



# **BEYOND THE BIN**

**What the Evidence  
Tells us About Plastic  
Recycling, and What  
Comes Next**

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[reusefoundation.org](https://reusefoundation.org)

# TABLE OF CONTENTS

**04**

---

KEY TAKEAWAYS

---

**05**

---

SCALE OF THE WORLD'S PLASTIC PROBLEM

---

**06**

---

COLLECTION FIGURES DON'T TELL THE FULL STORY

---

**07**

---

HOW RECYCLING BECAME THE DEFAULT

---

**09**

---

IT'S LABELLED 'RECYCLABLE', BUT IS IT RECYCLED?

---

**10**

---

INFRASTRUCTURE CONSTRAINTS

---

**11**

---

WHEN DOMESTIC PROCESSING  
SYSTEMS REACH CAPACITY

---

**12**

---

CONSEQUENCES FOR CORPORATE CREDIBILITY

---

**14**

---

AN OVERLOOKED OPTION: REUSE,  
THE ALTERNATIVE THAT CAN WORK

---

**15**

---

THE PATH FORWARD

---

**16**

---

SOURCES

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**A paper by REUSE Foundation, drawing on 18 reports spanning environmental investigations, academic analyses, intergovernmental data and industry examinations.**

For decades, recycling has been presented as the answer to the world's plastic problem.

Households sorted their waste diligently. Brands stamped the three chasing arrows logo on packaging. Governments counted collection volumes and reported progress.

We wanted to know whether that confidence was justified, so we examined the evidence from a range of sources and countries.

What we found points to a different reality: the gap between what is collected for recycling and what actually gets recycled is substantial – and there are no signs of it closing. And very little plastic that is recycled stays usable for long – most is downcycled (becoming a park bench or similar), after which it's unusable waste.

We've consolidated key findings from 18 reports, spanning academic research, intergovernmental data, environmental investigations and industry analysis, to set out what the evidence shows, why the current system has structural limitations that are hard to resolve, and what a more effective approach to plastic reduction looks like.



# KEY TAKEAWAYS

Without action, plastic pollution is projected to more than double, from **130 to 280 metric tonnes by 2040**<sup>1</sup>.

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In 2022, the latest year with comprehensive data, **just 9% of plastic waste generated worldwide was recycled**<sup>2</sup>.

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Plastic recycling became the standard, not because it is effective but because it served the interests of plastic producers and users.

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Many products labelled as recyclable are not recycled in practice. Infrastructure gaps, economics and end-market instability all play a role.

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The economics of plastic recycling rarely stack up: virgin plastic is often cheaper to produce than recycled material and is of higher quality.

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Despite ongoing investment in plastic recycling, the OECD expects recycled (secondary) plastic as a share of total plastic production **will remain unchanged at around 6% by 2040**<sup>3</sup>.

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Reuse systems offer a credible, evidenced alternative but haven't received the investment needed to make them succeed at scale.

<sup>1</sup> Pew Charitable Trusts, "Breaking the Plastic Wave 2025"

<https://www.pew.org/en/research-and-analysis/reports/2025/12/breaking-the-plastic-wave-2025>

<sup>2</sup> Khaoula Houssini, Jinhui Li & Quanyin Tan, "Complexities of the global plastics supply chain revealed in a trade-linked material flow analysis" (2025), <https://www.nature.com/articles/s43247-025-02169-5>

<sup>3</sup> OECD, "Policy Scenarios for Eliminating Plastic Pollution by 2040" (2024),

[https://www.oecd.org/content/dam/oecd/en/publications/reports/2024/10/policy-scenarios-for-eliminating-plastic-pollution-by-2040\\_28eb9536/76400890-en.pdf](https://www.oecd.org/content/dam/oecd/en/publications/reports/2024/10/policy-scenarios-for-eliminating-plastic-pollution-by-2040_28eb9536/76400890-en.pdf)

# SCALE OF THE WORLD'S PLASTIC PROBLEM

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In 2022, 400 million tonnes of plastic were produced worldwide and 268 million tonnes of plastic waste created<sup>4</sup>.

Of that plastic waste, less than 28% was sorted and collected for recycling, of which just over half was recycled (or around 14% of plastic waste generated); 34% was incinerated; 39% sent to landfill; and the rest was mismanaged or traded<sup>5</sup>.

