



The Circular Shift

Four Key Drivers of
Circularity in North America

A CLOSED LOOP PARTNERS REPORT

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The Four Key Drivers of the Circular Economy in North America



INVESTMENT

Capital flows spur innovation and growth to advance the transition to circularity



INNOVATION

New materials, technologies and delivery models support and enhance circular systems



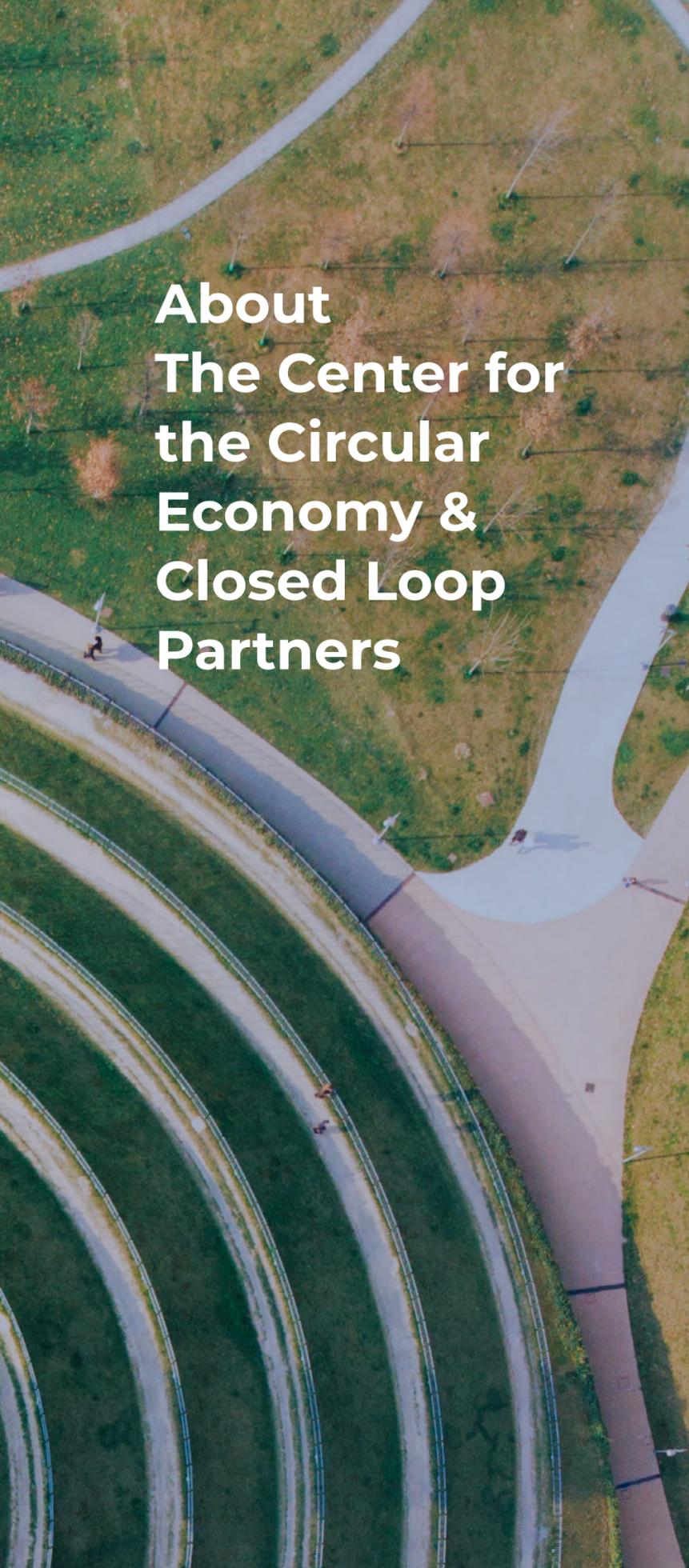
POLICY

Legislations ensure circularity, inclusivity and resiliency across cities and states



PARTNERSHIP

Collaborations align interests across multiple stakeholders and create system-wide change



**About
The Center for
the Circular
Economy &
Closed Loop
Partners**

The Center for the Circular Economy at Closed Loop Partners is an innovation center for research, analysis and collaboration to accelerate the transition to a circular economy in which materials are shared, re-used and continuously cycled.

The Center specializes in convening brands and industries to solve seemingly intractable material challenges, harnessing design, innovation and the power of collaboration to reimagine products and packaging for sustainable impact at scale, creating the systems change necessary for the advancement of the circular economy. The Center take a holistic approach to innovating, testing and scaling the circular solutions of the future, evaluating the full lifecycle of a product.

The Center's work builds on Closed Loop Partners' successful investment track record, spanning sectors including plastics and packaging, technology, food and agriculture and fashion. Closed Loop Partners is a New York-based investment firm comprised of venture capital, growth equity, private equity and project finance.

Foreword



In light of major global events transforming the way business operates today, from climate change to a global pandemic, building economic, social and environmental resilience into our supply chains is critical. These events have laid bare the limitations of the status quo—the take-make-waste economy—in which opaque supply chains and the continued depletion of finite natural resources result in significant costs to people, the planet and business.

The clock is ticking on our current linear economic system and the circular economy offers a solution: a robust framework that aligns the interests of shareholders, corporations, local communities and the environment. It reconsiders how products are designed, manufactured, sold, refurbished and recycled, and is underpinned by core principles of resource efficiency, inclusiveness and resilience. This circularity, when integrated throughout our systems, will be essential to reducing greenhouse gas emissions and addressing climate change.

Elements of the circular economy have existed within North America for centuries, under different names: indigenous stewardship, industrial ecology, recycling, environmental justice, remanufacturing, and more. At Closed Loop Partners, we seek

to build on this knowledge and draw on our experience as researchers, operators and investors in the circular economy to delve into the Four Key Drivers of the Circular Economy in North America, exploring how innovation, investment, policy and above all partnership act as key enablers of the new economic model.

To reach fast-approaching climate goals, now is the time to galvanize efforts and accelerate impact. And, as we share in the pages that follow, there is already a great deal of momentum and activity. Changing consumer preferences, increasing demands for better outcomes for local communities, and regulatory pressures provide momentum, while cutting edge sustainable innovations and growing investment opportunities provide a path forward. Unprecedented collaboration is now needed to catalyze inclusive approaches to systems change that shift us toward a better, more circular economy.

A handwritten signature in black ink that reads "Kate Daly". The signature is fluid and cursive.

Kate Daly, Managing Director, Center for the Circular Economy, Closed Loop Partners

Introduction

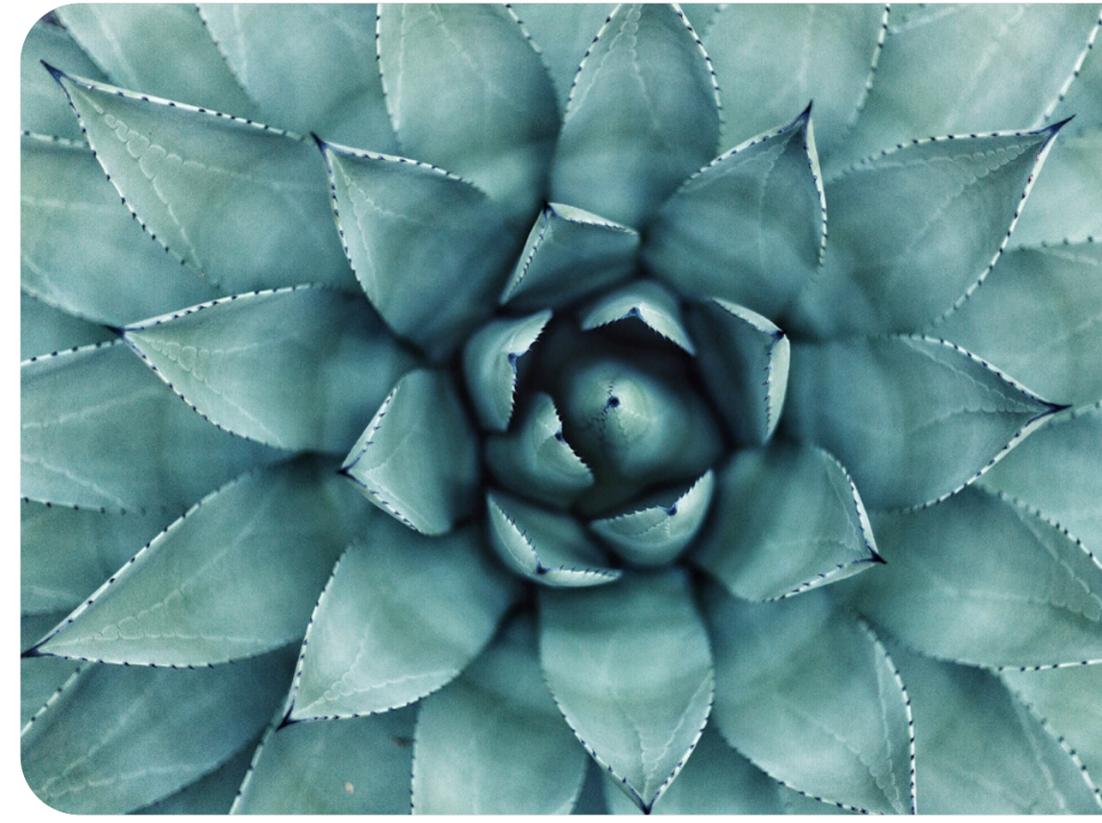
What is the Circular Economy?

Put simply, the circular economy¹ eliminates the concept of waste and makes the most of materials that are already in play, much like natural systems in which nutrients are continually cycled. Resource efficiency, and the resulting opportunities for savings and profit, is at its core.

The circular economy rethinks our systems to make them more connected, and therefore more resilient—less exposed to the uncertainties that come with climate change, less reliant on the exhaustive extraction of new raw materials, and less harmful to communities disproportionately affected by waste disposal.

It aims to solve system-wide challenges through holistic solutions, recognizing that there is no panacea that will effect systems change. It relies on a number of strategies, some old and some new, that extend the lifespan of products and eliminate waste through reusing, recycling, renting, remanufacturing, refilling and

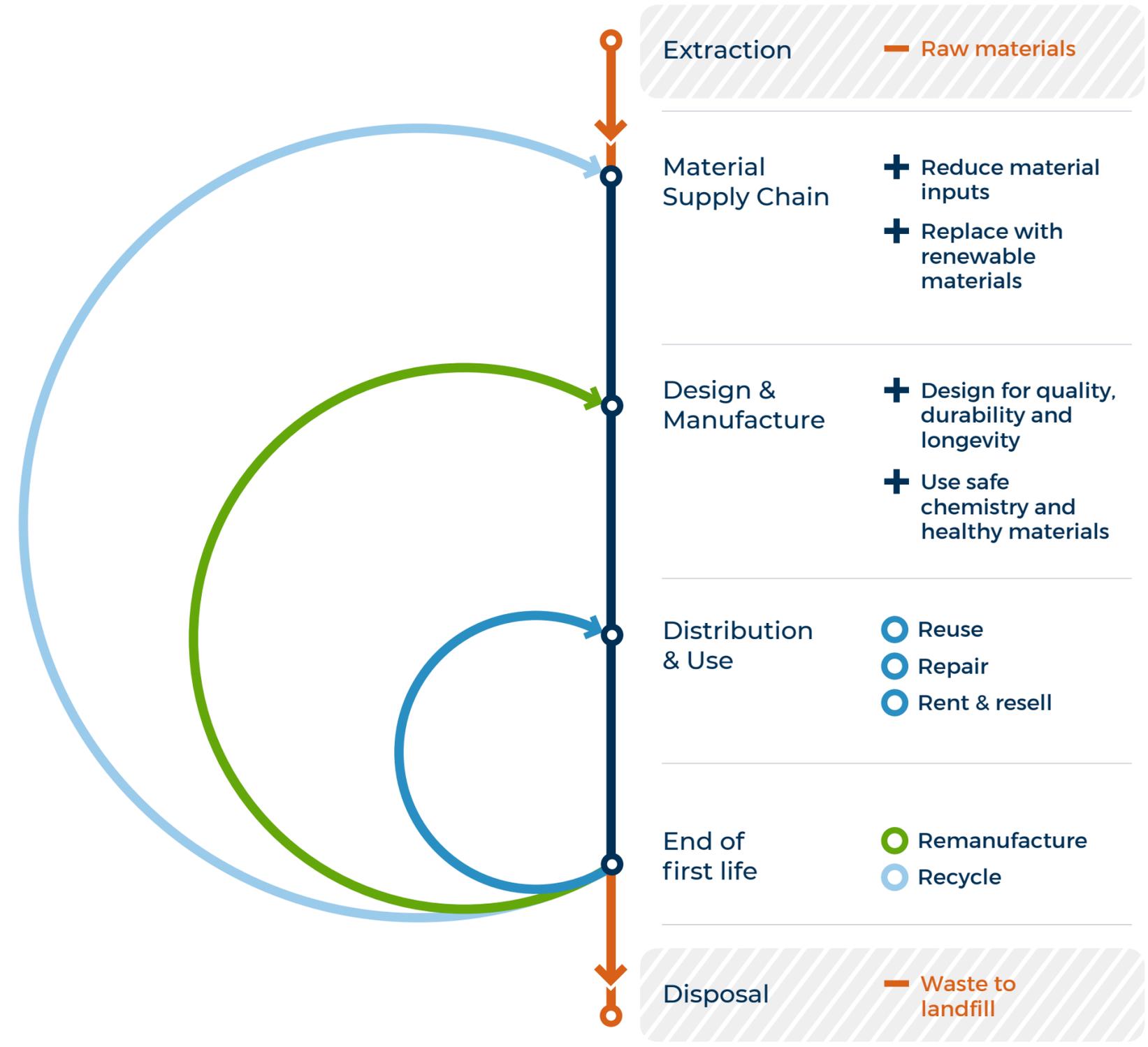
redesigning products and materials. This shift in thinking impacts every part of the value chain and creates a framework for global corporations, startups, governments and cities to reimagine capitalism in order to reduce costs, increase efficiency and protect the environment we share.



