BREAKING THE PLASTIC WAVE

By The Pew Charitable Trusts

In 2020, The Pew Charitable Trusts and Systemiq published a groundbreaking report, "Breaking the Plastic Wave" to identify a credible roadmap for addressing plastic pollution in the world's oceans. In an update, "Breaking the Plastic Wave 2025"[1], improved information is used to provide a deeper understanding of the environmental, economic, health and social impacts of plastic. The new report also explores the global plastic system's influence on efforts to address some of the world's greatest challenges. The overall aim is to support and encourage decision-makers as they respond to critical global issues, evaluate trade-offs and implement solutions.

Credit: The Pew Charitable Trusts

In 2020, amid rising concerns over the scale and impacts of plastic pollution, The Pew Charitable Trusts, Systemiq and their partners published "Breaking the Plastic Wave" (BPW1), which found that the amount of plastic that would enter the ocean each year from municipal solid waste would nearly triple by 2040, increasing from 11 million metric tons (Mt) in 2016 to 29 Mt, unless the global community undertook the ambitious actions identified in the report.

Despite that urgent call, progress towards that study's vision of coordinated measures across the entire plastic system to reduce pollution has yet to be realized, and in the intervening five years, 570 Mt of plastic pollution has entered the land, air and water worldwide.

To help illuminate the consequences and implications of that slow progress, we conducted a new, more comprehensive analysis of plastic pollution in Earth's waters, land and air.

This resulting report is an update to and expansion of BPW1 that builds on the better data that has become available over the past five years to examine all major sectors of the global plastic system.

Our analysis also finds that plastic is interconnected with other global challenges, and that solving the plastic pollution problem will have broad implications for improving the health of people, the planet and the global economy. (See Figure 1). With the added urgency created by five more years of growing plastic pollution, we renew and amplify the call for ambitious action and transformative strategies to address not only plastic pollution but also the far-reaching consequences of the plastic system.

[1] *Read the full report at: https://www.pew.org/en/research-and-analysis/reports/2025/12/breaking-the-plastic-wave-2025*

Figure 1

Fast Facts 2025–2040

Plastic's impacts on people and the planet, without and with ambitious action

Our assessment of the global plastic problem yielded the following nine key findings:

1. **Plastic pollution will more than double over 15 years.** As of 2025, 130 Mt of plastic pollutes the environment – land, air and water – each year. Without ambitious global action, that figure will rise to 280 Mt by 2040 – equivalent to dumping nearly a garbage truck worth of plastic waste every second. This increase will be primarily driven by rapidly growing production and use of plastic – particularly in packaging and textiles – that will further overwhelm already inadequate waste management systems.

2. **Growth in plastic production will outpace waste management capacity.** Absent urgent international efforts, annual primary plastic production will rise 52% from 450 Mt in 2025 to 680 Mt in 2040, growing twice as fast as waste management, which, even with considerable investment, will expand by only 26%. By 2040, annual costs to collect and dispose of plastic would increase by 30% to US$140 billion, requiring additional public funds and posing a financial risk to businesses. Despite this increased spending, the share of plastic waste that is uncollected will nearly double by 2040 from 19% to 34%.

3. **Plastic can harm human health at every stage of its life cycle.** Barring robust global action, health impacts from plastic production, waste and pollution, before accounting for use, will increase by 75% over the next 15 years, primarily because of new polymer production and open burning, with the most vulnerable communities bearing the brunt. A growing number of studies have linked plastic pollution and chemicals used in plastic products to health problems, including cancer, cardiovascular disease, asthma, decreased fertility and cognitive and developmental issues.Research has conservatively estimated the annual costs of health effects from plastic chemicals alone to be as high as US$1.5 trillion globally. That figure will only grow as plastic production, use and pollution increase, and as understanding of the health impacts expands.