**As a percentage of total plastic production in 2022, the recycling rate was just 9%<sup>6</sup>, meaning 91% of the plastic produced does not make its way back to be used again.**

**We think this used-again figure should anchor conversations about plastic recycling, not collection rates or recyclability labels.**

In the US, the recycling rate is lower still. Analysis conducted by Greenpeace USA found that only 5–6% of plastic waste is recycled. That figure has fallen from 9.5% in 2014<sup>7</sup>.

Further, the OECD predicts that, without significant action, the share of recycled plastics in total plastic production will remain at around 6% by 2040<sup>8</sup>.

<sup>4</sup> Khaoula Houssini, Jinhui Li & Quanyin Tan, "Complexities of the global plastics supply chain revealed in a trade-linked material flow analysis" (2025), <https://www.nature.com/articles/s43247-025-02169-5>

<sup>5</sup> Khaoula Houssini, Jinhui Li & Quanyin Tan, "Complexities of the global plastics supply chain revealed in a trade-linked material flow analysis" (2025), <https://www.nature.com/articles/s43247-025-02169-5>

<sup>6</sup> Khaoula Houssini, Jinhui Li & Quanyin Tan, "Complexities of the global plastics supply chain revealed in a trade-linked material flow analysis" (2025), <https://www.nature.com/articles/s43247-025-02169-5>

<sup>7</sup> Greenpeace USA, "Merchants of Myth: new report exposes plastic recycling as costly failure" (2025), <https://www.greenpeace.org/usa/merchants-of-myth/>

<sup>8</sup> OECD, "Policy Scenarios for Eliminating Plastic Pollution by 2040" (2024), [https://www.oecd.org/content/dam/oecd/en/publications/reports/2024/10/policy-scenarios-for-eliminating-plastic-pollution-by-2040\\_28eb9536/76400890-en.pdf](https://www.oecd.org/content/dam/oecd/en/publications/reports/2024/10/policy-scenarios-for-eliminating-plastic-pollution-by-2040_28eb9536/76400890-en.pdf)

# COLLECTION FIGURES DON'T TELL THE FULL STORY

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Collection and recycling are not the same thing.

For example, the BBC points out that while Germany collects 99% of its plastic waste, just 39% of it is recycled<sup>9</sup>. Some 60% is rejected during the sorting process, because it is contaminated or too difficult to separate, and mostly incinerated.

**This does not reflect a lack of effort from households but rather how the system itself is failing.**

To understand why, it helps to look at how recycling became the default response to plastic waste in the first place, and whose interests it served.



<sup>9</sup> BBC, "How much of our plastic 'recycling' is actually recycled?" (2022), <https://www.bbc.co.uk/news/av/science-environment-62013030>

# HOW RECYCLING BECAME THE DEFAULT

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Recycling did not rise to prominence because it was the most effective solution to plastic waste.

It rose because it worked well for many of the parties involved and was well-promoted as a result:

- Documents reviewed by the Center for Climate Integrity show that plastics and petrochemical companies backed recycling as a strategy for over 50 years, while internally acknowledging significant doubts about its economic viability as far back as the late 1960s<sup>10</sup>.
- In 1992, the American Plastics Council noted privately that its own published target — recycling 25% of post-consumer plastic bottles and containers by 1995 — would be hard to reach, because *"the value of the product is lower than the cost to produce"*<sup>11</sup>.

Despite these misgivings, support for recycling continued. A resin identification code, using the original chasing arrows symbol designed in 1970 with an added number from one to seven, was introduced in the 1980s by the Society of the Plastics Industry, a representative of plastic manufacturers. The official reason for adopting the symbol was to make it easier to sort plastic at recycling facilities but investigative reporters argue that the symbols were more likely a public relations move to give the impression each type of plastic was recyclable.