¹ Throughout the report, the circular economy is also referred to as 'circularity' or 'circular systems.'

Introduction

The Circular Economy in Action



Introduction

If You're Tackling Climate Change, You're Part of the Circular Economy

3 Ways the Circular Economy Helps Fight Climate Change:

Targets reduction of 66% of GHG emissions from materials

An estimated two thirds of greenhouse gas emissions are released during the extraction, processing, and manufacturing of goods.¹ In a circular economy, we rethink how we produce goods through innovative design and reuse, continuously cycling materials and reducing greenhouse gas emissions. The circular economy is tied to decarbonization and dematerialization.

Provides a holistic framework to address the complex challenge

Tackling climate change goes beyond rethinking our energy systems. While the circular economy is powered by renewable energy, it also focuses on reworking the fundamental flow of materials in our economy. This touches every sector, industry, and person, cutting across all parts of the economy, therefore creating a coherent and holistic framework that can help to achieve complex climate goals.

Mitigates risk by embedding resilience into supply chains

The circular economy incorporates a broad range of stakeholders—people, planet and business. This stakeholder engagement enhances communication channels, creates transparency, and builds resiliency to quickly adapt to changing circumstances.

Closed Loop Partners' Work Contributes to the Following United Nations Sustainable Development Goals:



CHAPTER ONE

Market Forces Advancing the Transition to Circularity

CHAPTER ONE

Market Forces Advancing the Transition to Circularity

Investment is the necessary driver for accelerating the circular economy, encouraging innovation and enabling transformative companies to bring their solutions to scale.

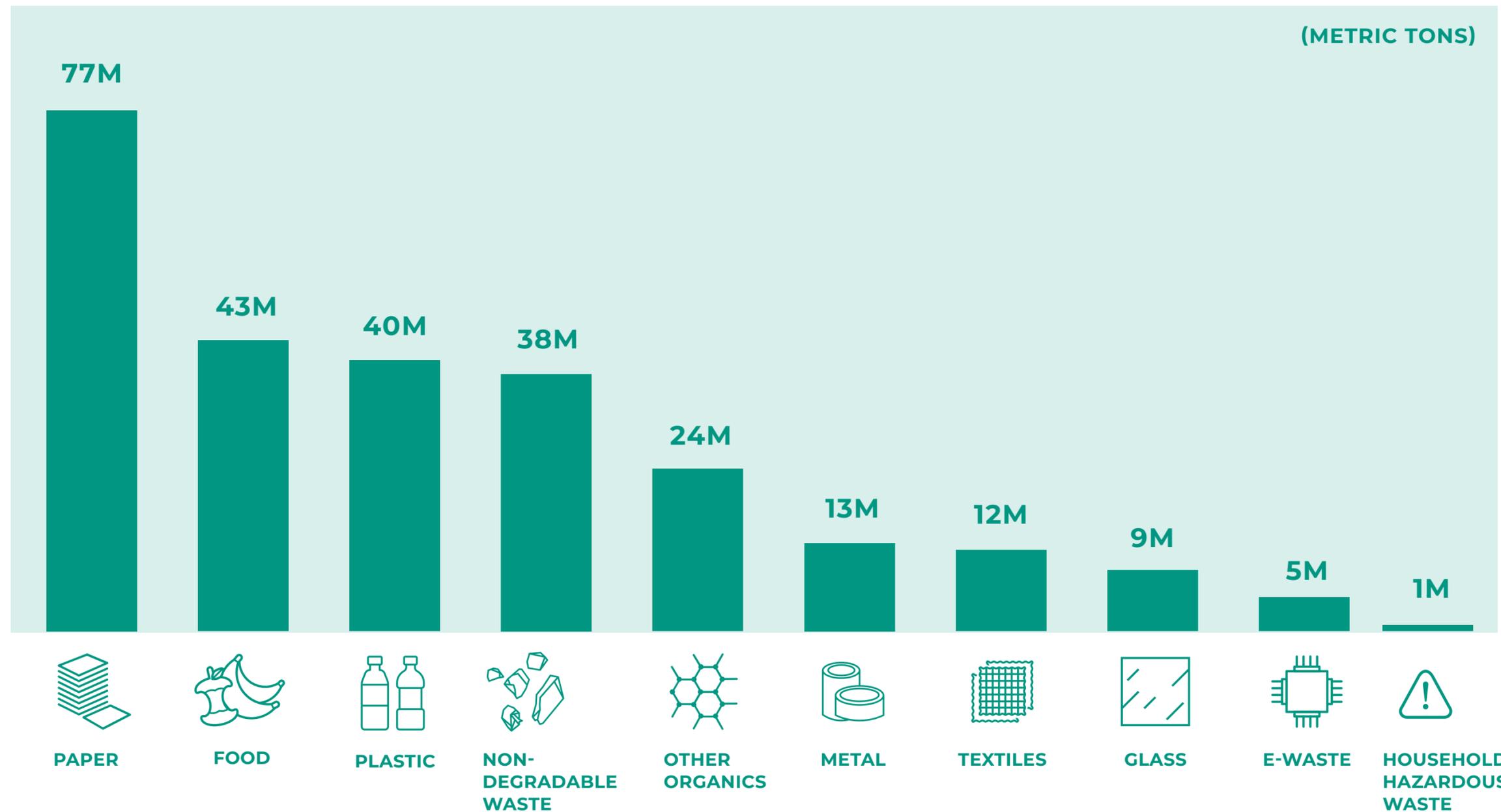
The need for funding spans every stage of the value chain despite growing investment; from early stage companies redesigning waste-free products to more established and capital intensive infrastructure investments, for example recycling facilities. Each sector, industry and company has unique needs and requires flexible capital structures.

Circularity doesn't mean sacrificing profits. The market is increasingly rewarding sustainability, in revenues and share prices. Last year, we learned from Unilever that their Sustainable Living Brands grew 69% faster than the rest of their business in 2018.² And the trend isn't unique to Unilever. From 2013-2018, sustainably-marketed products grew 5.6x times faster than conventionally marketed products.³ From a capital markets perspective, through November 2019, 48% of sustainability-focused large-cap public equity funds had outperformed the S&P YTD, compared with 26% of regular large-cap funds.⁴ And open-ended and exchange traded sustainable funds available to U.S. investors enjoyed net inflows of just over \$20 billion, up nearly 400% from 2018.⁵ While the circular economy remains a subset of thematic Environmental, Social & Governance (ESG) investing, there are a number of market forces driving increasing inflows of capital:

- Consumer Demand
- Procurement Power
- Profitability

Why Are We Throwing Money Away?

Under the current linear take-make-waste economy, we throw **\$10 billion** worth of materials into landfills across the United States.⁶



A circular economy keeps valuable materials out of landfills and in manufacturing supply chains, representing significant economic opportunities

CHAPTER ONE

Market Forces Advancing the Transition to Circularity

► Consumer Demand

Procurement Power

Profitability

Consumer Demand

Consumers are demanding sustainable change, in turn creating business opportunity. Whether it's driven by the plastic straw lodged in a sea turtle's beak, or the plastic bag choking wildlife, there is a growing consensus among consumers that we've reached a tipping point. The power of social media and the press have helped to propel subjects like plastic pollution to the front page of the news. Not only do consumers now expect companies to step up to address global environmental challenges, but they are actively voting with their wallets. Many will pay more for products and services that come from

companies who are committed to positive social and environmental impact. In fact, studies have shown that a broad cross-section of consumers, especially those shopping at grocery and convenience stores, are open to reuse models and have indicated that they prefer not to be given a single-use bag in stores. While the intention-action gap for consumers is oftentimes cited, extensive research by NYU Stern's Center for Sustainable Business proves otherwise; in more than 90% of CPG categories, sustainability-marketed products grew faster than their conventional counterparts.⁷

How Waste & Sustainability Became Top Of Mind For Consumers Key Drivers Propelling Shifting Sentiment



CHAPTER ONE

Market Forces Advancing the Transition to Circularity

Consumer Demand

► **Procurement Power**

Profitability

Procurement Power

In the U.S. large corporations are increasingly exercising their procurement power and driving demand for circular systems and materials, sending a strong and important market signal. Others with significant purchasing power, including governments, universities, and hospitals, must follow suit to further move the needle.

Our report on [Accelerating Circular Supply Chains for Plastics](#) found that 37 of the world's largest consumer brands and retailers, have made public commitments to use recycled plastics in their packaging within the next 10 years, signaling the opportunity to shift billions of dollars from the “take, make, waste” linear supply chain to circular supply chains. This burgeoning area of circular procurement is one of the signs of real shifts. Procurement doesn't generally reward change - procurement leaders are rewarded on scale and low cost. Seeing this sector begin to change is a sign that this movement is taking a hold.

Together, collective demand can create the pull through the system, aligning incentives across the entire value chain as suppliers and manufacturers cater to growing desires.

Bridging the Gap Supply & Demand for Recycled Plastics

Recycled plastic demand will outpace recycled plastic supply by 5 million tons in 2030⁸

For corporations to meet their ambitious sustainability commitments, and recapture the value of materials in their products, the plain facts of recycling infrastructure must be broached. This is the critical mechanism by which we capture and return valuable recyclables to manufacturing supply chains. To date, recycling infrastructure has been woefully underfunded across the United States, leaving behind an outdated and inefficient system. While our waste stream continues to evolve rapidly, with new types of packaging and textiles entering the fold, our recovery infrastructure hasn't kept up.

For corporations' commitments to translate from lofty to achievable, action must be taken.

“37 of the world’s largest consumer brands and retailers have made public commitments to use recycled plastics in their packaging within the next 10 years”

CHAPTER ONE

Market Forces Advancing the Transition to Circularity

Consumer Demand

► **Procurement Power**

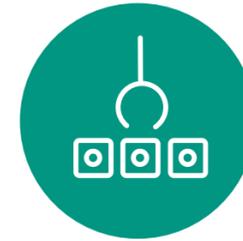
Profitability

Investing Across the Recycling Value Chain to Recapture Materials



Collection

With only 59% of the U.S. able to access curbside recycling⁹, many are left in recycling deserts. Investing in increased access to recycling via more carts at the curb, more collection trucks on the road, and improved education on the dos and don'ts of recycling will result in greater collection volumes.



Sortation

Upgrading recycling facilities with state-of-the-art technology and equipment, including optical sorters, new belt configurations and AI-backed robotic arms will increase the efficiency of separating and sorting recyclables.



Manufacturing

Using recyclables as the food for manufacturing supply chains for new products and packaging is critical. To encourage this, moving from spot market purchases to long-term purchase orders and multi-year contracts when buying recyclables will help to build enduring markets, enabling investment in the system to deliver higher quality outputs.

CHAPTER ONE

Market Forces Advancing the Transition to Circularity

Consumer Demand
Procurement Power

► **Profitability**

Profitability

Growing returns, alongside an increased understanding of the business risks posed by climate change, are attracting investors. Business-as-usual is no longer viable when faced with urgent issues like resource scarcity, increasingly volatile supply chains, shareholder activism and shifting consumer preferences.

