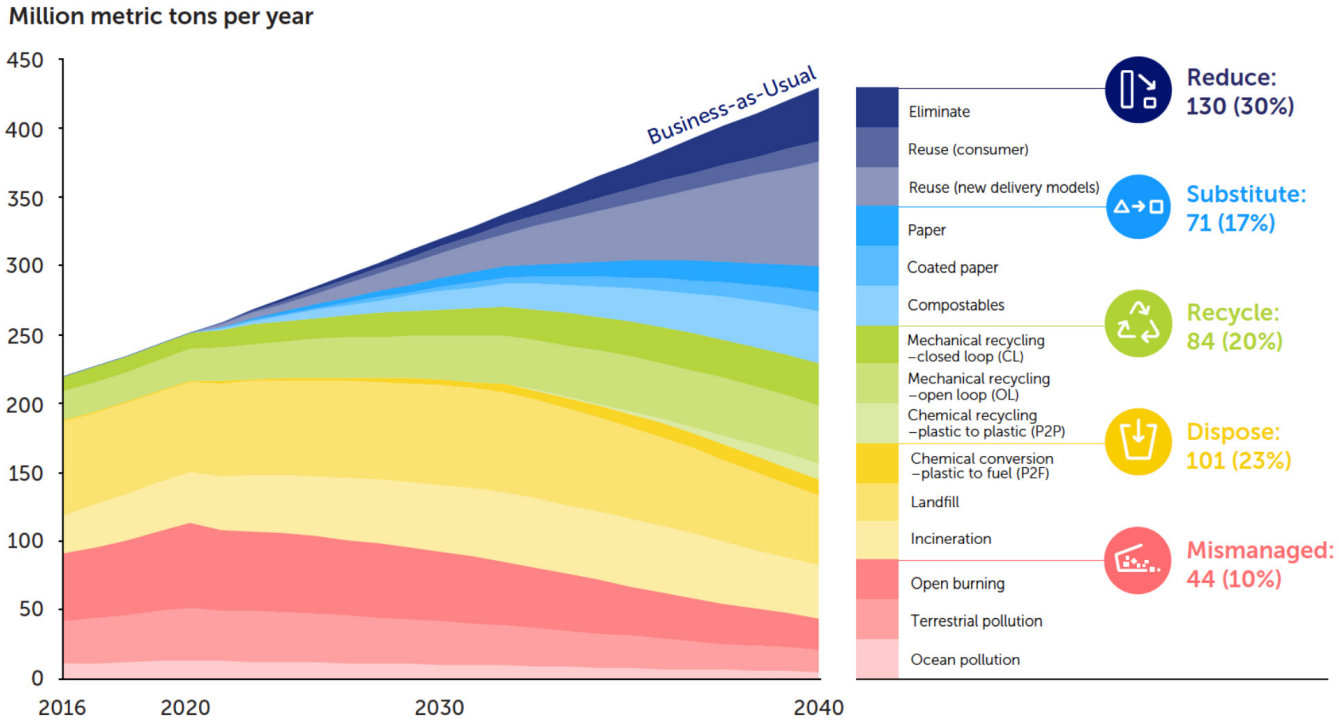


Figure 3: Diagram of a circular economy (Ellen MacArthur Foundation, 2019).

According to Pew Charitable Trusts' Breaking the Plastics Wave (2020), "up to 80 percent reduction of plastic leakage into the ocean could be achieved by 2040… but it depends on immediate, ambitious, and concerted global implementation of solutions across the entire plastics value chain." Figure 4 demonstrates a path to significantly reducing plastic leakage to the ocean. This requires implementation of multiple solutions with varying levels of impact, from reducing plastic consumption to identifying substitute materials, recycling, and properly disposing of plastic material. In the "Systems Change Scenario" discussed by PEW (2022) depicted in Figure 4, concurrent interventions aimed at reducing plastic pollution could divert up to 195 million metric tons of plastic waste from polluting the environment by 2040 compared to the "Business-as-Usual approach" (PEW, 2020). Reuse could achieve up to 30% reductions; substitution efforts, 17%; improved innovations in recycling, 20%; and proper management at end-of-life can achieve a 23% reduction of plastic pollution in the environment (PEW, 2022).



This "wedges" figure shows the share of treatment options for the plastic that enters the system over time under the System Change Scenario. Any plastic that enters the system has a single fate, or a single "wedge." The numbers include macroplastic and microplastic.

Image Credit: The Pew Charitable Trusts.

Figure 4: Wedge analysis in the "System Change Scenario" shows up to an 80 percent reduction in plastic pollution (Pew, 2020).

The United States can be a leader in developing an innovative, circular approach to reducing plastic pollution while growing the economy and fulfilling America's needs. Already, the United States is a leader in plastic circularity innovation. Between 2010 and 2014, the United States was among the top three countries with the highest number of patents focused on plastic circularity in the world (Figure 5) (OECD, 2022a).

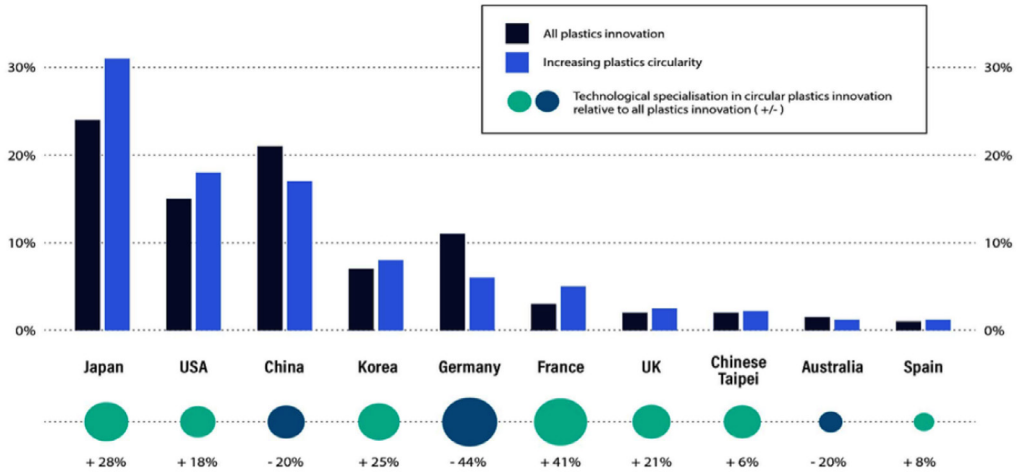


Figure 5: Innovations in plastics and plastic circularity worldwide (OECD, 2022a).