## Center for Climate Integrity:

*"Underpinning this plastic waste crisis is a decades-long campaign of fraud and deception about the recyclability of plastics"*

<sup>10</sup> Centre for Climate Integrity, *"The Fraud of Plastic Recycling"* (2024), <https://www.climateintegrity.org/uploads/media/Fraud-of-Plastic-Recycling-2024.pdf>

<sup>11</sup> Centre for Climate Integrity, *"The Fraud of Plastic Recycling"* (2024), <https://www.climateintegrity.org/uploads/media/Fraud-of-Plastic-Recycling-2024.pdf>

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A ProPublica investigation found that the plastics industry successfully lobbied 39 US states to require its use, including on products for which no viable recycling infrastructure existed. State regulators warned at the time that the symbol would lead consumers to overestimate how much plastic packaging could be recycled<sup>12</sup>.

**The labelling requirements were brought into law all the same.**

Brands displayed the arrows and households sorted their waste accordingly. Governments measured collection volumes, not plastic recovery rates. Today, much of what households sort for collection is never actually recycled. The chasing arrows suggest a product could be recycled, but nothing about whether it would be.



<sup>12</sup> ProPublica investigation into plastic recycling symbols  
[www.propublica.org/article/plastics-industry-redefine-recyclable-ftc-grocery-bags](http://www.propublica.org/article/plastics-industry-redefine-recyclable-ftc-grocery-bags)

# IT'S LABELLED 'RECYCLABLE', BUT IS IT RECYCLED?

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'Recyclability' has been adopted as a core metric in corporate sustainability targets and embedded in the goals of plastic circularity frameworks.

**For many products, the label 'recyclable' provides reassurance to consumers, cover for brands and a basis for policy claims – without a realistic prospect of the material ever being recycled and recovered.**

The result is not a labelling shortfall, but misdirection.

For many plastics officially designated as recyclable, there is limited collection infrastructure, inadequate sorting and reprocessing capacity.

This means that even as collection rates grow, recycling outcomes are unlikely to improve. Collection without stable sorting and recycling capacity leads to stockpiling, export, landfilling, incineration, low-value downcycling or dispersal into the environment.

Let's look at the supermarket soft plastic takeback scheme, now a familiar feature many retail environments.

The Environmental Investigation Agency UK tracked soft plastics through these schemes and found that none were closed-loop recycled. Around 70% of bags reaching a known destination were incinerated; the rest were downcycled, mostly overseas<sup>13</sup>.

These schemes offer consumers convenience and perhaps peace of mind, but the evidence suggests they currently work more as brand-reputation tools than as working recovery systems.

## **Center for Climate Integrity:**

*"The plastics industry continues to mislead the public and policymakers by conflating the words "recyclable" and "recoverable" in its advertising campaigns and stated goals."*

<sup>13</sup> Environmental Investigation Agency, UK soft plastics takeback  
<https://eia-international.org/report/the-hard-truth-about-soft-plastic/>

# INFRASTRUCTURE CONSTRAINTS

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Many countries face significant plastic recycling capacity constraints, but the US offers a well-documented example.

Greenpeace USA's 2020 survey found there were only two viable plastic recycling markets in the US: PET #1 bottles and HDPE #2 bottles and jugs, and when taking into account product collection, sortation and reprocessing capacity, *"only PET #1 and HDPE #2 plastic bottles and jugs (without harmful shrink sleeves) can legitimately be claimed or labeled as recyclable"*<sup>14</sup>.

By 2025, the situation had worsened. In an update to its 2020 findings, Greenpeace's 2025 report<sup>15</sup> found that US capacity could handle just 21% of PET#1 bottle waste generated in the country, with just 21 plants in commercial operation. It was a similar picture for HDPE#2 containers and packaging waste. Even the two most effective plastic recycling markets in the US can handle only slightly more than a fifth of the waste generated.

When recyclability labels misrepresent real-world recovery rates, it distorts consumer behaviour, corporate investment and reporting and policy design. In the long run, it makes progress more difficult to achieve.

## Economic barriers

Virgin plastic is typically cheaper than recycled plastic because it's usually cheaper to make. It's also of higher quality.

The Center for Climate Integrity concludes that, for most plastics, recycling is not only technically difficult but also economically unviable under current market conditions<sup>16</sup>. Analysis by researchers at Tsinghua University identifies quality and cost issues as a systemic structural barrier<sup>17</sup>.

In this context, it is hard for companies to commit to using recycled plastic.