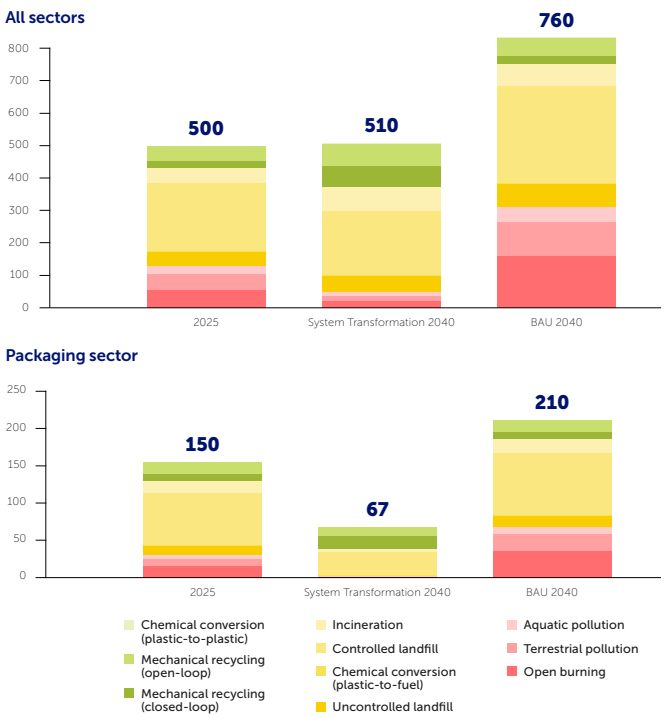
   Because of data gaps, we did not include the health impacts of plastic use or microplastics in our analysis, but those effects are likely to be significant, as are the potential human health benefits of reducing plastic use. To date, more than a quarter of the more than 16,000 chemicals used in plastic products have been identified as possible sources of harm to human health. Among the topics of growing concern are endocrine-disrupting chemicals – which affect the hormones that regulate human health and are widely used in food packaging, cookware, toys and cosmetics – and microplastics, which are increasingly being found throughout people's bodies and have been linked to potential risks to digestive, reproductive and cognitive function.

4. **Greenhouse gas emissions will surge.** Unless the plastic system is transformed, by 2040, annual greenhouse gas (GHG) emissions from the global plastic system will increase by 58% to 4.2 gigatons of carbon dioxide equivalents ($GtCO_2e$) – a metric used to standardize the measurement of emissions of different GHGs – equivalent to the emissions from one billion gasoline-powered cars. Achieving the commitments made by the global community under the Paris Agreement – the legally binding international treaty adopted in 2015, which pledges to keep global temperature rise below 2°C and ideally under 1.5°C – will require rapid declines in annual emissions, especially from plastic production, which accounts for 86% of plastic-associated emissions in 2025.

5. **Ambitious global action can dramatically reduce pollution.** Our "System Transformation" scenario reflects ambitious, complementary actions using existing solutions across the plastic system to cut production and use and improve waste management, which together could reduce annual plastic pollution by 83% by 2040. The myriad benefits of this scenario include lower GHG emissions, reduced harm to human health, as well as more efficient use of public funds and the creation of new business markets and opportunities. This report shows that an integrated approach to plastic that touches all the modelled economic sectors is crucial, with actions needed before, during and after plastic product use. (See Figure 2).

Figure 2: Existing Strategies, Implemented at Scale, Can Substantially Reduce Plastic Pollution

System Transformation outcomes for all economic sectors and for packaging only in Mt per year, 2025 and by scenario 2040



A key finding from this scenario is the importance of reducing production levels of "primary plastic" – plastic made from raw materials for the first time – to decrease plastic pollution and the impacts of production on human health and climate. The recommended actions could cut annual production of new plastic by 44% by 2040, compared with current projections, achieving a 14% reduction from 2025 levels, all while maintaining the same level of service for consumers and businesses. Reaching these reductions

could also unlock new opportunities for sustainable solutions, a market already valued in the trillions of dollars.