Fortunately, the tide is now starting to turn and we are witnessing some of the world's largest institutional investors wake up to the risks of inaction. Larry Fink, CEO of BlackRock, the world's largest asset management company, set the tone for more sustainable investment priorities in his annual letter on corporate governance in 2020. In this, he makes clear that sustainable investments are not a nice to have, but a need to have, sending an important signal to the business community with reverberating effects. BlackRock recently entered our sector with a dedicated public equity circular economy fund, investing in companies committed to circular systems through their products, supply chains and business footprints. As of September 2020, holdings included Microsoft, Nike, Nestlé, and Ball Corp.¹⁰

Investors see sustainability as the top investment theme of the next decade. Environmental, Social & Governance (ESG) investing has been one of the fastest growing investment strategies. There will be an estimated \$20 trillion in asset inflows into ESG funds over the next two decades.¹¹ The demand for responsible investment is driving sustainable bond issuance too, with \$130.9 billion worth of sustainable bonds issued globally during the second quarter of 2020, more than doubling the value recorded during the previous quarter.¹² Mergers and acquisitions involving sustainable companies are also on the uptick, totalling \$14.1 billion during the first half of 2020, representing a two-year high.¹³

There will be an estimated \$20 trillion in asset inflows into ESG funds over the next two decades.

CHAPTER TWO

Innovations Enabling Circular Systems

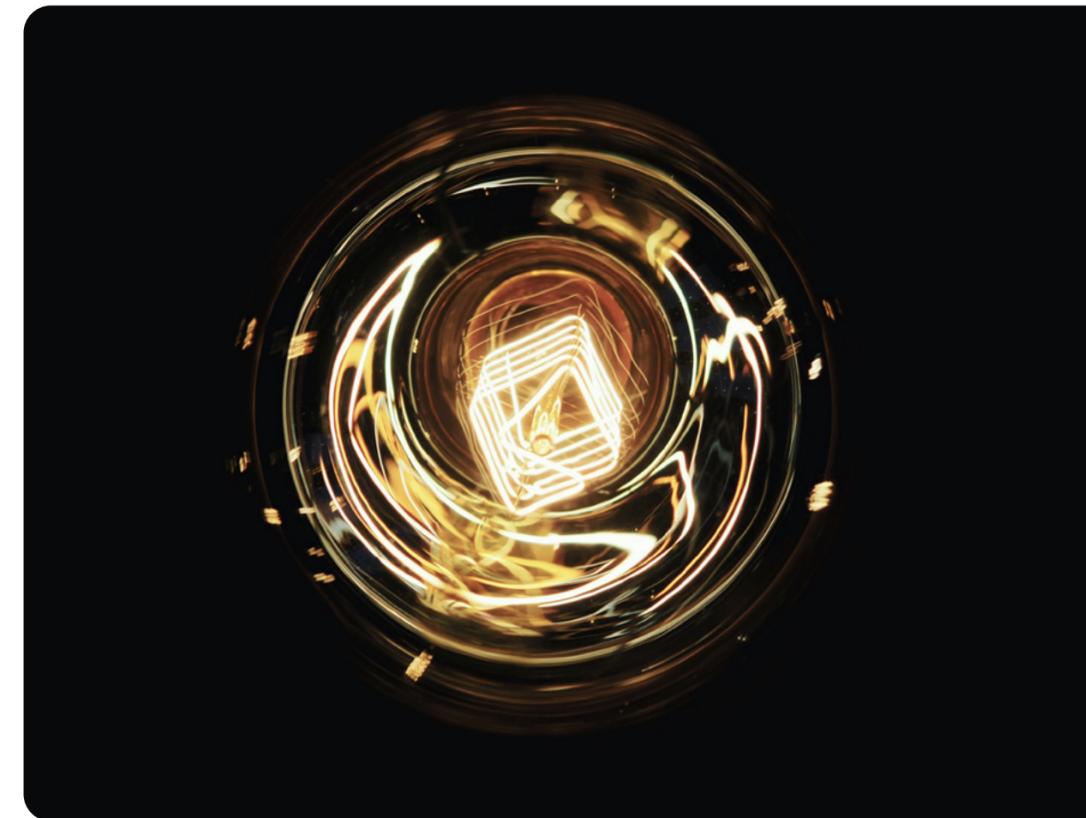
CHAPTER TWO

Innovations Enabling Circular Systems

As investment flows into circular systems, opportunities for innovation continue to grow. This creativity will shape the future of how consumers shop and how cities move, creating massive shifts that will advance consumer and brand value. In the face of growing climate risks, resource scarcity, a global pandemic, social unrest and the ocean plastics crisis, reimagining our leaky take-make-waste economic system is what will strengthen societies in ways we haven't seen before.

Innovative circular solutions transcend specific sectors or technologies, and are quickly shifting from disruptive to becoming an accepted part of doing business. We see rapid growth across the following categories in North America:

- **Material Innovations**
 - Plastic Alternatives
- **New Delivery Models**
 - Rent & Recommerce
 - Refill & Reuse
- **Transformational Technologies**
 - Digital
 - Material



CHAPTER TWO

Innovations Enabling Circular Systems

► Materials Innovation

- Plastic Alternatives

New Business and
Delivery Models

- Refill & Reuse
- Rent & Recommerce

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Emerging Materials

The materials in a product determine its life-cycle. An emerging cohort of circular economy-minded designers are focusing on material science innovation and reevaluating what goes into products for a carbon-free future. Introducing new solutions can inadvertently create a host of new problems, so we must ask of any new material: how does this new material

affect human health during its manufacture, distribution and at the end of its use? What are this new material's impacts on the environment, in terms of raw material extraction, carbon footprint, alignment with recycling or recovery infrastructure, and potential for it to leak outside its intended use?

Did You Know?

Until recently, black plastics, used to make the ubiquitous food takeout containers among other packaging, weren't recyclable. When products or packaging enter a recycling facility, they pass along a conveyor belt that uses special infrared light to detect and sort materials. However, the "carbon black" pigment in black plastics made them invisible to detection. The result: black plastics heading straight to landfills. A recent breakthrough material innovation has changed this, creating a detectable black pigment that means black plastics can now begin to be safely diverted from landfills and back into manufacturing supply chains.

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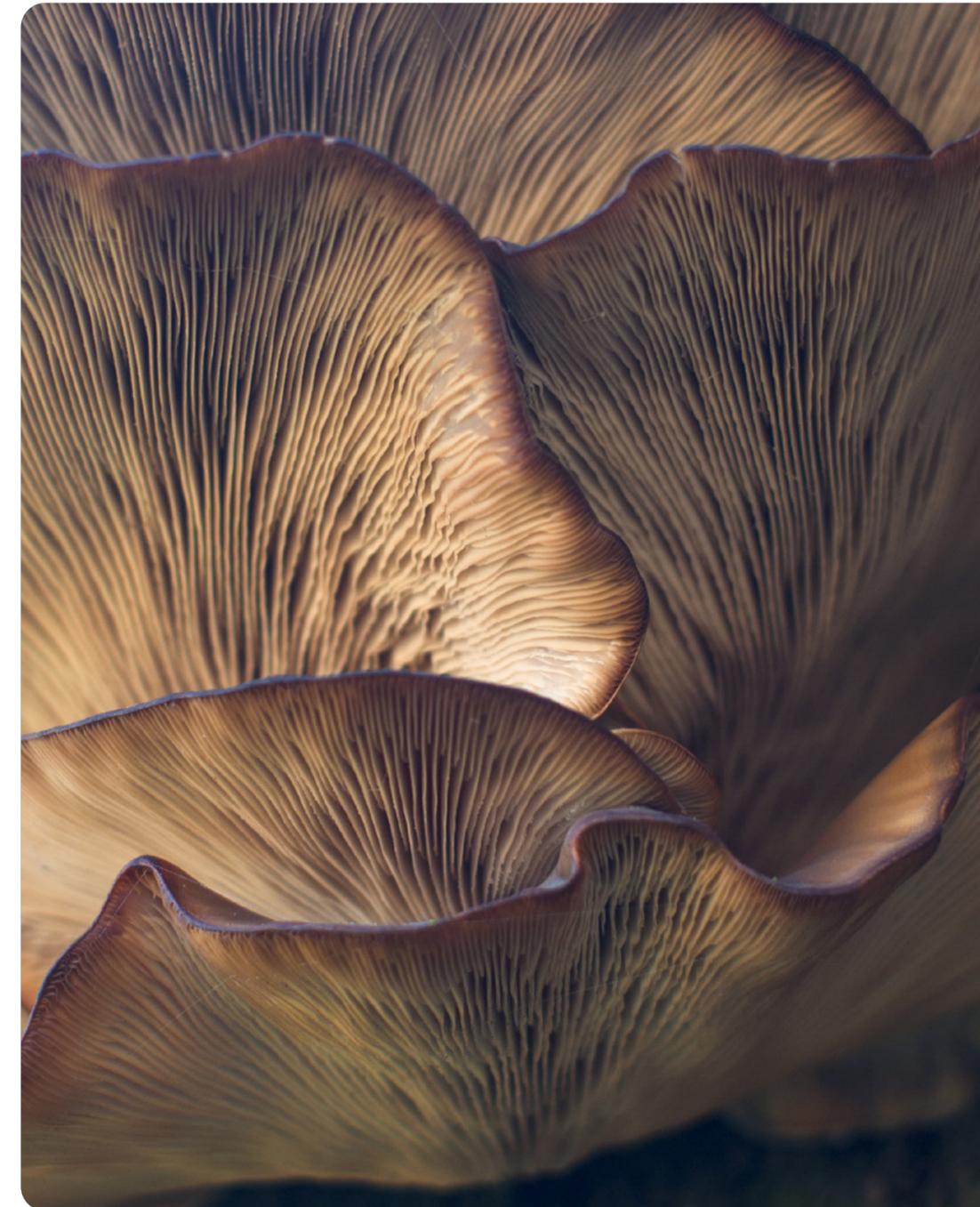
- Digital
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Plastic Alternatives

Organic materials including algae, mushrooms, eucalyptus, coconut fibers and corn are being explored to replace traditional fossil fuel-derived plastics. These new plastics are sometimes referenced as “bio-based,” “biopolymers” or “bioplastics” and they are rapidly replenishable.

The importance of plastic alternatives is rooted in the opportunity to diversify the resources used within our systems, relieving pressure from just one primary source—especially fossil fuel. To create stronger systems, we need to realize and maximize the value of different types of materials that cater to the needs of multiple stakeholders and products. Just as ecosystems find strength in diversity, so will our supply chains find resilience in diversification.

However, as with any shift in sourcing and supply chain, the use of agricultural land to grow these resources needs to be assessed against food production to ensure the highest and best use of resources, and their end-of-use outcomes must align with recovery infrastructure.



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A Grey Area: Biodegradable, Compostable or Recyclable

We believe compostable packaging has a role in the circular economy, but it cannot be created in a vacuum. Products made from organic materials, like corn and algae, can look identical to their traditional plastic counterparts. However, their end of life can be very different—they can be biodegradable, compostable or recyclable. The challenge before us is to align that potential with the recovery and infrastructure systems in place, to handle these materials after use.

Labeling, collecting, sorting and recovering these plastic alternatives in products and packaging will take cross-industry collaboration on an unprecedented scale. It is essential that brands work with their competitors, their supply chain and with the recovery industry to ensure they make the best material choice for each packaging format. It is this level of innovation and collaboration that will drive the direction of this category of packaging forward.

Biodegradable vs Compostable Products and Packaging



● **Biodegradable**

- + Will break down into gases (CO₂), water, residue and biomass
- Can leave microplastics

● **Compostable**

- + Will break down within a specified time frame and into non toxic materials
- + Will add value to the planet's ecosystem through nutrient rich materials

Types of Composting

- Industrial Composting
- Home Composting
- Anaerobic Composting

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Case Study: Mori

mori



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SECTOR PACKAGING



Leafy Greens



Beef

Every year, Americans spend \$218 billion growing, transporting and throwing away food that is never eaten. As a result, 30-40% of our food supply is wasted.¹⁴ What if you could extend the lifespan of food while avoiding the need for excessive plastic packaging?

Mori, formerly known as Cambridge Crops, commercializes silk-based edible coatings to prevent food spoilage. Their innovations—coatings applied directly to food and films to replace plastics—can be applied to whole or cut produce, prepared food, raw meat, seafood and processed foods. The edible coating is safe to eat, invisible, tasteless, and virtually undetectable. Because it keeps food fresher for longer, less food goes into our waste streams which benefits the grower, farmer, shipper, processor, retailer, consumer, and most importantly, the planet.

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mori



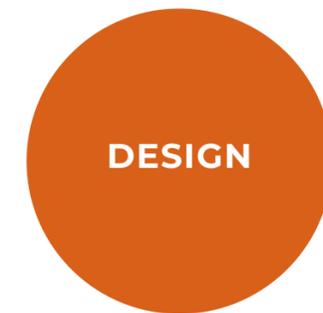
CLOSED LOOP PARTNERS PORTFOLIO COMPANY

SECTOR PACKAGING



Case Study: Mori

The Circular Advantage



Harnessing the Power of Silk

Using natural silk, Mori creates a protective layer that slows down three key mechanisms making food spoil: dehydration, oxidation, and microbial growth



Waste for One Is Food for Another

Silk proteins are derived from low value silk that would typically be trashed in pursuit of higher quality silks for textile applications



Reducing Packaging Waste

Silk coatings and films reduce the need for the production of traditional single-use plastics and therefore our dependency on fossil fuels

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New Business and Delivery Models

Typically after point-of-sale, customers own products whether they want to or not. For example, does anyone actually need to permanently own a lightbulb, or do we simply want to be provided with the service of light?