<sup>14</sup> Greenpeace USA, "Circular Claims Fall Flat: Comprehensive U.S. Survey of Plastics Recyclability" (2020), <https://storage.googleapis.com/planet4-usa-stateless/2024/12/c1efba9a-greenpeace-report-circular-claims-fall-flat.pdf>

<sup>15</sup> Greenpeace USA, "Plastic Merchants of Myth: Circular Claims Fall Flat" (2020), <https://www.greenpeace.org/static/planet4-usa-stateless/2025/12/b05908fc-plastic-merchants-of-myth.pdf>

<sup>16</sup> Center for Climate Integrity, "The Fraud of Plastic Recycling" (2024), <https://climateintegrity.org/uploads/media/Fraud-of-Plastic-Recycling2024climateintegrity.org/uploads/media/Fraud-of-Plastic-Recycling-2024>

<sup>17</sup> Khaoula Houssini, Jinhui Li & Quanyin Tan, "Complexities of the global plastics supply chain revealed in a trade-linked material flow analysis" (2025), <https://www.nature.com/articles/s43247-025-02169-5>

# WHEN DOMESTIC PROCESSING SYSTEMS **REACH CAPACITY**

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When domestic recycling infrastructure cannot absorb the volume of plastic waste being collected, that waste goes to landfill, gets incinerated or is exported.

China was once a primary importer of this waste but its 2017 ban on imported waste, followed by similar measures from Malaysia and others, drove waste shipments to other countries.

Greenpeace UK<sup>18</sup> and The Guardian<sup>19</sup> both reported on the UK's continued export of large volumes of plastic waste to countries including Indonesia, Malaysia and Turkey.

And waste exported from wealthier countries typically ends up in countries less likely to manage the waste in an environmentally sound manner.



<sup>18</sup> Greenpeace UK, Trashed: How the UK Is Still Dumping Plastic Waste on the Rest of the World (2024), [www.greenpeace.org.uk/wp-content/uploads/2024/07/Trashed-Greenpeace-plastics-report-final.pdf](http://www.greenpeace.org.uk/wp-content/uploads/2024/07/Trashed-Greenpeace-plastics-report-final.pdf)

<sup>19</sup> The Guardian, 8 October 2025, "UK plastic waste exports to developing countries rose 84% in a year, data shows", [www.theguardian.com/environment/2025/oct/08/uk-plastic-waste-exports-to-developing-countries-rose-84-in-a-year-data-shows](http://www.theguardian.com/environment/2025/oct/08/uk-plastic-waste-exports-to-developing-countries-rose-84-in-a-year-data-shows)

# CONSEQUENCES FOR CORPORATE CREDIBILITY

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As evidence about the limitations of plastic recycling rise, investors and consumers rightly question the value of making packaging recyclable when most still goes to landfill or incineration, or gets exported to countries with laxer environmental standards.

Companies that built sustainability strategies on recyclability face a credibility problem, as do NGOs that promote these measures.

Into this mix, a new offered solution is emerging: chemical recycling, also called advanced recycling.

The appeal is understandable, but the evidence for its effectiveness at scale is limited – see sidebar on next page.



# ADVANCED RECYCLING

The Center for Climate Integrity devotes a 50-page report to what it calls *“the fraud of advanced recycling”* and the plastics industry’s *“most recent deception...to continue producing ever-greater amounts of new plastics.”* It highlights five *“deceptive claims”* by arguing that advanced recycling: is not a new or groundbreaking technology, but just a rebrand of chemical recycling; is not scaling up in line with industry commitments but “flounder as a result of predictable issues”; does not address the problem of hard-to-recycle mixed plastics; is not environmentally friendly; and does not meaningfully enable a circular economy but enables companies to support circularity claims with *“an inherently deceptive mass balance attribution scheme”* that means products with little or no recycled content can still be called *“circular”* or *“recycled”*.

The same report cites research by researchers at the National Renewable Energy Laboratory that only 1-14% of plastic waste processed via pyrolysis or gasification could become new plastic feedstocks.

A 2023 report by Beyond Plastics and IPEN said 11 advanced plastic recycling facilities had been constructed in the US but even at full capacity could process less than 1.3% of the 35.7 million tons of discarded plastic generated in the US each year, and most were operating below their rated capacity.