This innovation was incentivized by many state and local government policies that address plastic pollution by curbing plastic use and increasing recycling. The United States is looking to accelerate leadership in innovations and technology to reduce plastic waste in oceans and landfills through the U.S. Department of Energy's *Strategy for Plastics Innovation*, which focuses on advancing plastics recycling technologies and manufacturing plastic products that are recyclable by design (U.S. DOE, n.d.)

Recycling initiatives are part of the solution. However, we need more upstream solutions to addressing plastic pollution, such as reducing the use of unnecessary plastic, designing for circularity, and increasing innovations in systems that extend the lifespan of products, such as repair and reuse.

Developing the Draft National Strategy to Prevent Plastic Pollution

In December 2020, the Save Our Seas 2.0 Act was signed into law in response to the growing local, national, and international concerns over plastic pollution and marine debris. Section 301 of the Act charges EPA, in consultation with stakeholders, with developing a strategy to improve post-consumer materials management and infrastructure to reduce plastic waste and other post-consumer materials in waterways and oceans. Congress further required that EPA:

> *"distribute the strategy to States; and . . . make it publicly available, including for use by . . . for-profit private entities involved in post-consumer materials management and other nongovernmental entities."*

This strategy, together with the *National Recycling Strategy*, satisfies Congress' direction to EPA. EPA's National Recycling Strategy, part one of the series of strategies on building a circular economy for all, was published in November 2021 and primarily focuses on enhancing and advancing the national municipal solid waste recycling system, including plastic products in municipal solid waste. This strategy, the *Draft National Strategy to Prevent Plastic Pollution*, builds upon the *National*

Recycling Strategy's focus on actions to reduce, reuse, collect, and capture plastic waste. Other strategies in the strategy series will focus on different parts of building a more circular economy for all, including a strategy on textiles.

EPA has been working to conserve and recover resources for decades under the Resource Conservation and Recovery Act (RCRA). In EPA's report, *Beyond RCRA: Waste and Materials Management in the Year 2020* (2003), the Agency identified that many global environmental challenges can be addressed through reducing waste and increasing the efficient and sustainable use of resources, as well as preventing exposures to humans and ecosystems from the use of hazardous chemicals and managing waste and cleaning up chemical releases in an environmentally sound manner. In addition, EPA's *Sustainable Materials Management: The Road Ahead* (2009), EPA identified a Sustainable Materials Management (SMM) approach for EPA's work. A circular economy approach under the SMM umbrella demonstrates continuity in EPA's emphasis on reducing the life cycle impacts of materials, reducing the use of harmful materials, and decoupling materials use from economic growth.

To inform the development of this strategy, EPA held several stakeholder engagement meetings in November 2021 and received input from the following organizations:

- **State, Tribal, and local agencies.** The Association of State and Territorial Solid Waste Management Officials (ASTSWMO), the Eastern Band of Cherokee Indians, Environmental Council of the States (ECOS), the Mississippi River Cities and Towns Initiative, the St. Louis Civil Rights Enforcement Agency, the National Tribal Caucus, the Santee Sioux Nation, the Nez Perce Tribe, the Sac and Fox Nation of Missouri, the Tribal Waste and Response Steering Committee, and the U.S. Conference of Mayors.
- **Nonprofit organizations/nongovernmental organizations (NPO/NGOs).** Beyond Plastics, Center for Biological Diversity, Ellen MacArthur Foundation, Five Gyres, Keep America Beautiful, Manufacturing Communities Collaborative, Ocean Conservancy, Pew Charitable Trusts, and the National Environmental Justice Advisory Council.
- **Private sector/industry.** American Institutes for Packaging and the Environment, American Chemistry Council Closed Loop Partners, Patagonia, Plastics Industry Association, Sustainable Packaging Coalition, and the U.S. Plastics Pact.
- **Academia.** Duke University, Iowa State University, Sea Education Association, University of California, Davis, the University of Cincinnati, the University of Georgia, and the University of Massachusetts Lowell.

Between November 2021 and July 2022, EPA hosted virtual meetings across the country with interested stakeholders to inform the development of new grant programs established by the Infrastructure Investment and Jobs Act, which further informed the development of this strategy.

Throughout the development of the strategy, EPA has coordinated with the following federal agencies: National Science Foundation (NSF), the U.S. Agency for International Development (USAID), the U.S. Department of Agriculture (USDA), the U.S. Department of Commerce (DOC) (including the International Trade Administration [ITA], National Oceanic and Atmospheric Administration [NOAA], and the National Institute of Standards and Technology [NIST]), the U.S. Department of Defense (DOD), the U.S. Department of Energy (DOE), the U.S. Department of State (DOS), the Federal Trade Commission (FTC), the U.S. General Services Administration (GSA), and the U.S. Trade Representative (USTR).

Goal and Scope of the Strategy

The *Draft National Strategy to Prevent Plastic Pollution* aims to identify actions needed to eliminate the release of plastic waste from land-based sources into the environment by 2040.[9] This strategy aligns with and supports EPA's National Recycling Goal to increase the U.S. recycling rate to 50 percent by 2030.

This is a domestic strategy that identifies strategic objectives and voluntary actions where EPA can work collaboratively with U.S. stakeholders to prevent plastic pollution through initiatives that reduce, reuse, collect, and capture plastic and other waste from land-based sources. The proposed actions under each objective create opportunities to shift from a linear approach in plastic materials management to a circular system that is restorative or regenerative by design, enables resources to maintain their highest value for as long as possible, and aims for the elimination of waste.