In the circular economy, ownership is transferred back to the producers and manufacturers, shifting away from typical purchasing models and toward renting, leasing and subscription models. These models change the incentive structures by selling products—and even packaging—as services; buyers become users and companies start to see their products or packaging as valuable assets worth investing in. They take them back and rent or reuse materials. We're seeing this concept play out in businesses in a number of different ways:

- Refill & Reuse
- Rent & Recommerce



The clothing rental market is poised to grow by \$80M from 2019-2023¹⁵

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Refill & Reuse

Think back to the milkman model and then add a few more bells and whistles; you'll land at today's optimized refill and reuse models. From personal care products to beverages, refilling reusable containers is becoming more and more popular.

Some models are tech-enabled, which helps companies track, discount and incentivise reuse while gaining customer insights. Some models are completely closed loop, with collection, washing and disinfecting stations embedded in the machines to sanitize and return packaging onsite. Other models allow users to dispense precise amounts of product, cutting waste and empowering those unable to afford larger purchases.

“The bottom line is that reuse helps reduce the environmental impacts of delivering food and products, saves businesses money, and creates new opportunities for entrepreneurs and investors. It's a win-win-win.”

Matt Prindiville, Lead Solutioneer & CEO at UPSTREAM

Key Ingredients for Scaling Reuse Models

Cost Competitiveness: Reusable systems need to be cost competitive if they are to reach beyond high income, sustainability-oriented consumers

Convenience: Nobody wants extra steps or complexity when it comes to making a purchase; reuse models need to seamlessly integrate with a customer's lifestyle through convenient drop-off spots for products

Ease of Integration: Reuse models need to fit within existing payment systems, reward programs and store set-ups to encourage uptake

Measurable Impact: Companies will need to prove that the benefits outweigh the potential costs of reverse logistics, like cleaning and transportation

Health and Safety Standards: Cleanliness is critical and all components of a reuse system must be fully sanitized to ensure public health and safety, and customer confidence in the system

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Algramo



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SECTOR PACKAGING



Case Study: Algramo

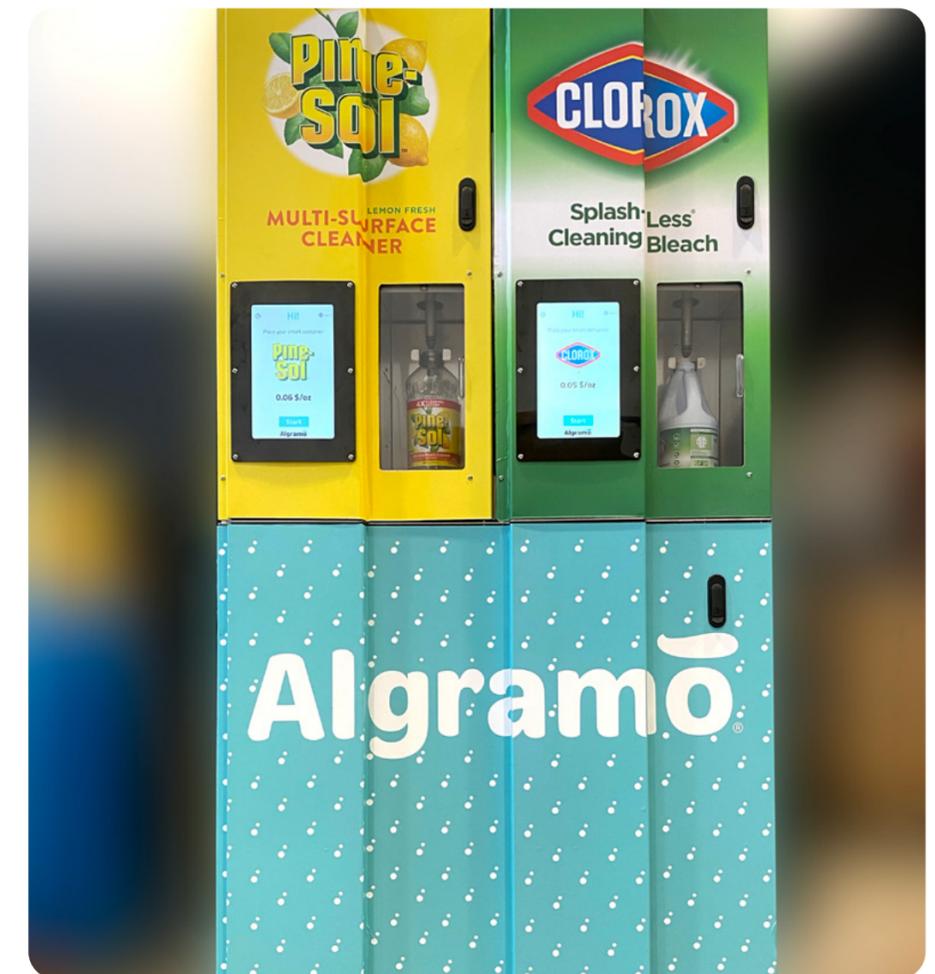
Small plastic sachets make products like shampoo or detergent accessible for low-income communities, but leave a scourge of waste behind as they're difficult to recycle and are prone to leak into the environment. Communities unable to afford standard or bulk size products are also left paying as much as a 40% premium, or a "poverty tax," on these individual sachets.

Algramo offers a complete refill and reuse system, solving economic and environmental issues through its vending machines that dispense staple products such as household cleaners "by the gram."

The Solution

Algramo's smart reusable packaging can help minimize the amount of waste left behind from single-use plastic packaging in landfills and oceans. At the same time, Algramo's refill system addresses the poverty tax by allowing families

to buy the exact quantity of products they need at bulk prices. Algramo not only makes the sustainable option the cheaper option, but also the more equitable and convenient option.



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Algramo



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SECTOR
PACKAGING



Case Study: Algramo

The Circular Advantage



Brands want to sell products, not packaging; Algramo offers better profits and new sales channels for brands



Customers benefit from a smart, modern reuse system that meets the growing demand for convenient, accessible and waste-free solutions



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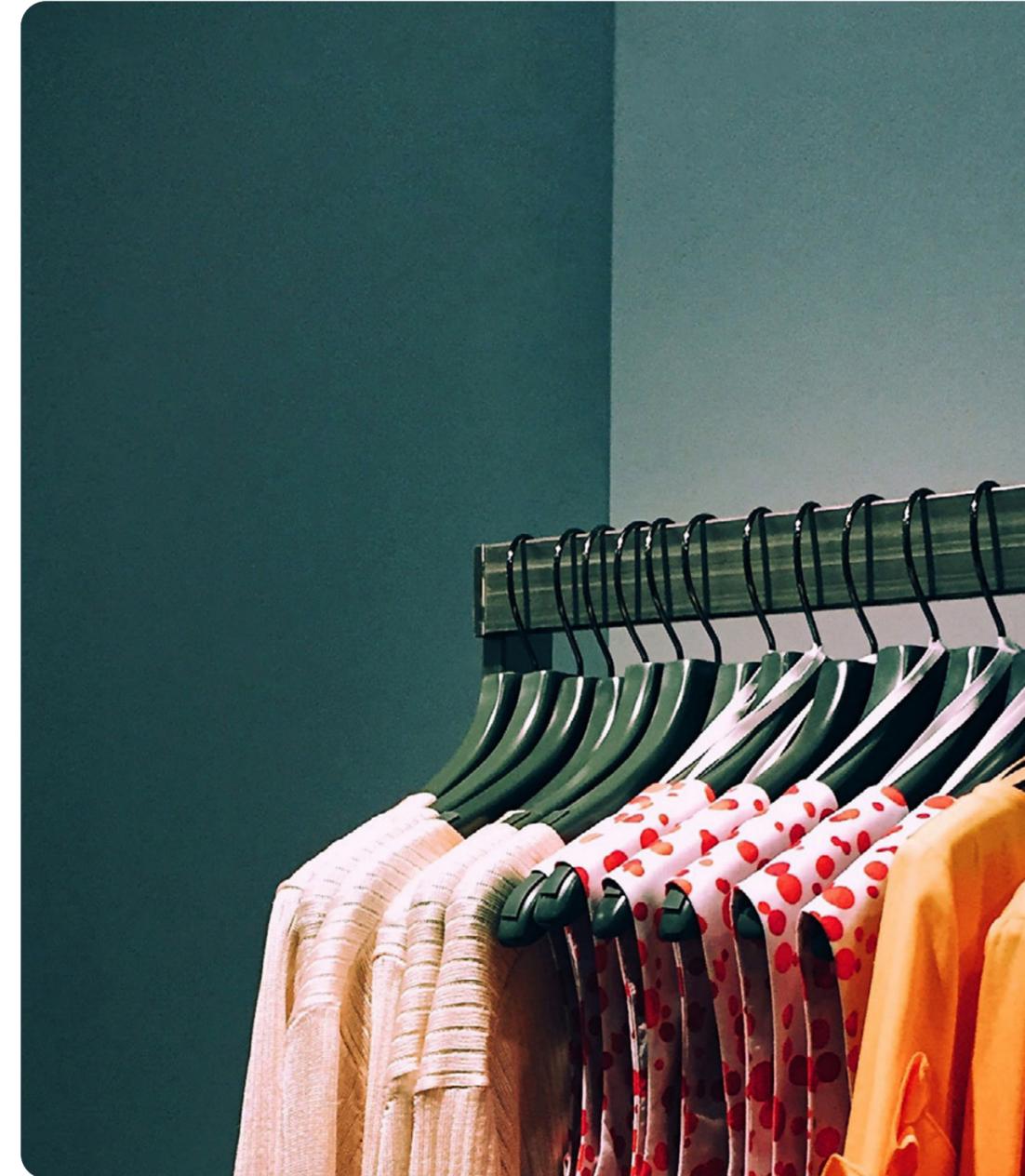
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Rent & Recommerce

By 2023, the sale of secondhand apparel is expected to more than double to \$51 billion.¹⁶ Millennials and Generation Z are leading the growth. Brands like Patagonia, H&M and The North Face are taking note and developing or testing their own secondhand marketplaces.

The Circular Advantage

- ✓ **Increasing revenue streams** through multiple rental fees can exceed a single sale price
- ✓ **Reducing the extraction of raw materials, energy and costs** of original manufacturing when rentals replace single sales
- ✓ **Extending the useful life of products**
- ✓ **Fewer discarded products** going to landfills or incinerators
- ✓ **Increasing customer touch points** and brand loyalty



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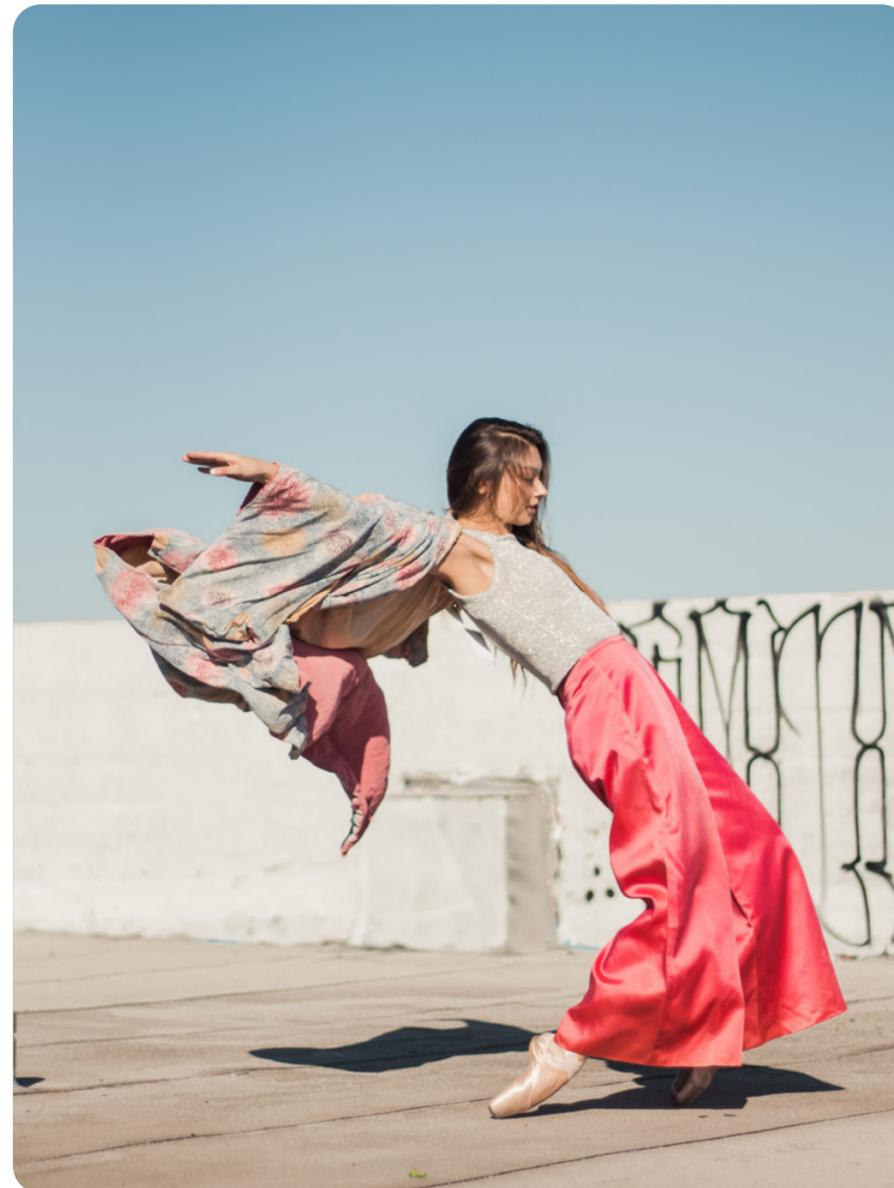
Case Study: Thrilling

THRILLING



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PORTFOLIO COMPANY

SECTOR
FASHION



Every year, 100 billion items of clothing are produced for a planet of 7.5 billion humans, and fashion consumption continues to rise, while the average number of times a garment is worn in its lifetime decreases.¹⁷

Thrilling has disrupted the vintage clothing market, digitizing clothes from local vintage shops to create a seamless customer experience.