Although implementing and rapidly scaling policies across the plastic life cycle worldwide will require unprecedented global collaboration and commitment, doing so would have substantial benefits, including a 38% reduction in annual GHG emissions from plastic, a 54% reduction in modelled annual health impacts, and a US$19 billion decrease in yearly government spending on plastic collection and disposal by 2040.

6. **Packaging pollution can be virtually eliminated.** Pollution from plastic packaging, the largest source of plastic waste, can be nearly eradicated by 2040, decreasing 97% from 66 Mt under BAU to less than 1.7 Mt by 2040. System Transformation could reduce primary plastic production for packaging by 76% compared with BAU and by 66% relative to 2025. Reuse accounts for two-thirds of the total decrease by 2040, demonstrating the central role that reuse will play in transforming how products are delivered and used.

   In particular, the scale of reuse required for these reductions will entail shifting nearly US$570 billion in annual private sector spending away from single-use and towards reuse, which highlights the many new economic opportunities that System Transformation presents, especially for early adopters and innovators. These investments would also support other substantial benefits, including 48% lower GHG emissions from packaging production and hundreds of thousands of new jobs.

7. **Solving microplastic pollution will require innovative solutions.** Microplastics make up 13% of global plastic pollution in 2025, with the largest sources being tyre wear and paint (10 Mt each), agriculture (3 Mt) and recycling (2 Mt). Under BAU, microplastic pollution will grow from 17 to 26 Mt annually by 2040. In high-income economies, microplastic pollution will make up 79% of overall plastic pollution by 2040.

   By contrast, under System Transformation, the annual flow of microplastics entering the environment could be cut by 41% by 2040 through a suite of actions to reduce production and use, improve product design and scale solutions for capture and treatment of microplastics. Although these targeted policy actions can achieve meaningful reductions in microplastic pollution, more than half of it remains unaddressed. This limitation highlights the need for other innovative solutions to deliver more substantial decreases in microplastic pollution.

8. **System Transformation offers opportunities for workers and communities.** Reimagining the plastic system would support 8.6 million additional jobs and create new business opportunities. But in the near term, it would also have consequences for millions of people worldwide whose livelihoods will require dedicated attention as the new plastic economy takes shape. Effective policies to tackle plastic pollution can create jobs, help alleviate poverty and safeguard the well-being of the world's most vulnerable people.

   More than three-quarters of all plastic that is recycled globally is collected and sorted by waste pickers, most of whom are from marginalized parts of society. Our analysis shows that waste pickers could make up nearly two-thirds of the plastic workforce by 2040. Despite providing an important service, these workers are not paid fairly or properly recognized for their contributions and are often exposed to hazardous conditions. Participatory approaches to waste management and governance that provide waste pickers with safe working conditions and economic opportunities and fully integrate them into broader waste management improvement strategies will be key to ensuring that the plastic system's transition is equitable and aligned with efforts to address global poverty.

   Furthermore, a shift away from linear economic models, based on production, use and disposal, and towards circular models that prioritize reusable and repairable products will shift the landscape of jobs across the plastic system. Under System Transformation, production accounts for 19% of plastic sector jobs by 2040, down from 30% under BAU, recycling jobs increase by 39% from 2025 to 2040 and expanded reuse systems create nearly 620,000 new jobs by 2040. Additional opportunities may also arise from thoughtful integration of waste pickers – who already play a substantial role in the recycling economy – as part of future waste management and reuse systems. Applying waste pickers' knowledge and expertise could facilitate a successful and socially responsible transition.

9. **Delay is costly.** Waiting just five years to initiate System Transformation would result in 1,100 Mt more primary plastic being produced, 540 Mt more plastic entering the environment and 5.3 GtCO2e more GHG emissions between 2025 and 2040. A five-year delay would increase governments' annual costs for plastic collection and disposal by an estimated 23% annually (US$27 billion) and add US$6.1 billion in annual capital expenditures by 2040 for open-loop mechanical recycling and incineration capacity for plastic alone. But these technologies also would be at growing risk of obsolescence as the economy becomes more circular. So this same five-year delay could lead to overinvestment in solutions that do not align with the future plastic system and, in turn, sizeable financial losses for companies and inefficient use of the limited public funding available for addressing the global plastic problem.