The waste management sector is also growing sceptical about advanced recycling with industry leaders concerned that they risk being held responsible for a technical failure not of their making, as the gap between the promotional claims and delivered outcomes continues to widen.

Advanced recycling may well have a role to play eventually but based on the evidence, it looks like a complement to a broader system change, not a substitute for one.

## Sources:

- Center for Climate Integrity, *“The Fraud of Advanced Recycling”* (2025), <https://climateintegrity.org/uploads/media/Fraud-of-Advanced-Recycling-2025.pdf>
- Beyond Plastics / IPEN, *“Chemical Recycling: A Dangerous Deception”* (2023), [www.stoppoisonplastic.org/blog/chemical-recycling-dangerous-deception/](http://www.stoppoisonplastic.org/blog/chemical-recycling-dangerous-deception/)

# AN OVERLOOKED OPTION: REUSE, THE ALTERNATIVE THAT CAN WORK

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Here's where it gets more hopeful. Rather than concentrating effort on plastic recycling — with its demonstrably poor outcomes — the evidence and a groundswell of opinion points toward a different approach: one that addresses the problem earlier in the supply chain, before waste is generated.

Reuse systems keep material circulating by using packaging over and over. It's a simple but powerful solution and data on its potential is compelling.

The Pew Charitable Trust's *Breaking the Plastic Wave 2025*<sup>20</sup> found that its "System Transformation" scenario, featuring *"ambitious, complementary actions using existing solutions"*, could reduce annual plastic pollution by 83% by 2040, and that pollution from plastic packaging, which represents the largest plastic waste source, could be almost eradicated by 2040, with reuse accounting for two-thirds of the 97% decrease.

A 2023 Ellen MacArthur Foundation study into business-to-customer returnable packaging found that alongside environmental benefits — reduced emissions, water consumption and material use — there is potential for impactful cost savings once reuse systems reach scale<sup>21</sup>.

Barriers to reuse are not primarily technical and, in the long run, are not primarily financial. They are systemic. Reuse requires changes to product design, logistics, policy incentives and consumer habits, all of which can be addressed with sufficient investment and resources.

There are numerous examples around the world of startups and innovations successfully breaking down the barriers, but addressing the kind of challenge reuse faces requires coordinated action.

<sup>20</sup> Pew Charitable Trusts, *"Breaking the Plastic Wave 2025"*  
<https://www.pew.org/en/research-and-analysis/reports/2025/12/breaking-the-plastic-wave-2025>

<sup>21</sup> Ellen MacArthur Foundation, *"Unlocking a reuse revolution: scaling returnable packaging"* (2023)  
<https://content.ellenmacarthurfoundation.org/m/791a4013fead211e/original/Unlocking-a-reuse-revolution-Scaling-Returnable-Packaging.pdf>

# THE PATH FORWARD

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The 18 reports are clear that we need a new path.

The OECD's 2024 modelling<sup>22</sup> shows that recycling alone cannot carry the burden, and the most cost-effective path to eliminating plastic pollution combines production and demand curbs with design for circularity, including reuse.

The 2025 failure of the INC Plastic Treaty negotiators to reach agreement means there is no overarching policy, but until there is, there are changes we can make.

Regions, nations and municipalities can pass their own supportive policy and regulation. Companies can acknowledge the limits of 'recyclable' claims and push on by investing in promising solutions and business models.

Consumers have a role to play too. Increasingly sceptical of recycling claims, they can help drive the transition through the choices they make and by contributing to the call for change.

And investors and financial institutions should look beyond recyclable packaging claims as cover for sustainability and realise the shift to reuse is not just an environmental imperative but also a commercial opportunity.

It's time we all – corporations, policy makers, consumers and investors – moved ***"Beyond The Bin"***.



<sup>22</sup> OECD, "Policy Scenarios for Eliminating Plastic Pollution by 2040" (2024)  
[https://www.oecd.org/content/dam/oecd/en/publications/reports/2024/10/policy-scenarios-for-eliminating-plastic-pollution-by-2040\\_28eb9536/76400890-en.pdf](https://www.oecd.org/content/dam/oecd/en/publications/reports/2024/10/policy-scenarios-for-eliminating-plastic-pollution-by-2040_28eb9536/76400890-en.pdf)

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