Market Opportunity

There are more than 40,000 secondhand apparel stores across the United States, but more than 95% of their inventory is offline. And the resale market is growing 21x faster than the retail apparel market in the past three years.¹⁸

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Case Study: Thrilling

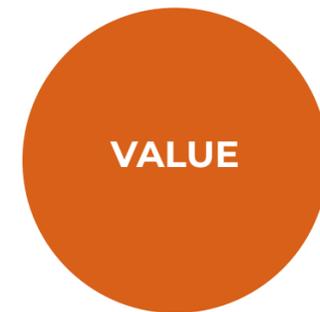
The Circular Advantage

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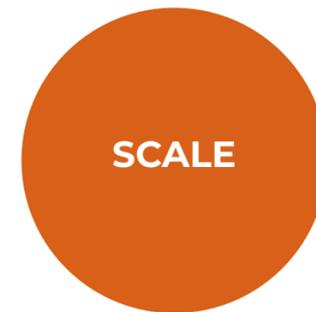


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SECTOR FASHION



Creates value for and empowers small-business owners of individual vintage shops by digitizing their inventory and creating new sales channels



Helps vintage stores reach a broader, global customer base and connects shoppers to unique, high quality, secondhand inventory at scale



Solves for a critical cost in the reuse market: sortation. Textiles require labor-intensive inspection and categorization after use, and Thrilling uses existing small-scale vintage shops across the nation to categorize, upload and digitize inventory



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Transformational Technologies

Technology is a key enabler of the circular economy, and can be broadly segmented into two categories: digital and material. The former relates to electronic and computerized tools that store data or code, while the latter refers to physical machinery that breaks down material. Both types of technology continue to mature rapidly, poised for disruption. In the following pages, we dig into just a couple of the transformational technologies emerging on the scene.

- **Digital Technologies**
 - Transparency Tools
 - Artificial Intelligence
- **Material Technologies**
 - Advanced Recycling



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New Business and Delivery Models

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- Rent & Recommerce

► Transformational Technologies

- **Digital**
- Material

Digital Technologies

Digitization increases supply chain transparency and makes collecting data easier, which optimizes efficiencies and informs strategic decision-making that can accelerate the transition to a circular economy.

Transparency Tools

Quick Response (QR) codes and/or radio-frequency identification (RFID) systems (see Fig. 1) allow companies and consumers to check products in and out along a product's lifespan, increasing visibility. They can be used in a number of different kinds of products from clothing to reusable cups. Tracking can be high level, for example displaying where a product has been checked in along the value chain i.e. at a distribution center or at a recycling facility; or it can be more detailed and the tag can hold a "digital birth certificate." This certificate is akin to a Nutrition Facts food label – that shares information about the product, for example how to disassemble the product or to validate fair labor practices.

Fig 1



QR Codes: A machine-readable code that holds information about the product to which it is attached, typically pointing to a website or app for reading by a smartphone's camera.



RFID Systems:

RFID is an acronym for "radio-frequency identification," which references a technology whereby digital data encoded in tags or labels can be read by an RFID scanner, providing information on given products.

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Case Study: CircularID™

The fashion industry is responsible for four percent of global waste and eight to 10 percent of greenhouse gas emissions¹⁹. What if we could harness the power of digital technologies to reduce waste and drive reuse, resale and recovery of clothing?

The CircularID™ Initiative is an industry-wide collaboration to advance the role of the Internet of Things in creating connected systems for the circular economy. The CircularID™ Initiative established the CircularID™ Protocol – the global language for Connected Products in the circular economy.

The CircularID™ Initiative was established and introduced by Eon – a leading Internet of Things Platform in fashion and retail – in partnership with apparel brands, retailers, foundations and circular economy stakeholders – including H&M, PVH, Target, Laudes Foundation, Waste Management and Closed Loop Partners.

The digitization of products unlocks the communication, transparency and operational capabilities essential for managing and monetizing products and materials across their lifecycle, to achieve the vision of a circular economy at scale.

With the data-secure digital identity providing critical information on products, reusing, reselling or repurposing clothing after use becomes easier and smarter. Data on material compositions, material flows and entire product lifecycles are brought to life, growing transparency and responsibility across the entire supply chain.

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Artificial Intelligence

Advances in machine learning and AI have transformed the waste management industry. Robots can be trained to “see” different types of materials by shape, size, color, texture and even brand. In turn, they can positively sort or “pick” select materials to speed up material recovery facility sortation times. When applied to recyclables this means more valuable metals, paper and plastics collected each minute. Robots can also help to reduce workplace safety issues by decreasing the need for manual sortation of dangerous materials.

Robots could also be deployed to validate the purity of bales of recyclables, with pricing based on objective data around bale quality and composition. Or, they could link products back to their producer, becoming the guardians of growing extended producer responsibility policies.



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CLOSED LOOP PARTNERS PORTFOLIO COMPANY

SECTOR RECYCLING

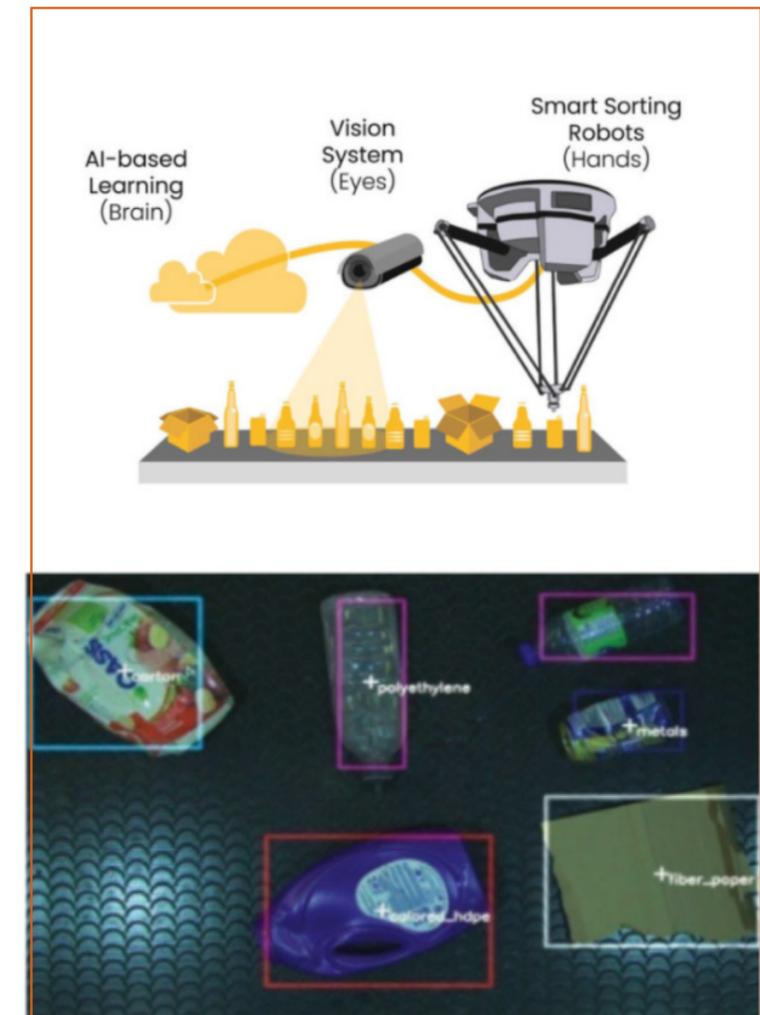


Case Study: AMP Robotics

Recycling rates in the U.S. are as low as 35%²⁰, which leaves a lot of valuable materials on the table. Old and inefficient recycling systems compound the issue. Even if an aluminum can makes its way to a recycling facility, it could still slip through the cracks. What if AI and robotic-backed systems were able to increase the speed and accuracy of recycling, bringing it into the 21st century?

AMP Robotics uses AI and machine learning to robotically sort material by composition as granular as type of plastic at a pick rate of 80 items per minute, safely sorting diverse materials at a rate more than two times greater than the pick rate of human workers.

How Do Robotic Sorters Work?



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SECTOR RECYCLING

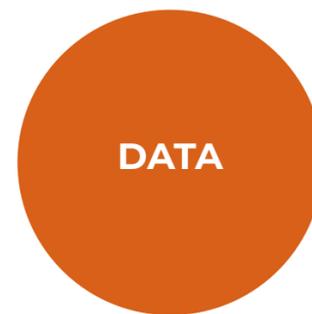


Case Study: AMP Robotics

The Circular Advantage



Increases quality and quantity of recyclables processed and therefore, potential revenue from sales



Gathers intelligence that helps robots improve over time



Improves health and safety at recycling facilities by eliminating the need for individuals to manually sort through dangerous materials (think needles and diapers)



Demonstrates greater speed and efficiency compared to manual process, enabling higher and more consistent “pick” rates

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Material Recovery Technologies

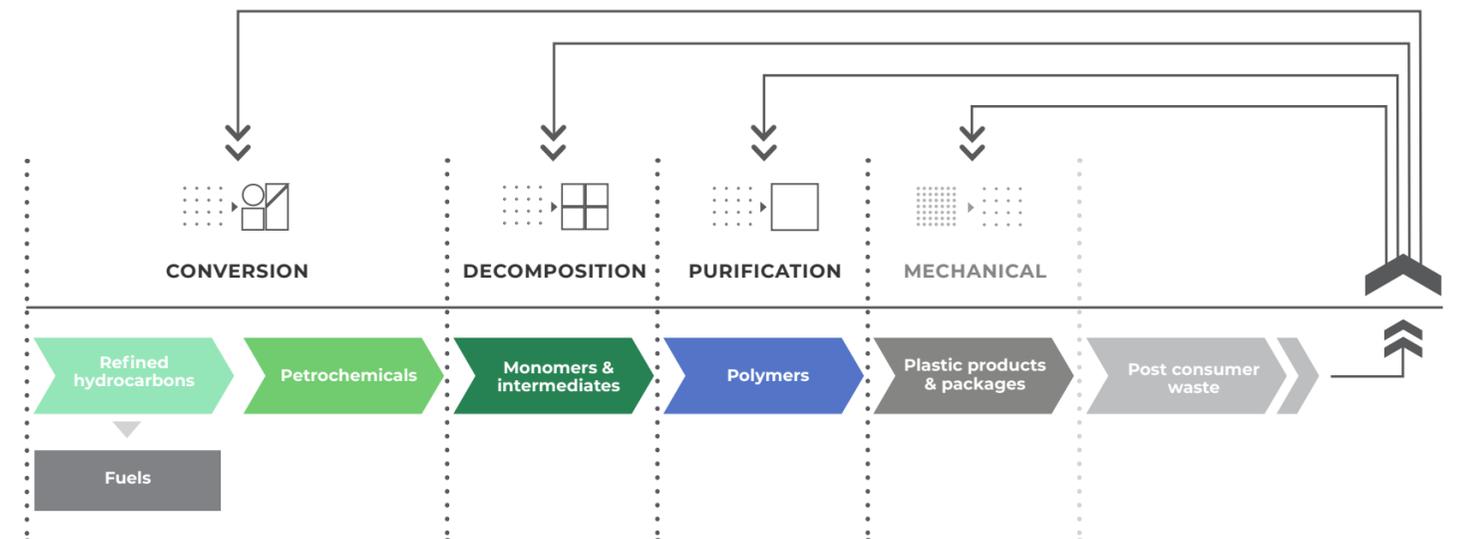
Advanced Recycling

New advanced technologies make it possible to break down used materials into their original components. The building blocks can then be repurposed for a new life. Until now, mechanical recycling has been the main way that products and packaging are recycled after use. Although critical, mechanical recycling can lead to “downcycling,” meaning the value and quality of materials are diminished during the process. It

also can’t handle the wide range of products and materials entering the waste stream today, like new multi-layered packaging formats or textile blends. Advanced recycling can address hard-to-recycle materials like mixed-waste plastics, textiles and single-use healthcare plastics. It complements mechanical recycling, allowing brands and suppliers to incorporate higher quality recycled content into their supply chains and make new products, including those that meet food-grade post-consumer recycled packaging standards.