Opportunities for policymakers, researchers and businesses

The global community can make significant strides towards eradicating plastic pollution by 2040, despite the slow progress to date, by using existing solutions to transform the global plastic system, making ongoing investments in innovation and adopting a renewed sense of urgency. Although this is a sizeable challenge, the opportunities are substantial. Transforming the global plastic system will provide workers with better jobs and working conditions and build the business models of the future – ones that are built on sustainability and fostering innovation to provide better-designed materials and products.

This amount of system-level change will require coordinated action by policymakers, businesses and researchers to tackle the foundational challenges that hinder progress – rebalancing manufacturing, design, governance and consumer decisions to prioritize people and the environment. This report outlines four strategic pillars with associated opportunities for government, the research community and business to achieve this lofty goal:

1. Establish measures to reduce plastic production and use.

- Implement policy measures to ensure that market prices reflect the true costs of plastic and other materials.
- Complement pricing measures with targeted policies to reduce plastic production and use to sustainable levels, such as eliminating subsidies, enacting reduction targets and restricting new production facilities.
- Phase out low-utility, avoidable plastic through bans, product design standards and voluntary corporate actions to reform supply chains.

2. Rethink chemical, plastic product and system design.

- Adopt pre-market policies that assess the safety of chemical additives used in plastic, to safeguard human health and the environment.
- Establish and enforce a list of comparatively safer chemicals to promote material innovation and product safety.
- Implement policies that support the shift from single-use to reusable products, such as targets, standards, investment in shared infrastructure and financial incentives for consumers and businesses.
- Establish consistent product design requirements and standards for safe reuse and recycling and to reduce microplastic emissions.
- Simplify polymers and polymer compositions, such as by restricting problematic polymers – those that are difficult to recycle or pose health risks.
- Adopt measures to reduce microplastic shedding across key sectors, including plastic production, recycling, agriculture, marine, textile, transport and construction.
- Promote innovation in sustainable materials development, promising recycling technologies and reusable products.
- Establish public-private partnerships and provide incentives for open and transparent collaborations across industries to accelerate development of innovative solutions.

3. Expand participatory waste management systems.

- Implement policies to scale waste collection, including collection and recycling targets, deposit return schemes, design and labelling standards and, where appropriate, increased separate collection.
- Expand environmentally sound waste management systems by integrating waste pickers and other informal workers into waste management planning and extended producer responsibility (EPR) schemes to finance waste collection and management.
- Incorporate informal workers into census protocols to improve understanding of their contributions to existing waste management and improve long-term strategies.
- Develop targeted funding for groups that lack access to traditional financing to create cooperatives, offer training opportunities and support participation in governance.
- Establish enhanced filtration at recycling and wastewater facilities to minimize microplastic leakage to the environment and identify long-term, safe disposal options for contaminated waste sludge.

4. Unlock transparency of the plastic supply chain and its impacts.

- Invest in research into and monitoring of the impacts of the global plastic system, particularly on human health.
- Develop targeted research into impacts of exposure to plastic on vulnerable populations, including communities adjacent to production and waste management facilities, waste pickers and workers across the plastic supply chain.
- Disclose data on plastic-related commerce, impacts, risks and opportunities through reporting platforms, such as CDP.
- Establish a global chemical reporting and disclosure framework to help improve supply chain transparency, evaluate chemical risks and assess progress towards global targets.
- Increase interdisciplinary research and monitoring to provide a fuller picture of the extent of the plastic system's environmental and health impacts.

Urgent action is needed to transform the global plastic system and curb the worst effects of plastic pollution on the environment and human health, and to ensure efficient use of financial resources. A coordinated, ambitious effort by the global community can substantially reduce plastic pollution overall and virtually eliminate pollution from plastic packaging in the next 15 years, while reducing costs, supporting millions of jobs and bolstering efforts to protect human health, address climate change and alleviate poverty.

Pew

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