EPA is promoting circular economy policies while excluding processes that convert solid waste to fuels, fuel ingredients, or energy from being considered as a recycling practice in the *Draft National Strategy to Prevent Plastic Pollution* and the implementation of the *National Recycling Strategy*. EPA's *National Recycling Strategy* primarily focused on mechanical recycling of municipal solid waste but welcomed further discussion on technologies often referred to as "chemical recycling," such as pyrolysis. EPA now understands that some of these technologies, produce fuels and/or intermediate materials used in the manufacturing or processing of fuel or fuel substitutes. EPA reaffirms that the Agency does not consider activities that convert non-hazardous solid waste to fuels or fuel substitutes ("plastics-to-fuel") or for energy production to be "recycling" activities.[10] EPA also aims to ensure that a U.S. circular economy approach for plastic products reduces greenhouse gas emissions and protects overburdened communities from facilities that can increase the generation of hazardous waste and other forms of pollution. Additionally, EPA is aware of concerns about the potential health and environmental risks posed by impurities that may be present in pyrolysis oils generated from plastic waste. Accordingly, EPA intends to require companies submitting new pyrolysis oil chemicals to the Agency for review under TSCA to conduct testing for impurities that could be present in the new chemical substance prior to approval, and ongoing testing to ensure there is no variability in the plastic waste stream that is used to generate the pyrolysis oil.

9 U.S. Submission UNEP's Intergovernmental Negotiating Committee on plastic pollution (INC-2) https://wedocs.unep.org/bitstream/handle/20.500.11822/41810/USsubmission.pdf?sequence=1&isAllowed=y

10 See EPA's 1997 Measuring Recycling: A Guide for State and Local Governments https://archive.epa.gov/wastes/conserve/tools/recmeas/web/pdf/guide.pdf

Sea-based sources are not in the scope of this strategy. The Save Our Seas 2.0 Act, however, requests several reports on various aspects of sea-based sources, which are currently under development. Additionally, we note that NOAA has several programs to address sea-based sources, which are described in depth at the following website: https://marinedebris.noaa.gov/.

Solid Waste vs. Trash

This strategy uses both the term "solid waste" and "trash" in different parts of the document because those terms are used by different groups of professionals that manage plastic waste in the waste management system or when it ends up in waterways.

Solid waste, as defined by the Resource Conservation and Recovery Act, means any garbage or refuse; sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility; and other discarded material resulting from industrial, commercial, mining, and agricultural operations and from community activities. This term is commonly used in sectors that collect, recycle, and dispose plastic waste.

Trash is not defined by statute but is commonly used in water management programs to mean any persistent solid material that is manufactured or processed and has been disposed of or abandoned in the environment. Trash, though typically intended to be contained via waste management systems, may end up polluting the water environment because of littering, unintentional spillage, or other means.

Objective A. Reduce Pollution During Plastic Production

Most plastic products found in the environment are items that are single-use, unrecyclable, or frequently littered. To minimize the associated environmental impacts of these plastics it is essential to reduce the increasing rates of both plastic production and consumption in the United States and to address pollution that occurs along the life cycle of plastics products. It is also important to reduce impacts from the production of materials, which can negatively impact the environment and human health, especially in disadvantaged or underserved communities with environmental justice concerns.

A1. Reduce the production and consumption of single-use, unrecyclable, or frequently littered plastic products.

Various policy approaches should be employed to encourage stakeholders to reduce the production and use of single-use, unrecyclable, or frequently littered plastic products.

A1.1: Identify single-use, unrecyclable, or frequently littered plastic products and identify alternative materials, products, or systems with fewer impacts on the environment.

Identifying and communicating the types of products with adverse environmental impacts could help shift consumption away from these products. To this end, a list of single-use, unrecyclable, difficult to recycle, or frequently littered plastic products that may be reduced or eliminated should be developed that can be integrated within company, government, and organizational purchasing policies and procurement guidelines. This list should be shared widely with the public for use. Where possible, also consider alternative materials or delivery systems (e.g., product as a service) that could minimize environmental impacts.

A1.2: Develop a plan to reduce single-use products across the federal government.

To reduce negative environmental impacts and costs, the federal government should identify opportunities to reduce single-use, unrecyclable, difficult to recycle, or frequently littered products that it procures and evaluate pathways to phase out single-use, unrecyclable, or frequently littered products, utilizing the information identified in A1.1. The EPA should recommend specifications, standards, ecolabels, or other mechanisms that the federal government can leverage in the acquisition process to reduce its plastics footprint. The federal government should provide these resources to the federal acquisition workforce on a new or existing sustainable purchasing tool to identify products or delivery systems that can replace single use products, such as GSA's Green Procurement Compilation or Sustainable Facilities Tool (SFTool). EPA also produces "Recommendations of Specifications, Standards, and Ecolabels" to help federal purchasers identify and procure environmentally preferable products and services.

A1.3: Create an innovation challenge program to develop alternatives to single-use, unrecyclable, or frequently littered plastic products.

An innovation challenge program would promote and encourage the development of innovative alternatives to single-use, unrecyclable, or frequently littered plastic products. For instance, Section C of the Save Our Seas 2.0 Act establishes the Genius Prize for Save Our Seas Innovations (Save Our Seas 2.0 Act, 2020). The Genius Prize prioritizes projects that advance solutions that can help decrease plastic marine debris. A similar innovation challenge program could be supported through various funding opportunities across the federal government and through public-private partnerships.

A1.4: Identify effective policy tools and approaches to reduce production of single-use, unrecyclable, or frequently littered plastic products.

Policymakers at all levels of government need to understand the impact that various policy tools and approaches have on the production of single-use, unrecyclable, or frequently littered plastic products, as well as the resulting environmental, economic, and social impacts. The federal government should conduct a study or literature review to identify effective policy tools and approaches and share the results broadly.

A1.5: Set a new goal to reduce the production of single-use, unrecyclable, or frequently littered plastic products.

Setting a new national voluntary goal to reduce the production of single-use, unrecyclable, or frequently littered products identified in A1.1 is needed. This new goal would help galvanize action across the country, support and promote the use of alternative products and reuse programs.

A2. Minimize pollution across the life cycle of plastic products

Manufacturers have a pivotal opportunity to design products and systems that have fewer negative human health and environmental impacts throughout the life cycle. Manufacturers must ensure that their plastic production operations meet relevant environmental regulatory standards at the federal, state, Tribal and local levels. They also have an opportunity to further reduce pollution from plastic production operations.

A2.1: Increase the availability of data on plastic products produced and perform life cycle assessments to better understand the health, environmental, social, and economic impacts of plastic products and their alternatives.