A Spectrum of Technologies

Advanced recycling is an umbrella term that typically refers to technologies that purify, decompose or convert waste plastics into renewed raw materials.



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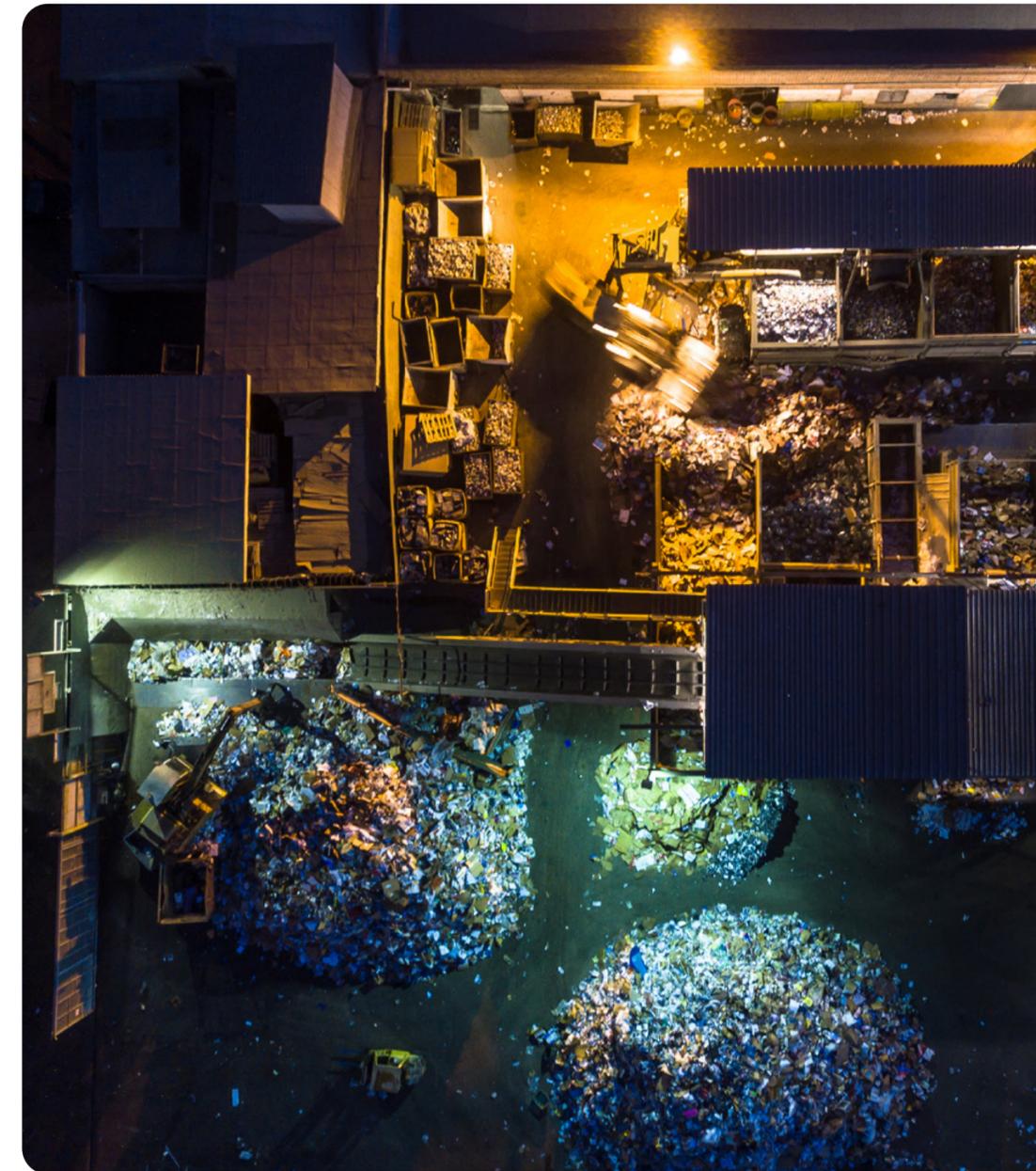
**► Transformational
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A Grey Area: The Unanswered Questions Around Advanced Recycling

As an emerging industry, advanced recycling leaves many questions unanswered. What are the environmental and health impacts of these new advanced recycling processes? How does our current recycling infrastructure need to adapt to scale them? How do these technologies challenge the current definitions of recycling? What is truly safe and circular?

Closed Loop Partners is working in partnership with a group of brands, retailers, industry trade associations, plastic producers and environmental NGO experts to further analyze the environmental and health impacts of these processes, as well as unpack the current policy and investment landscape for advanced recycling. It is critical that we advance this technology in a way that drives the impact and future supply chains we aim to create—one that is modular and resilient, requires less transport of material and keeps molecules in play.



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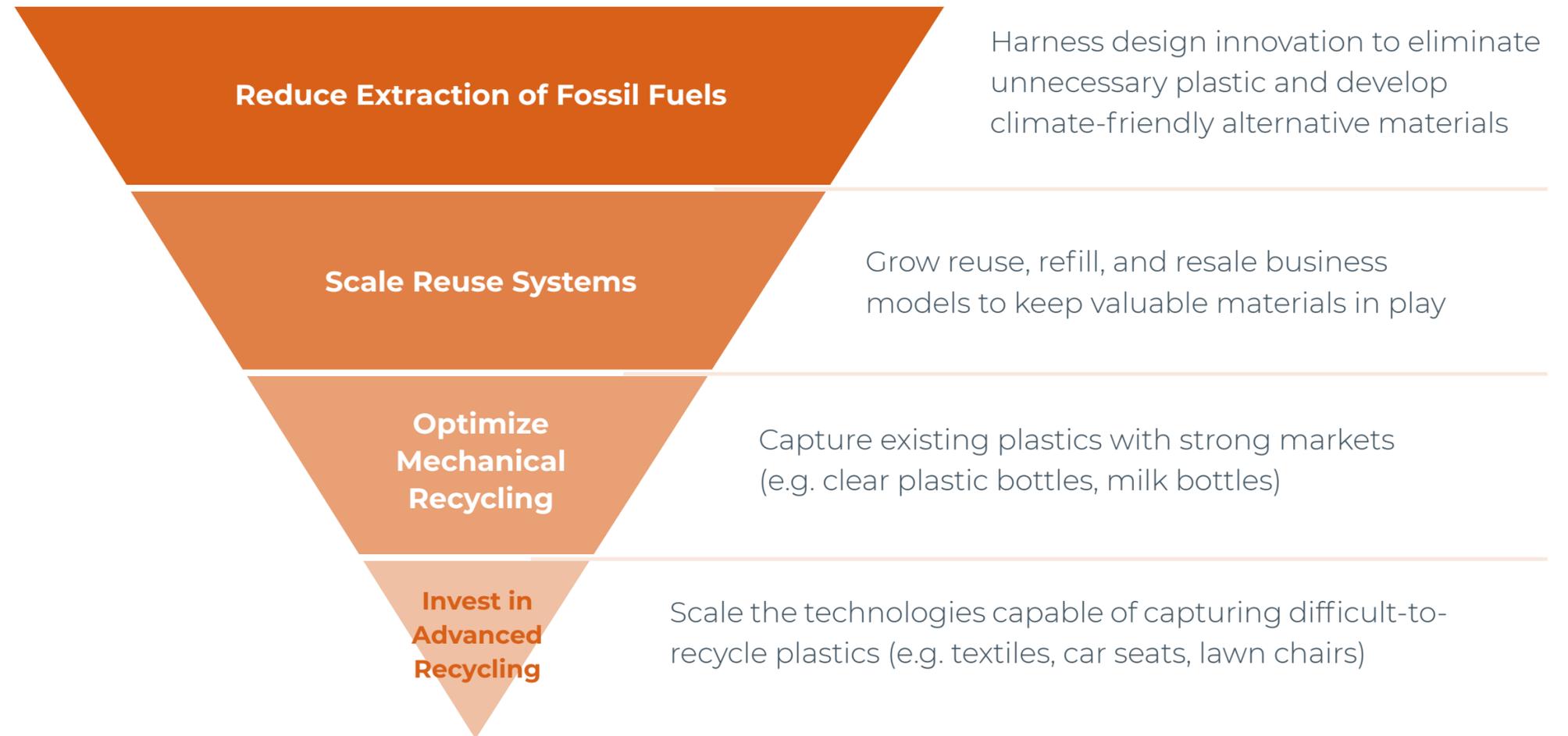
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Hierarchy to Address Plastic Waste



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SECTOR PLASTICS



Case Study: GreenMantra

Only 9% of the world’s plastic is recycled globally²¹; most of it ends up in landfills, or worse, our oceans. With global plastics demand set to triple by 2050, it’s time to accelerate innovative solutions.²²

The Solution

GreenMantra Technologies upcycles post-consumer and post-industrial plastics by transforming them into value-creating polymer additives and specialty waxes used in applications such as roofing, roads, industrial packaging, and composite decking.

The Circular Advantage

INCREASE VALUE

Single-use plastics and hard-to-recycle materials, such as films, are transformed into value-creating polymers additives and specialty waxes

EXPAND MARKETS

Creating novel materials allows GreenMantra to expand the lifespan and applicable end markets for post-use plastics, diverting valuable materials from landfills and reducing the need for extraction of virgin plastics

CREATE DEMAND

By establishing viable, long-term outlets for discarded plastics, Greenmantra incentivizes the recycling value chain to optimize collection and sortation, creating pull through the system.

CHAPTER THREE

Policymakers Accelerating Lasting Change

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Policymakers Accelerating Lasting Change

For the circular economy to work, it needs to be taken up wholesale. Policy helps to make this happen from the very top. Policymakers set vision and precedent and incentivize diverse stakeholders to get onboard.

Across Europe and Asia, and to a growing extent the U.S. and Canada, policymakers are drafting (and passing) legislation supporting the reuse, recovery and use of recycled content in products and packaging. In May 2019, the European Union (EU) passed the Single Use Plastics Directive to ban products where market-ready alternatives exist.²³ The incoming EU Commissioner also declared that she intends for the circular economy to be the “number one priority” of Europe’s Green New Deal. Canada launched their national Action Plan on Zero Plastic Waste in 2019. The U.S. has some catching up to do. Thus far, it’s been global brands and NGOs leading the charge. But, increasingly, we’re seeing the U.S. government step up on multiple levels:

- City
- State
- Federal



CHAPTER THREE

Policymakers Accelerating Lasting Change

► **City**

State

Federal

Cities Taking Steps Toward Circularity

Many cities, including New York City, Vancouver and Houston, have progressive zero waste goals, which serve as stepping stones to circularity. While the concept of the circular economy remains foreign to most U.S. cities, Austin, Phoenix and Charlotte are the exceptions. They are already

explicitly talking about identifying ways their city governments can advance circularity while creating jobs and economic benefits for local communities. The lessons learned from the experiences of these cities can inform other efforts nation-wide.

2014

City of Austin, in partnership with The United States Business Council for Sustainable Development, launch the Materials Marketplace to keep local materials in circulation for multiple uses

2017

City of Phoenix and Arizona State University launch Resource Innovation and Solutions Network (RISN), an innovation incubator for circular solutions

2018

City of Charlotte, in partnership with Metabolic and Envision, unveil the Circular Charlotte plan, advancing toward a Zero Waste and Inclusive City

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Ensuring the Circular Economy Benefits All

When building a new system, no one should be left behind. We seek a future where historically underrepresented groups, particularly low-income communities of color, are no longer disproportionately affected by environmental burdens brought about by pollution and waste. A successful circular economy supports affordable business models that are accessible to all, and

considers any risks new systems could pose for local communities. A regenerative, healthy and circular society depends upon thriving communities that are heard, included and benefit from the transition. Successfully building resilience against the impacts of climate change needs to consider every person who will be affected—and that's all of us.

