The materials ecosystem

Unlocking the value of waste

How connected systems and people are helping plastic waste reach its full potential

CHAPTER 3

Finding value in waste: Signs of progress in waste collection and recycling

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Modern sorting plants apply several technologies adapted to specific waste streams—ranging from enhanced optical sorting technologies to advanced solutions, such as the use of digital watermarks and artificial intelligence.

Global tailwinds are enabling circular plastic supply chains. Momentum stems from corporate commitments to sustainable packaging, global policies that support a circular economy, the negotiation of an international legally binding instrument for tackling the plastic pollution crisis and investments in disruptive innovations.

Circulate Capital, a Dow partner, reports that the amount of capital infused into private equity firms that invest in circular economy solutions, such as Closed Loop Partners and Lombard Odier, has increased fivefold since 2020.[12]

We're witnessing first-hand how barriers to transforming waste are being broken down through technology, and the value of recycled materials is increasing.

Alongside this positive momentum, we also recognize a major challenge: Plastic waste is in large supply — but it is not being accessed. The gap between downstream demand for circular plastics and available supply is significant.

While the materials ecosystem is a global construct, the actual "systems" that tap into that supply, before transforming it for new products and packaging, are highly localized.

The local players in waste management, recycling, design and manufacturing are essential to waste reaching its full value potential through local recycling options, infrastructure, education and incentives.

The most recent technological advancements to transform waste focus increasingly on local collection and recycling of a larger variety of materials. As technology and recycling infrastructure improve worldwide, "wish cycling" lessens over time and consumers can more freely place items like flexible and film packaging into their bins.

Here, we examine examples of how the public's good intentions and recycling capacity connect and how global organizations are improving recycling as a key part of materials-management efforts.

Connections:

Recycling success hinges on improving local access and behavior

Recycling is often cited as the most common action taken to help the environment. Data shows people want to recycle. The Recycling Partnership (The Partnership) notes in recent research that 80% of U.S. residents see recycling as having a positive impact.[13] According to the United Nations Environment Programme, over the last several decades, recycling rates in high-income countries have continued to increase.[14]

Even so, about two-thirds of household recyclables — 32 million tons of recyclable paper, glass bottles, plastic containers and more — end up incinerated or in landfills every year in the U.S. alone.[13] According to The Partnership, many are confused about what and how to recycle, and that lack of confidence in themselves, labels, or the ultimate impacts, has grown into a lack of confidence in the recycling system. As shared in The Partnership's 2023 Knowledge Report, even if every American had curbside recycling, we know that over half of all residential materials would still be lost to landfills and one of the main reasons for that is behavior — not access.[15]

Improving household recycling requires understanding what drives behavior and creating conditions that support the recycling behavior we seek. Dow's environmental nonprofit partners — including The Partnership, the Alliance to End Plastic Waste (the Alliance) and Delterra — are demonstrating that behavior change is possible.

"The moment of truth for changing recycling behavior is in the kitchen," says Cecilia Sluga of Delterra, about the residents Delterra works with in Argentina. Delterra is an independent environmental nonprofit tackling broken recycling systems in the global South.

Delterra has learned that what works in one community may not work in another. They've built their knowledge base at a grassroots level by going door to door, kitchen to kitchen. In Olavarria, Argentina, Delterra seeks to appeal to the city's identity and collective pragmatism.[16] To generate support, they invite the community to learn about the new industrial processes and how the recycling system works.

Delterra's approach incorporates the supply side through community-owned, self-sustaining waste management systems that produce a reliable stream of high-value recyclables — and the demand side by working with corporate players to build aggregation, traceability and logistics solutions.

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Mr. Green Africa drives positive change

A strong example of communities creating unique programs and localized infrastructures can be found in Mr. Green Africa, the first recycling company to be a Certified B Corporation on the African continent. Leveraging incentives to stimulate awareness and participation, Mr. Green Africa's trading points are scattered across Nairobi, where deposited plastic waste is exchanged for cash or Green Points that may be used to purchase daily goods and supplies. Here, part of the economic fabric depends upon residents earning income for their recycling efforts. Collected materials are turned into recyclates and sold to meet the rising demand for recycled plastic feedstock: high-quality PCR (post-consumer recyclates).