More data are needed to understand plastic production and the impacts of plastic products across their life cycle. Life cycle assessments (LCAs) can improve understanding of the health, environmental, social, and economic impacts of products across the lifespan from production to end of life. LCAs are excellent tools for determining the valuation and externalities of plastic products. Conducting LCAs and making the data publicly available to companies, communities, and other organizations for consideration and decision-making is critical. Specific attention should be given to areas where gaps exist in our understanding of plastic products and alternative materials (e.g., paper, glass, cardboard, metal) and where vulnerable communities are impacted.

A2.2: Review, develop, update, and use sustainability standards, ecolabels, certifications, and design guidelines that decrease the environmental impacts of plastic products across their life cycle.

Standards, ecolabels, certifications, and design guidelines can be designed to promote circularity and decrease negative environmental and human health impacts. A review and gap analysis of existing standards, ecolabels, certifications, and design guidelines is needed to identify areas where additional standards are necessary (or where existing standards may need to be strengthened) to decrease negative environmental impacts across the life cycle of plastic products. As part of this review, identification of common data fields that online purchasing platforms can use to accurately identify products that meet the standards, ecolabels, certifications, and design guidelines is needed to avoid inaccurate labeling on online purchasing platforms and greenwashing. Furthermore, appropriate methods and standards for the determination of chemicals of concern, including PFAS, could be established for recycled content to ensure protection of human health and the environment.

A2.3: Review and improve government purchasing criteria to reduce life cycle environmental impacts from plastic products in government purchasing.

Governments often use purchasing criteria to guide how they should make purchasing decisions. Criteria should be evaluated to ensure that the government is purchasing sustainable products, including products that have recycled content or can be reused. EPA's Comprehensive Procurement Guidelines (CPG) program establishes recommended minimum recycled content levels for certain categories of products purchased by the federal government (U.S. EPA, 2023). As directed in the 2021 Infrastructure Investment and Jobs Act, EPA should continue to periodically review the CPGs to determine if changes are warranted. EPA can also consider leveraging the CPG program to develop a registry of applicable products that meet the minimum recycled content levels, which would help purchasers in easily finding and purchasing the compliant products.

Other procurement standards and guidelines should also be reviewed and improved, where needed, to reduce the life cycle environmental impacts from government purchasing. Extended producer responsibility (EPR) approaches for key products and materials should also be explored for potential use in government purchasing criteria to further decrease the volume of solid waste that must be treated, stored, or disposed.

A2.4: Conduct evaluations to ensure that production facilities within the plastic sector are in compliance with applicable federal, state, Tribal and local regulatory requirements.

Consistent implementation and enforcement of regulations at all levels of government can reduce or prevent environmental and human health risks posed by existing or proposed new plastic production facilities, particularly those that use or release toxic or other harmful chemical or additives. Various instruments and approaches can be used to ensure compliance with regulatory requirement and the need to ensure careful and full evaluation of any proposed new facilities or expansions of existing facilities, under all applicable requirements as follows:

A2.4a: For existing facilities in the plastic sector and facilities producing inputs used by the plastic sector, examine existing authorities, policies, and actions to determine how they could be adjusted or built upon to avoid and reduce negative environmental or human health impacts, including safety threats like chemical leaks, fires, and explosions.

A2.4b: Review and update, as appropriate, regulations relating to air emissions and water discharges of pollutants or waste disposal from plastic production and recycling facilities, and other health and safety measures, including regulation of the production and transport of plastic pellets. In addition, work across the federal government to prevent accidental releases of hazardous chemicals related to plastic production into the environment during transit.

A2.5: Map existing and proposed plastic production facilities, as well as evaluate their environmental justice and public health impacts on neighboring communities.

The locations of existing plastic production and recycling facilities and proposed new facilities should be mapped to analyze potential disproportionate impacts on disadvantaged and vulnerable communities, including air toxics and other air emissions, as well as water and waste impacts. Tools, such as EPA's Environmental Justice Screening and Mapping Tool (EJScreen 2.0), the Council on Environmental Quality's Climate and Economic Justice Screening Tool (CEJST) or Center for Disease Control's Social Vulnerability Index, are available, and the analysis of potential impacts should also make use of other tools, research, information from environmental monitoring, and feedback received from impacted or potentially impacted communities.

A2.6: Develop methods to measure reductions in greenhouse gas emissions from the life cycle of plastic products and alternative materials as part of meeting global, national, and state greenhouse gas emissions goals.

A full understanding of the link between the production, use, recycling, and disposal of various types of plastic products and associated greenhouse gas emissions are important to addressing climate change. Policymakers must also understand the environmental trade-offs that result from the use of alternative materials. Methods need to be developed to better understand and measure any reductions in greenhouse gas emissions associated with the use of alternative materials or products, and more greenhouse gas data needs to be made available. Existing models, such as the U.S. Environmentally-Extended Input-Output Model and EPA's Waste Reduction Model (WARM) or Federal Life Cycle Assessment (LCA) Commons, should be used to support life cycle analyses of environmental impacts of plastic products and their alternatives.

A2.7: Coordinate domestic and international interests to support the development of international standards, including product labelling, to increase the circularity of plastic products.

Adopting and further refining international standards for circularity will help support sustainable trade efforts and will reduce barriers to achieving a more circular economy. Product labelling is often included in product standards and can be an important lever for communicating product recyclability and transparency about chemicals in products. The United States should continue to support the development of international standards to increase the circularity of plastic products.

Objective B. Improve Post-Use Materials Management

The United States should employ more circular approaches to reduce the life cycle environmental impacts of plastic products. While EPA's National Recycling Strategy extensively identified actions to improve the U.S. recycling system, further increases in circularity can be achieved by developing:

- Reuse systems for plastic and alternative products,
- Composting systems for certified compostable materials, and
- Increased public outreach and education on proper management.

Promoting product use to its fullest extent equates to cost savings for consumers, as well as reductions in the amount of waste disposed of in landfills and in greenhouse gas emissions from production. Where waste disposal is necessary, it should be done in a manner that minimizes impacts to human health and the environment.

B1. Conduct a study of the effectiveness of existing public policies and incentives upon the reuse, collection, recycling, and conservation of materials.