THE IMPORTANCE OF EDUCATION

Structural racism has contributed to a system in which communities of color are disproportionately impacted by climate issues, from rising tides to hurricanes.

Knowledge is power; transparency and inclusion are critical when transitioning from old systems to new.

THE ROLE OF LEGISLATION

Inequities play out in the political arena on a daily basis, for example, polluting incineration plants are often built in low-income neighborhoods.

Engaging with policymakers on these issues can create lasting change.

THE ALLOCATION OF INVESTMENTS

Achieving systems change means putting funding where it counts. Environmental justice groups need greater resources to ensure they are on an equal footing with other areas of the environmental movement.

THE BALANCE OF BENEFITS

Setting up for success requires the appropriate means to measure holistic success; broad social, environmental and economic inputs must be measured equally when assessing the benefits of a circular economy.

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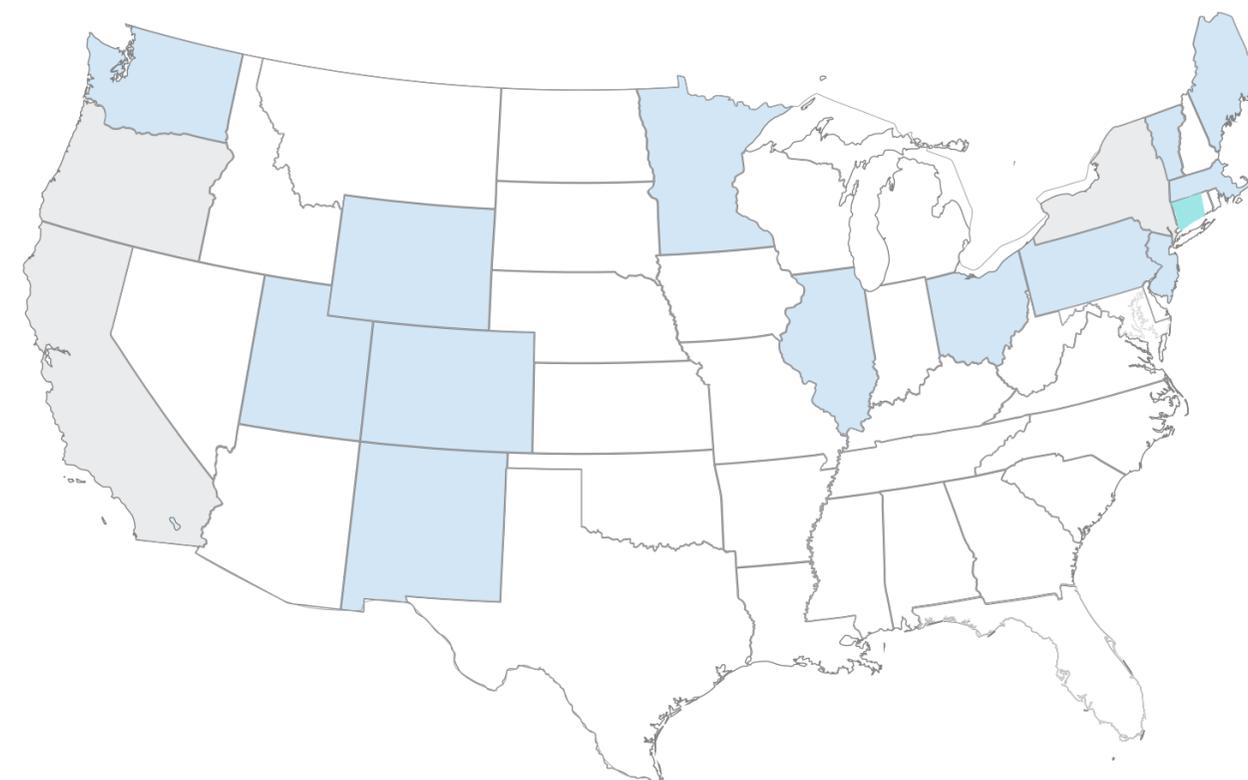
U.S. States Advancing the Circular Economy

States are stepping up; from food waste recycling legislation passed in New York, California, Massachusetts, Oregon and Vermont²⁴, to fresh municipal recycling education campaigns in Denver and Detroit, to increasing bans, fees and pre-emptive legislation against single-use plastics.

But this state-by-state approach limits enduring consistency. Rules vary per place, and businesses must adapt accordingly. A more collaborative and holistic approach between states could help align interests and accelerate consistent educational messaging to advance circularity.

States with Enacted Plastic Bag Legislation

- PLASTIC BAGS BANNED
- LOCAL CHARGE OR BAN IN PLACE (COUNTY OR MUNICIPAL LEVEL)
- A CHARGE ON SOME PLASTIC BAGS



CHAPTER THREE

Policymakers Accelerating Lasting Change

Partnering Up On Policy

*By Elizabeth Biser, VP of Policy and Public Affairs
at The Recycling Partnership*

From city councils to the halls of Congress, there is a large array of policy proposals addressing nearly every aspect of our recycling system and the broader circular economy. There's a reason for this. Elected officials are hearing from their constituents about how critical recycling and the circular economy are to our environment and our economy.

The challenge is that utilizing policy to build a circular economy requires a long-term view. Political outlooks are usually based on election cycles. Corporate decisions are based on quarterly earnings cycles. We need to give consideration to this, but also paint the picture of how – by working together today, we create a more prosperous tomorrow, both for the economy and bottom lines, and for the health of our environment and citizens.

This isn't work for the faint of heart. Collaboration is not singing "Kumbaya." But no one company,

no one organization, no one politician can do this alone. In order to get policy passed, we need to work together, across traditional boundaries. We need to think, not only about the environmental benefit of a circular economy, but also the economic benefits. Jobs and economic investment are always important, but they are particularly important to address in the post-COVID-19 landscape.

Closed Loop Partners works with The Recycling Partnership as part of the Every Bottle Back initiative, alongside WWF and the American Beverage Association.

The Recycling Partnership launched a policy arm last year – called the Circular Economy Accelerator – recognizing the need to use policy as a lever to accelerate the change towards a circular economy.



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Encouraging Federal Policies on Circularity

In 2018 the Canadian Council of Ministers of the Environment's groundbreaking Strategy on Zero Plastic Waste mandated the adoption of enabling circular economy laws for plastics across Canada. In the U.S., conversations around circularity are nascent, but growing. China's National Sword policy (see pg. 47), enacted in 2018, has served as a catalyst for renewed attention on the United States' ageing recycling infrastructure. With the pressure to handle our own mounting waste, heightened by increased public awareness, legislative action is brewing. Even extended producer responsibility (EPR) laws are being considered, which shift the burden to producers to manage the end-of-life of their products. These kinds of laws can increase transparency, better accounting for the external costs of recovering materials after use and encouraging producers to harness design innovation.

U.S. Legislative Snapshot: 2020

IN REVIEW

Realizing the Economic Opportunities and Values of Expanding Recycling (RECOVER) Act

Allocating \$500 million²⁵ in matching federal grants to eligible states, local municipalities and tribal governments to invest in improving their recycling infrastructure, programs and education efforts.

IN REVIEW

Break Free From Plastic Pollution Act

Tackling plastics pollution at the production level, EPR is built into the legislation. This puts the onus of managing single-use plastic items, after their useful life, on producers, instead of local governments or individuals.

PASSED

Save Our Seas Act 2.0

Addressing plastic pollution in waterways and the environment by funding cleanup efforts and seeking innovative new solutions to processing plastics.

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China's National Sword Policy: Uprising the Recycling Industry

What Is It?

China's National Sword policy, which came into effect in 2018, banned the majority of foreign recyclables entering the country, enforcing a near impossible 99.5% purity standard on imported recyclables.²⁶

Impact on the United States

Overnight, the United States' biggest market for recyclables was shut down, sending recycled commodity prices spiraling downward. 2019 saw a resulting wave of recycling facility closures. A silver lining of China's policy is the renewed attention on the urgency of strengthening domestic recycling and waste management infrastructure. In the long term, the policy has opened up the floodgates to innovation, encouraging the growth and development of recycling in the United States.



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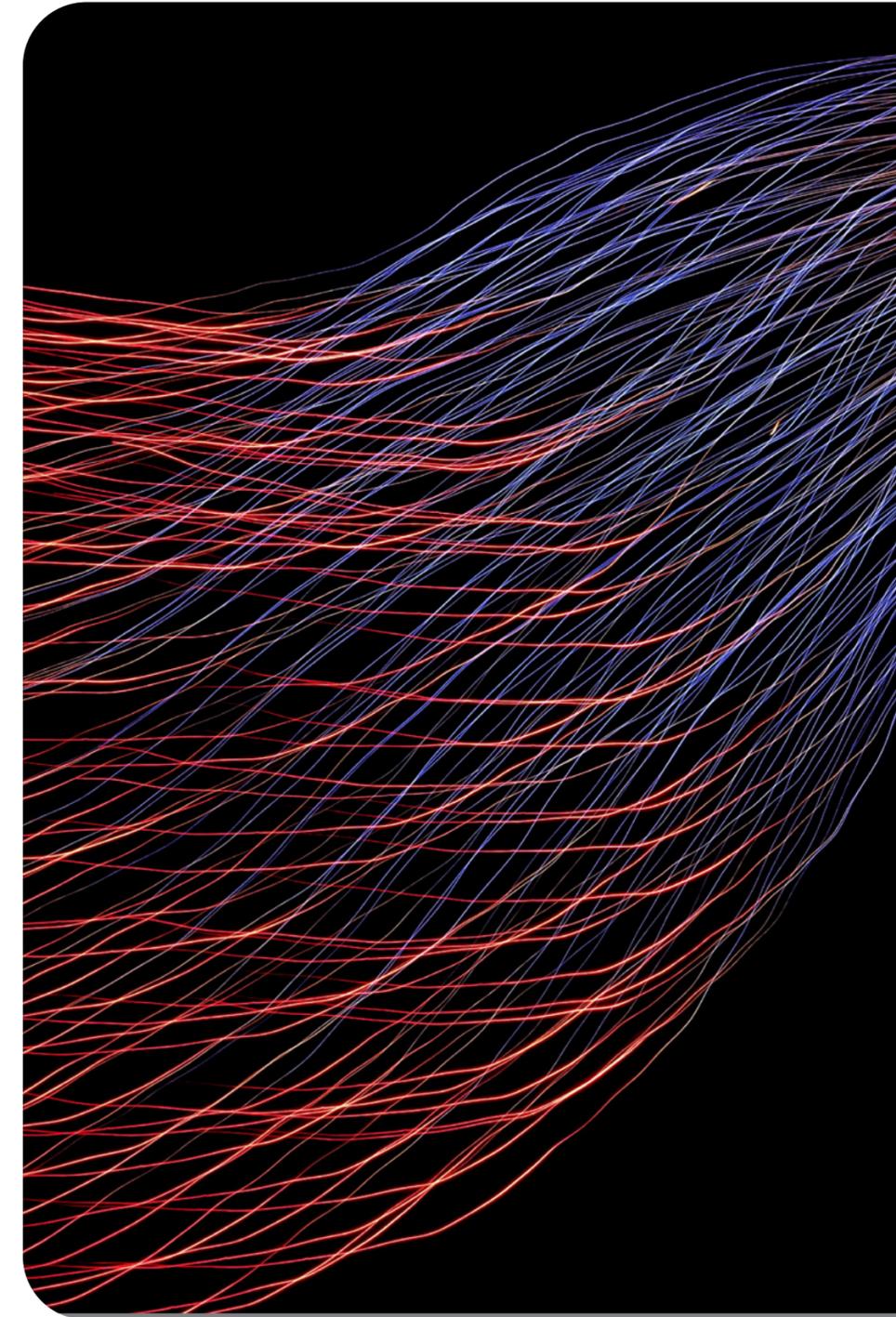
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To see real change in the way our systems work, we need to try solutions that have never been tried before. Aligning the interests of shareholders, business, customers, local communities and the environment will require unprecedented and unexpected partnerships. The circular economy touches every part of the value chain in a complex global system. No one actor, company or industry can realize the shift toward circularity alone.

The following chapters explore some of the types of collaboration we're seeing emerge in order to advance circularity.

- Collaboration Among Corporations
- Public-Private Partnerships
- Global Commitments



CHAPTER FOUR

Unexpected Partnerships Catalyzing Systems Change

► Collaboration among Corporations

Public-Private Partnerships

Global Commitments

Collaboration among Corporations

Multinational corporations are extraordinarily powerful. Their supply chains and retail footprints span the globe, and their revenues can be larger than those of governments. This serves as a strong foundation, and massive opportunity, to scale impact. For example, a corporation's decision to use recycled content in their packaging has reverberating effects, incentivizing diverse suppliers to listen up and follow suit, to keep up. By teaming up and aggregating their efforts and scale, the impact of corporations multiples manifold.