Influences:

Technology driving change and efficiencies

Globally, less than 10% of the plastic used around the world is recycled, according to a 2022 report by Organization for Economic Co-Operation and Development — with most of the remaining 90% being incinerated or ending up in landfills.[17] There are many reasons for this low recycling rate, which have been discussed earlier, including infrastructure — but the technology available to recycle plastics is no longer one of those reasons. The industry has invested $17 billion so far in new recycling technologies and investments to deliver circularity.[18] One accelerator we see is digital tools to track, trace and provide more transparency in the circular supply chain.

To fully realize the value and impact of technology on recycling, the industry needs to lean into non-traditional partners in the materials ecosystem, such as BanQu, a supply chain compliance software developer. Through the adoption of BanQu offerings, companies can trace the lifecycle of their products, from raw materials to disposal, making it easier to mark areas for improvement and recycling optimization. Other non-traditional partners, such as Empower and Recykal, are using technology and innovative solutions to help transform material waste into circular solutions.

What's more, the BanQu solution creates a traceable, transparent and equitable supply chain that helps waste pickers be paid for the value of waste they collect. BanQu CEO Ashish Gadnis recently shared his view on the value of waste pickers, recyclers, and smallholder farmers at the 2023 Fast Company Innovation Festival, sponsored by Dow.

Partners such as the Alliance understand the critical importance of harnessing technology such as artificial intelligence to process and analyze large volumes of data rapidly and with great accuracy, significantly improving the efficiency of waste sorting and collection. Recognizing the sheer scale of this global challenge, the Alliance has been championing significant investments in developing and deploying cutting-edge solutions to make a tangible difference in waste collection and recycling. Furthermore, the Alliance promotes collaboration among industry leaders, innovators and governments to accelerate technology implementation.

Gaps:

Infrastructure challenges create opportunities for collaboration and new economic models

Government intervention plays a crucial role in propelling large-scale implementation of successful waste management models. This critical support can enable countries to improve waste management at a scale that increases the volume of waste entering the recycling channels rather than being consigned to landfills, incineration or even worse scenarios, such as open burning, leakage or dumping.

In some communities, the entrepreneurial spirit of citizen waste pickers has filled a gap left by the absence of government-funded programs. Non-governmental organizations (NGOs) are supporting these efforts with seed investments. One example is in São Paulo, Brazil, where Boomera, a Dow partner, invests in waste-picking cooperatives. Boomera provides cooperatives and their employees with training, equipment, administrative support and more. Their efforts have prevented plastics from going to landfills and have helped develop a strong, efficient circular economy.[19]

In many developing countries, private investments and funding from companies like Circulate Capital allow an increased focus on improving waste and recycling infrastructure. In India, this support enabled Dow and its collaborators to develop a new polyethylene film solution using post-consumer recycled plastics, introducing a closed-loop solution for packaging in the region.

Key takeaways

- New and emerging technologies are becoming increasingly important in addressing the inefficiencies and limitations in the plastic recycling industry.
- Collaborative efforts led by organizations like the Alliance are crucial for promoting the adoption of innovative technologies in tackling global plastic waste challenges.
- By prioritizing investments in technological recycling innovations, stakeholders can better align economic viability with environmental sustainability, helping realize the vision of a waste-free world.

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WM & Dow improve residential recycling through pilot learnings

Dow and WM announced the launch of a bold new collaboration in 2022 to improve residential recycling for plastic films by allowing consumers in select markets to recycle these materials directly in their curbside recycling. According to The Recycling Partnership, currently, only 1.9% of U.S. households have access to curbside plastic film recycling, the plastic material with the lowest overall recycling rate.

The initiative will enable consumers in pilot cities to recycle film plastics like bread bags, cling wrap and dry-cleaning bags directly in curbside recycling. Once operating at full capacity, the program is expected to divert more than 120,000 metric tons (MT) of plastic film from landfills annually. Through our pilot, we are adapting to what we learn. This pilot tested how consumers can be supported to recycle film, whether they do recycle film, the quality of that material, and how it reacts to processing. The good news: we learned that consumers did recycle films when guided on what they could put into their bins. We also learned this material did process into film bales, but we see that the quality needs to improve significantly for the end-market specifications. Together, we are working on more adjustments and innovation to improve in this area.

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