State, territorial, tribal, and local governments have implemented policies that have been effective at increasing the reuse, collection, recycling, and conservation of materials. Extended producer responsibility policies and deposit refund schemes are two examples of policies that have been effective at achieving circularity goals in some jurisdictions at the state and local levels. A study is needed to assess the effectiveness of existing public policy frameworks to investigate, identify, and share best practices in programs and policies aimed to increase reuse or refill, collection, and recycling efforts. This study can then be used to inform the development of recommended actions.

B2. Develop or expand capacity to maximize the reuse of materials.

Effective reuse (including refill) systems can drastically reduce the disposal of plastic products. Innovative systems should be expanded or developed to ensure that existing plastic products are reused as long as possible.

B2.1: Provide funding to communities to create and implement plans to facilitate reuse that have a greater need for support.

Many communities lack an approach to facilitating reuse and refill. As a result, reusable/refillable products are often thrown away. Community-based solutions may include creation of a reuse or refill centers, or collaboration with stakeholders to increase the use of reusable food or package delivery containers in an area. Financial support is needed for communities, in particular those with environmental justice concerns, to create plans to grow reuse systems and infrastructure throughout their area, with a focus on

reducing single-use, unrecyclable, and frequently littered items, while also providing job opportunities for the local community.

B2.2: Research and identify obstacles to reuse and propose innovative, viable solutions.

Faced with large volumes of mixed plastic waste that has little or no market value, many jurisdictions are assessing existing and new avenues to support reuse where appropriate. This action promotes continued work to identify obstacles and friction points that limit the viability of reuse systems, identify possible existing solutions, as well as to encourage new innovative solutions to those obstacles.

B3. Facilitate more effective composting and degradation of certified compostable products.

Certified compostable products can replace plastic products in some cases. However, composting programs and infrastructure are not readily available across the United States, and not all composting facilities accept or can effectively process certified compostable products. Furthermore, consumers and businesses need to be educated on how to properly source and separate certified compostable products and where they can effectively compost those products.

B3.1: Evaluate maps of available composting infrastructure and determine infrastructure needs, including considerations for communities with environmental justice concerns.

To expand access of composting programs to more communities, a gap and needs assessment should be conducted by examining existing maps of available municipal composting infrastructure. This should include considerations for the needs of communities with environmental justice concerns. Several resource maps have been developed and are publicly available that show both opportunities and constraints in composting capabilities and capacities. For instance, GreenBlue (2023) has developed an interactive map that tracks composting facilities throughout the United States (including location and types of packaging accepted). The U.S. Composting Council (2023) also maintains an interactive map of facilities that produce compost certified under the Seal Testing Assurance Program.

B3.2: Research the use and environmental impacts of certified compostable plastic products.

Certified compostable products can have adverse environmental impacts as they are no less prone to being littered or "leaked" into the environment. These products are designed to break down under controlled conditions, such as in industrial composting facilities, not in the natural environment. Case studies and research can be used to determine the life cycle environmental impacts of these products and to identify

the barriers composting facilities face with regards to accepting certified compostable products. Such a study could also identify the changes in product design, collection, or policy needed to reduce the life cycle environmental impacts of these products and ensure that they are managed soundly. Releases of micro/nanoplastics should be considered.

B3.3: Provide funding to improve composting capacity for communities within the United States that have a greater need for support.

Improving the capacity of communities to participate in composting programs is an important component of the circular economy for all compostable products. Both federal funding and private sector leveraging of funds are needed to help establish composting opportunities across the United States, with a specific focus on opportunities to provide support for disadvantaged and rural communities.

B3.4: Review and, if needed, update compostable product standards to ensure that certified and labeled products fully decompose in composting facilities and do not negatively impact the composting process or the quality of the final compost product.

Contamination can be a major problem in the quality of final compost products. Plastic products can contaminate compost, resulting in plastic and microplastic pollution when compost is applied to the soil. Compostable product standards are necessary to prevent contamination from entering the system. Ensuring that products perform as intended is important to maintaining quality assurance across the composting process and in final products. For example, experts could develop and share best practices for testing compostable products to reduce plastic contamination in compost.

B3.5: Evaluate claims made by companies about the degradability of plastic products to eliminate "greenwashing" and misleading claims by marketers.

Degradability claims are sometimes included on products that are not degradable. Claims should be evaluated in conjunction with "truth in labeling" efforts addressed in the Federal Trade Commission's Guides for the Use of Environmental Marketing Claims ("Green Guides") and in Action B5.2 below. Concerns related to the inadequate documentary standards, definitions and greater accountability with such claims need to be appropriately addressed.

B3.6: Identify gaps in the measurement of composted materials and develop methodologies for consistent, harmonized measurement.

Gaps exist in the understanding of compostable products and the extent to which products break down under recommended conditions. Materials which could be deemed compostable may in fact cause contamination in home and industrial composting systems. A systematic series of studies that include real-world conditions at commercial composting facilities can help to better measure, understand the variations, and make recommendations for different and improved compostable products.

B4. Increase solid waste collection and ensure that solid waste management does not adversely impact communities, including those overburdened by pollution.

Effective collection decreases the leakage of plastic products. Improvements are needed in some solid waste collection bins and trucks to ensure that plastic waste does not leak once collected. Increased collection of plastic waste is needed in hotspots for plastic pollution.

B4.1: Increase awareness and availability of public and private sector funding for improvements to recycling and collection programs, and strategies for accessing this funding.

Grants, such as those provided by the Solid Waste Infrastructure for Recycling grant program authorized by the Save Our Seas 2.0 Act, can be used to support improvements in local post-consumer materials management and infrastructure and recycling programs and to assist local authorities in making improvements to municipal waste management systems. Funding support for communities where recycling collection rates may be low, specifically in rural or minority populations, can have a positive impact on the reduction of plastic waste. Use the environmental justice analysis results from Action B4.4 to inform the design and implementation of this action to reduce disparities in resource management infrastructure, funding, technology, and access.

B4.2: Fund research, development, demonstration, and deployment of technologies and processes that ensure that collected waste enters and stays in the waste management system.

Successful management of waste requires equipment supporting collection and transportation that is able to keep the waste contained and that is placed in ways that encourage people to use it. Funding for social/ behavioral research could identify the ways that equipment could be improved to promote use, while funding for technological research could identify new innovative equipment that ensures that waste stays contained once collected. Use the environmental justice analysis results from Action B4.4 to inform the design and implementation of this action to reduce disparities in resource management infrastructure, funding, technology, and access.

B4.3: Develop guidance and recommendations for efficient, cost-effective, and locally appropriate solid waste collection techniques.

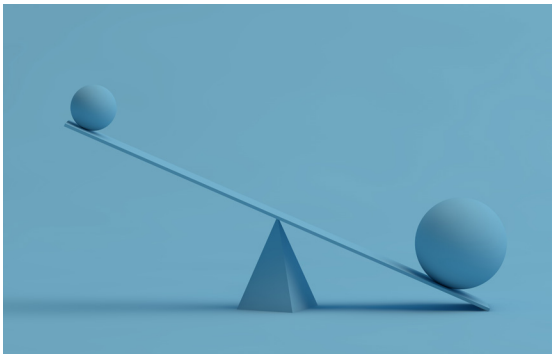
Guidance and recommendations are needed for efficient, cost-effective, and locally appropriate solid waste collection techniques that encourage proper disposal and prevent loss, including recommendations for bin placement, bin containment systems, and bin labeling. Use the environmental justice analysis results from Action B4.4 to inform the design and implementation of this action to reduce disparities in resource management infrastructure, funding, technology, and access.

B4.4: Perform an environmental justice assessment for non-hazardous solid waste management facilities, including recycling facilities, incinerators, landfills, and chemical recycling facilities, and for other emerging or novel processes.

As other actions in this strategy are taken, it is important to actively assess the environmental and health burdens that new and existing waste management facilities impose on surrounding communities, including communities with environmental justice concerns. Understanding potential impacts allows EPA to discourage or disincentivize any technologies or processes that: (i) increase air pollution; (ii) increase the generation of hazardous wastes; (iii) fail to use a circular economy approach that is restorative or regenerative by design; or (iv) maintain or increase pollution in communities that are already overburdened. It also allows EPA to work closely with potentially impacted communities to address environmental and health concerns. This analysis would be done in conjunction with Action B1.3 ("Conduct an environmental justice assessment of non-hazardous solid waste management infrastructure in the U.S.") of EPA's National Recycling Strategy. Tools, such as EPA's Environmental Justice Screening and Mapping Tool (EJScreen 2.0), the Council on Environmental Quality's Climate and Economic Justice Screening Tool (CEJST) or Center for Disease Control's Social Vulnerability Index, are available, and the analysis of potential impacts should also make use of other tools, research, information from environmental monitoring, and feedback received from impacted or potentially impacted communities..

B4.5: Assess the social costs of plastic waste (including litter cleanup) and how those costs could be reduced via reduction/prevention solutions.

Analyze the social costs of non-hazardous solid waste, particularly plastic waste, to assess causes, outcomes, and potential waste reduction solutions and to address concerns related to environmental justice.



B4.6: Explore the development of an accredited, voluntary third-party certification program for plastic recyclers to increase the safe and effective management of plastic recyclables in the United States.

Such certification systems have been successful in safely managing other materials, such as used electronics. The certification system should address multiple aspects of sound recycling, including ensuring that exports of plastic waste and scrap follow applicable domestic and international law. Once launched, develop tools and materials that encourage governments at all levels, American public, businesses, states, territories, and tribal nations to use certified recyclers. Involve States, territories, tribal nations, NGOs and other stakeholders on the key elements of program development.

B4.7: Standardize measurement and increase data collection.

Standardized measurement methods, standardized definitions, and additional data are needed to improve the estimates of non-hazardous solid waste collected, managed, imported, and exported, as well as the amount that escapes the solid waste management system into the environment. This action would be performed in conjunction with Objective E ("Standardize measurement and increase data collection") of EPA's *National Recycling Strategy*.

B5. Increase public understanding of the impact of plastic mismanagement and how to appropriately manage plastic products and other waste.

Consumers play a pivotal role in determining how plastic products are used and disposed of. To reduce the amount of plastic and other waste that ends up in waterways and oceans, it is essential to gain a better understanding of how messaging is perceived by consumers and to make improvements in messaging.

B5.1: Identify effective ways to increase public understanding of waste reduction, materials reuse, and composting options.

Clear and persuasive public communication can help modify behavior and result in increased waste reduction, reuse, and composting. National messaging around these behaviors can be developed, building on Action C1 ("Enhance education and outreach to the public on the value of recycling and how to recycle properly") in EPA's National Recycling Strategy, as well as on recycling education and outreach grants funded by the 2021 Infrastructure Investment and Jobs Act. Recommended approaches for improving messaging consistency and effectiveness include:

B5.1a: Develop common messages about reduction, reuse, and composting, especially for targeted priority materials, such as single-use, unrecyclable, and frequently littered materials.

B5.1b: Develop a national program to educate the public about reduction, reuse, and composting. Enlist the assistance of traditional and social media, governments, waste haulers, and product manufacturers to disseminate messaging that is contextually relevant across diverse groups and geographies.

B5.2: Increase awareness among businesses of the Federal Trade Commission's Guides for the Use of Environmental Marketing Claims ("Green Guides").

FTC's Green Guides provide guidance to businesses on how to make non-deceptive environmental claims with considerations for consumer perception of those claims. Specifically, the Green Guides state marketers should not claim their products are "recyclable" unless recycling facilities for those products are available to a substantial majority of consumers or communities where the item is sold. Businesses should make greater use of the Green Guides to make truthful claims. Efforts to increase awareness of the Green Guides and the consequences of deceptive environmental claims should also be initiated with federal suppliers.

B5.3: Review plastic resin identification codes to determine if changes are needed to reduce confusion around the recyclability of plastic products.

Governments and organizations at different levels have been reviewing the use of resin identification codes. This work should ensure that the codes used reflect the purpose for which they were created and do not perpetuate consumer confusion around what is recyclable.

B6. Explore possible ratification of the Basel Convention and encourage environmentally sound management of scrap and recyclables traded with other countries.

B6.1: Support the Basel Convention.

Some countries continue to strengthen their recycling and waste management systems and may face challenges to ensure that scrap and recyclables are managed in an environmentally sound manner, especially in communities with environmental justice concerns. The Basel Convention requires parties to control the transboundary movements of certain materials and hazardous wastes covered by the treaty, and to take measures to prohibit certain exports if parties have reason to believe the exports would not be managed in an environmentally sound manner. Plastic scrap and waste amendments were adopted by Parties to the Basel Convention in 2019 to control exports and imports of most plastic scrap and waste. As a result of these changes, transboundary movements of most plastic scrap and waste to countries party to the Convention are allowed only with the prior written consent of the importing country and any transit countries, a process known as prior notice and consent. The amendments took effect on January 1, 2021.

Currently, EPA has authority under the Resource Conservation and Recovery Act to control transboundary movements of most hazardous recyclables and waste, but not all waste controlled under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal.[11] The United States signed the Basel Convention in 1990, and the Senate gave its advice and consent to ratification in 1992. The United States should explore options for strengthening U.S. participation in the Basel Convention, including options that would enable ratification.

B6.2: Encourage environmentally sound management practices to support protection of human health and the environment.

The United States supports environmentally sound management of scrap and recyclable materials. In conjunction with exploring options for strengthening U.S. participation in the Basel Convention, EPA should identify ways to enhance practices to ensure that environmentally sound management of scrap and recyclable materials can benefit circular economy approaches.

11 See Basel Convention on the Control of Transboundary Movements of Hazardous Wastes: https://www.unep.org/resources/report/basel-convention-control-transboundary-movements-hazardous-wastes

Objective C. Prevent Trash and Micro/ Nanoplastics from Entering Waterways and Remove Escaped Trash from the Environment

Interventions are necessary to prevent littering and to ensure that trash (including plastic waste) and microplastics do not enter waterways. Such interventions could include implementing programs to reduce littering and illegal dumping; installing trash-capture technologies to collect and remove trash from stormwater, wastewater, and surface waters; and increasing street sweeping to remove trash before it is carried by stormwater or wind into waterways. Efforts to manage escaped trash can be hindered by a lack of reliable data on the amount and type of trash in domestic waterways and the areas of concentration. A greater understanding of the sources, pathways, and sinks of trash in communities across the United States would help decision-makers prioritize intervention options and maximize the impact of litter prevention and removal efforts. It would also help decision-makers address important equity and environmental justice concerns.

Similarly, interventions to reduce micro/nanoplastic emissions into the environment are needed to address potential risks to human and ecosystem health, particularly given the expected increase in plastic production over the coming years. Micro/nanoplastics include those that result from the degradation of plastic waste as well as microplastics that enter the environment already in microplastic form (such as microbeads, microfibers, and plastic pellets). Significant knowledge gaps currently exist about the sources, fate, and impact of these particles in the lithosphere, hydrosphere, and atmosphere and about the source-pathway-sink relationships influencing such transport.

C1. Identify and implement policies, programs, technical assistance, and compliance assurance actions that effectively prevent trash/ micro/nanoplastics from getting into waterways or remove such waste from waterways once it is there.

C1.1: Conduct analyses on the cost, effectiveness, and equity of policies/programs addressing the problems of litter, illegal dumping, and unintentional spillage of trash, in particular in disadvantaged and vulnerable communities.

Stakeholders need to understand the likely cost ranges, effectiveness, and equity ramifications for different policies and programs addressing litter, illegal dumping, and unintentional trash spillage that different levels of government could potentially institute to address the problem of trash in waterways. A better understanding of the implications of various policy options will allow governments to be more effective, fair, and efficient in their policy choices. Environmental justice analyses, such as proposed in A2.5 above, of policy options should be considered wherever possible.

C1.2: Explore expanded use of Clean Water Act authorities to significantly reduce trash loadings into waterways.

Implementation of regulatory tools can help reduce trash loadings in waterways. EPA, in collaboration with select stakeholders, should comprehensively assess how existing Clean Water Act programs can be more expansively and effectively utilized to address trash loadings into waterways. Such programs could include National Pollutant Discharge Elimination System (NPDES) permits, Total Maximum Daily Load development, water quality standards, impaired waterbody listings, nonpoint source management plans, effluent limitation guidelines, and pretreatment standards. An analysis of the effectiveness of such programs in addressing trash should be conducted and the results conveyed to those administering and implementing the programs.

C1.3: Provide technical assistance to include new or improved trash reduction/removal actions and provisions in watershed plans, stormwater management plans, area management plans, and other related plans.

Many watershed plans, stormwater management plans, and other area management plans fail to effectively address trash removal and reduction, even where trash is a problem for the watershed or other areas. To create more relevant plans to address trash—or to do so more effectively—plan developers should seek assistance and guidance from stakeholders with knowledge about local trash issues, including guidance on effective actions and provisions that would address the main sources of the local trash problem. Technical assistance should also include financial planning to identify funding and finance options and incorporate trash capture infrastructure investments into asset management planning. Communities that are already overburdened may need further support to incorporate effective trash mitigation actions into existing plans.

C2. Improve water management to increase trash and micro/nanoplastic capture in waterways and stormwater/wastewater systems.

C2.1: Identify and address potential barriers to installing and maintaining effective trash and micro/nanoplastic capture systems.

Even with more effective source reduction efforts in place, trash and miro/nanoplastic capture will remain an important part of the equation of comprehensively addressing the problem of trash and micro/nanoplastics in local waterways. Installing and maintaining effective trash capture technologies in waterways or as part of wastewater and stormwater conveyance systems requires understanding financial, technical, and environmental factors such as capital and operational costs, installation and maintenance needs (including the need for training), device siting, hydrology, ecological impacts and other variables that may potentially affect the amount of trash captured. These potential barriers should be analyzed to ensure that the right capture solutions are implemented given local conditions. The economic, ecological, recreational, equity, and other benefits

accruing from effective trash capture systems should also be articulated and quantified where possible to make a case to decision-makers for funding and installation of such systems.

C2.2: Fund research, development, demonstration, deployment, and maintenance of existing and new technologies and processes that capture trash or micro/nanoplastics in waterways, stormwater, and wastewater.

The lack of dedicated funding is one of the most significant barriers to getting effective trash capture systems in place. Research is also needed to inform the development of capture technologies; for example, technologies to reduce micro/nanoplastics discharge from commercial and residential washing machines should also be explored.

Funders should look expansively at creating and promoting funding programs and mechanisms that can help meet trash and micro/nanoplastics capture needs. Administrators of funding programs that could potentially fund trash and micro/nanoplastics capture but that have been underutilized for that purpose should consider prioritizing and/or promoting the use of those funding sources for the capital as well as maintenance costs of trash and micro/nanoplastics capture technologies. Financial support for research on the detection, capture, and (where viable) removal of trash or micro/nanoplastics in stormwater, wastewater, terrestrial, freshwater/riverine, and marine environment should also be addressed.

C3. Increase and improve measurement of trash loadings into waterways to inform management interventions.

C3.1: Explore the possibility of a national tracking and reporting plan that would produce estimates of the amounts, types, and locations of materials that enter waterways or oceans.

A system for measuring and monitoring loadings of trash, especially plastic waste, in U.S. waterways would be helpful to support the development of effective and targeted mitigation strategies. Federal agencies (in collaboration with stakeholders from academia, the private sector, and NGOs) should lead efforts to design a tracking and reporting plan for trash loadings into U.S. waterways on a national scale. U.S. government agencies should coordinate with international bodies, as appropriate, to ensure that any national data tracking and reporting plan produces data that are consistent with international efforts.

C3.2: Evaluate opportunities for using more precise modeling approaches to establish a baseline for the amounts and types of materials that escape into U.S. waterways and oceans.

Obtaining reliable baseline measurements of the amounts of trash in waterways and oceans is critical for measuring the success of mitigation efforts and interventions over time. Some researchers have already developed models that could be used to estimate the amounts of various types of trash that escape into waterways, but the accuracy of these models could be improved with more refined modeling approaches, better data, or both. As appropriate, any approved national modeling approach should be incorporated into the plan for tracking and reporting trash loadings into U.S. waterways, as described in Action C3.1 above.

C3.3: Disseminate information on trash assessment protocols and the appropriate usage of these protocols.

Many researchers, community groups, volunteers, and other stakeholders are engaged in efforts to collect data on trash. However, stakeholders are not always aware of the most appropriate protocol to use. EPA and its partners should endeavor to use multiple communication channels to educate stakeholders about available assessment protocols, including information about the appropriate usage for each protocol and how data from different protocols might be effectively used. Stakeholders should be encouraged to use trash assessment protocols as a standard part of their cleanup and trash capture efforts to inform potential interventions.

C4. Increase public awareness of the impacts of plastic products and other types of trash in waterways.

C4.1: Develop messaging and educational materials about the nature and impacts of trash pollution and what targeted audiences can do to help address the problem.

As a complement to Action B5, which focuses on education on proper waste management, there is a need for public outreach education efforts to reduce littering and illegal dumping. High-quality, plain language education and outreach materials should be developed or collected for use by educators, NGOs, and other stakeholders across the country. Where available, litter survey data should be used to focus anti-littering messaging for each geographic region on frequently littered items. Materials could be provided in a variety of languages using multiple delivery methods. Equity concerns should also be proactively addressed, and specific messaging appropriate for communities with environmental justice concerns should be assessed and developed.

C4.2: Research and disseminate information on successful outreach and education practices and programs to motivate positive behavior change.

Stakeholders and partners who are positioned to drive behavior change, at the tribal, state, and local, levels, often need support to develop successful outreach and education practices and programs to reduce pollution. Stakeholders and entities should conduct and compile research on best practices for outreach that maximize the chances of producing positive behavioral changes. This information should then be disseminated for use by organizations that are designing and implementing anti-littering campaigns or other types of campaigns aimed at reducing trash pollution. A searchable central repository for such information should be developed and maintained.

C4.3: Conduct campaigns using known best practices to raise public awareness of the trash pollution problem and encourage behavior changes that reduce trash pollution.

Without more public awareness, the public will not engage in behaviors that avoid or help reduce trash pollution. Interested parties should conduct outreach and education campaigns aimed at reducing trash pollution in waterways through behavioral changes such as properly disposing of trash and recyclables and reducing single-use plastic consumption. Community-based social marketing and equity principles should be adhered to wherever possible. Partnerships with schools, NGOs, and private entities should also be considered, where appropriate, to support these efforts.

C5. Increase and coordinate research on micro/nanoplastics in waterways and oceans.

C5.1: Conduct research and disseminate information on the sources, transport, fate, concentrations, impacts, and remediation of microplastic pollution.

It is important to identify and categorize the major sources of micro/nanoplastics and the pathways micro/nanoplastics take to enter waterways. Furthermore, identifying and categorizing the major impacts of micro/nanoplastic pollution and effective remediation methods are still critical needs, as are measuring and cataloguing microplastic concentrations in domestic waterways and our oceans. Funders and researchers should disseminate available information, as well as address remaining data gaps.

C5.2: Support the development of management practices and technologies to remove microplastics (including microfibers) from effluent and waterways.

Funding and research are greatly needed to support the development of best management practices (BMPs) and technologies to remove microplastics from waterways. Wastewater treatment plant operators and stormwater planners would benefit from comparative information on application of BMPs and about the efficiency with which different treatment technologies remove microplastics of different types and sizes from wastewater and stormwater. Active collaboration between government and the private sector should be pursued for BMP and technology development.

C5.3: Develop definitions for micro/nanoplastics and standardized methods for their collection, extraction, quantification, and characterization.

Because there is no generally accepted definition for microplastics, data about microplastics are not currently harmonized. Stakeholders should work collaboratively to identify existing national and international micro/nanoplastics definitions, including those for microfibers. It is also critical to develop standardized methods for collecting, extracting, quantifying, and characterizing microplastics that appear in waterways (both in the water column and in sediment) and in various media (e.g., drinking water, surface water, indoor/outdoor air, soil, biota). These methods should be based on existing microplastics research methods.

Next Steps

EPA is opening a 45-day public comment period on this draft strategy. Due to the action-oriented nature of the draft strategy and the need for commitments to execute it, EPA will continue outreach and engagement during the comment period and the finalization of the strategy. Implementation of the strategy is expected to be an iterative process as resources, entities leading efforts, and needs change over time. EPA intends to help facilitate the implementation of actions in the strategy and will provide routine status updates to interested stakeholders.

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