From the outset, Closed Loop Partners has specialized in getting unlikely partners to collaborate. In 2014, the Closed Loop Infrastructure Fund rallied more than nine Fortune 500 brands to come together and pool capital, investing millions of dollars in recycling and circular economy infrastructure in North America. Since then, more

large companies have joined the fund, including Amazon, Danone North America, Danone Waters, Nestlé Waters North America and Starbucks.

Competing brands experience the same shared challenge; typically, after point of sale, they lose sight of their product or packaging. Without insight into the systems beyond their scope of operation, it is difficult to ensure that materials don't end up in landfills or the natural environment. As a result, individual efforts fall short for solving what is a systemic challenge. To create value that outweighs the risks, it is essential for key players to capitalize on opportunities for cross-sector and pre-competitive collaboration.

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Benefits of Corporate Collaboration



Demonstrates the high level of commitment and ambition

needed to truly move the needle on global challenges, setting a positive precedent



Sends a unified signal to the market,

representing and generating volumes that incentivize manufacturers, recovery infrastructure and technology to adopt more sustainable practices



Accelerates advancements

by increasing efficiencies through shared resources and insights



Reframes the issue beyond short-term fixes to long-lasting, systemic solutions

by acknowledging the need for collective action

“Partnerships and consortia efforts provide an important platform for companies to work together on challenging systems change issues that would be impossible to achieve on their own, while providing transparency allowing them to be held publicly accountable by stakeholders to ensure they follow through.”

Conrad MacKerron, Senior Vice President, As You Sow

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Closed Loop Infrastructure Fund

Established in 2014, our Closed Loop Infrastructure Fund brings together the world's largest retailer and consumer goods companies to finance recycling and circular economy infrastructure in North America—closing the large gap between supply and demand of post-consumer recycled content.

To reach fast-approaching zero-waste goals, more consumer packaged goods (CPG) giants are making powerful commitments to use recycled packaging for their products. These targets are driving a significant spike in demand for post-consumer recycled content, yet are met by a dearth in supply of these materials. Our Infrastructure Fund invests in recycling technology and infrastructure at every point in the value chain, helping them meet the large quantities commercially demanded. And by collaborating with the large companies driving this very demand, we ensure that recycling facilities have end-markets for their products—closing the loop of the supply chain.
















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CLOSED LOOP PARTNERS INITIATIVE

INNOVATION



Case Study: NextGen Consortium

“McDonald’s is proud to work with such an unprecedented number of brands to address the issue of fiber to-go cups. Collaboration is what we need to truly move the needle, amplify impact and bring solutions to scale quickly.”

— **Marion Gross, Senior Vice President and Chief Supply Chain Officer, McDonald’s USA**

Globally, more than 250 billion fiber cups are produced each year.²⁷ While many cups are potentially recyclable, in practice the vast majority end up in landfill, wasting valuable resources.

“We’re a founding partner of the NextGen Consortium because we believe it will take the scale and influence of many global companies to make recyclable, compostable to-go cups an industry standard rather than the exception.”

— **John Kelly, Senior Vice President of Global Public Affairs and Social Impact, Starbucks**

About

The NextGen Consortium is a multi-year collaboration that addresses single-use food packaging waste globally, by advancing the design, commercialization and recovery of food packaging alternatives. The NextGen Consortium’s first initiative is NextGen Cup, which advances recoverable solutions for the fiber, hot and cold, to-go cup system.



MANAGING PARTNER



FOUNDING PARTNERS

IDEO

INNOVATION PARTNER



SUPPORTING PARTNERS



ADVISORY PARTNER

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Case Study: NextGen Consortium

NextGen Cup Challenge

Our global innovation challenge in partnership with IDEO received nearly 500 applications from innovators with solutions to redesign the iconic single-use fiber cup. 12 winners were announced in three categories, and received a share of \$1 million to advance their solutions.

Category One: Innovative Cups & Cup Liners

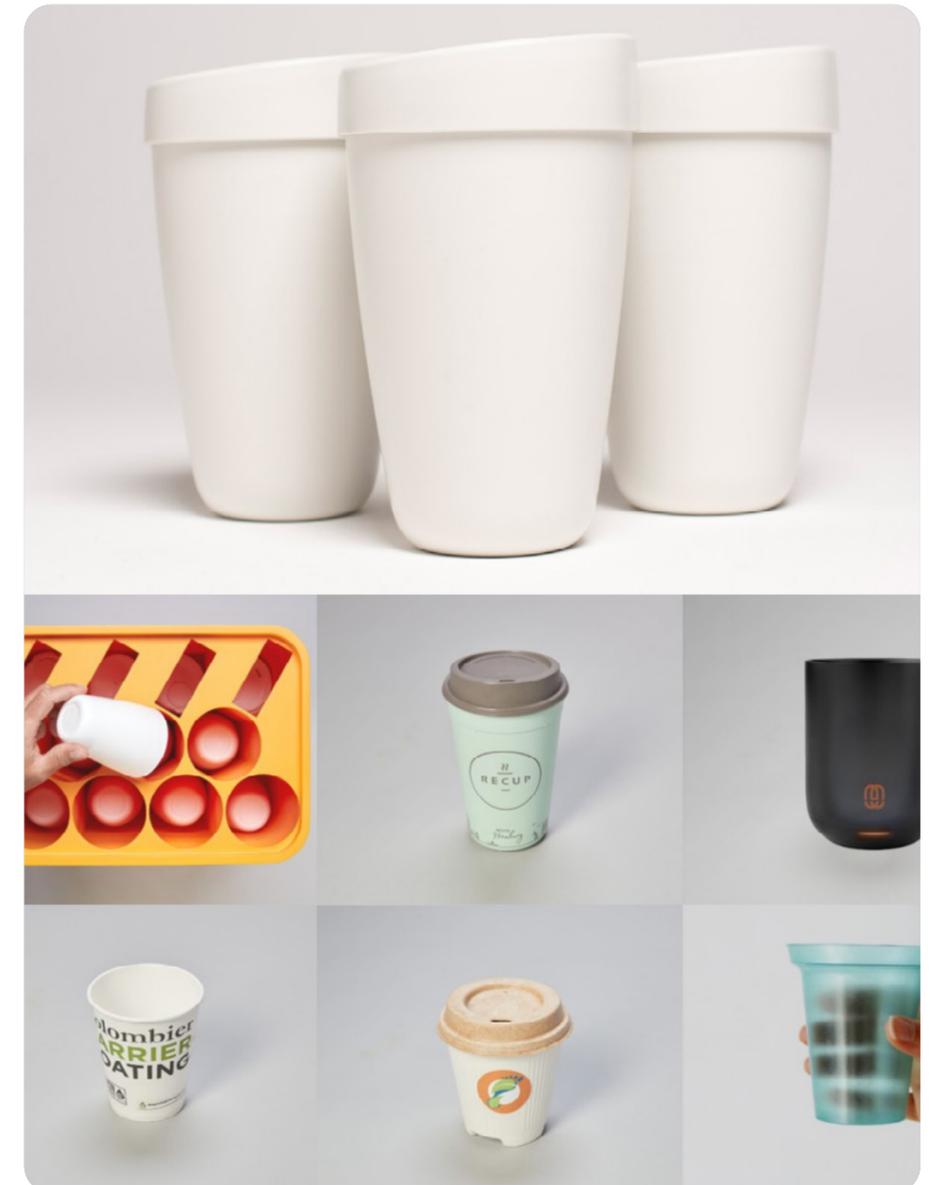
These companies are rethinking the polyethylene plastic liners in cups that can currently make to-go cups difficult to recycle.

Category Two: New Materials

These companies are using cutting edge, plant-based materials to design compostable cups.

Category Three: Reusable Cup Service Models

The cups made by these companies aren't single-use, they just keep cycling - remaining in service by harnessing the power of technology and design.



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Case Study: NextGen Consortium

The Innovate-Test-Scale Framework

Our work is underscored by the framework of **Innovate-Test-Scale**, whereby we seek to advance the development of new cup solutions and recovery methods through necessary, iterative, repetitive loops of innovation and testing. This enables us to learn and refine solutions as a Consortium efficiently before scaling.

NextGen Circular Business Accelerator & Advanced Solutions Program

Challenge winners received multi-industry business support, subject matter expertise and technology support, including testing opportunities through our Accelerator and Advanced Solutions program.

Cup Recovery Infrastructure & Value Chain Engagement

Given the diversity and regional inconsistency of recycling and recovery infrastructure, in

order to close the loop on the fiber cup, we must understand the current infrastructure landscape, best practices and stakeholders at every step of the value chain. We are working across the value chain to ensure solutions can integrate into supply chains and get through recovery infrastructure systems as valuable commodities. This means addressing critical gaps and bottlenecks to identify opportunities for integration and recovery.

Piloting Reuse Systems

The Consortium is working with reusable cup service models to understand potential applications, rethink incentives for customers, as well as operations, technology and employee training factors, to minimize disruptions and maintain a positive customer experience. Two winning reusable solutions took part in month-long pilots at independent cafes in the San Francisco Bay Area in early 2020.

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INNOVATION



Case Study: Consortium to Reinvent the Retail Bag

The Beyond the Bag Initiative

The Beyond the Bag Initiative, launched by the Consortium to Reinvent the Retail Bag, is a collaboration across retail sectors that aims to identify, test and implement innovative new design solutions that serve the function of today’s single-use plastic retail bag, delivering ease and convenience for consumers while striving to lessen the impact on the environment. Harnessing design, innovation and the power of collaboration to reimagine the retail bag, the Consortium is exploring reusable systems, altogether bagless solutions and innovative materials for a less wasteful future.

The Beyond the Bag Initiative takes a holistic three-year approach to identify and scale affordable, accessible and less wasteful solutions. The initiative focuses

on spurring innovation through the Beyond the Bag Challenge, Circular Accelerator and Pilot; advancing materials recovery through infrastructure investments, identifying and recommending best practices for policy, and engaging consumers to most effectively meet their needs at every stage in the process of getting goods home.



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INNOVATION



Case Study: The Beyond the Bag Initiative

Why Does the Retail Bag Need Reinventing?



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Case Study: The Beyond the Bag Initiative



“This collaboration with Target, Walmart and other like-minded retailers and innovators allows for collective reach that can be truly impactful.”

Eileen Howard Boone
SVP, Corporate Social Responsibility & Philanthropy and Chief Sustainability Officer, CVS Health



“We’re proud to partner with Closed Loop Partners and other leading retailers to take on a challenge facing the entire industry. We welcome others to join us in this collective effort as we aim to design a better solution.”

Amanda Nusz
Vice President of Corporate Responsibility, Target



“By coming together to tackle the problem, we aim to accelerate the pace of innovation and the commercialization of sustainable solutions.”

Kathleen McLaughlin
Executive Vice President and Chief Sustainability Officer for Walmart

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The Center for the Circular Economy

NextGen Consortium & the Consortium to Reinvent the Retail Bag



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Public-Private Partnerships

On its own, the private sector is limited in its ability to bring about systemic change. Public-private partnerships between government and business have the potential to accelerate the circular economy in ways that neither can accomplish alone. We can look to local examples where these kinds of partnerships show us a starting point for larger collaborations in the future. Examples include Arizona State University's RISN incubator that helps to guide, build and scale circular companies, or the city of Boulder, Colorado, which created a network of nonprofit, for-profit, government and community partnerships to successfully increase recycling rates and work towards their zero waste goals.



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► **Global Commitments**

Global Commitments

Pacts and global partnerships bring together different levels of government, corporations, NGOs, universities and individuals in a shared purpose. Holding one another accountable and creating multi-stakeholder collaborations are essential to scale the circular economy.

Over 450 signatories of the New Plastics Economy Global Commitment envision a circular economy in which plastic never becomes waste.²⁸ The vision is supported by the Ellen MacArthur Foundation and the United Nations Environment Programme, and is built on six pillars. Similarly, the Sustainable Ocean Principles has stakeholders from internationally leading companies, industry associations, financial institutions, UN specialized agencies and academic institutions in agreement on sustainable ocean business practices and goals. Further, the World Economic Forum (WEF) has a Circular Economy Initiative that brings together public and private players to accelerate the transition to circularity. The Initiative includes the Platform for Accelerating the Circular Economy

(PACE), the Global Plastic Action Partnership (GPAP), the Circular Electronics Action Partnership, the Global Battery Alliance and Scale360^o.²⁹ Through these projects and platforms, WEF aims to advance leadership commitment, transform material value chains and scale innovation and the 4IR (4th industrial revolution).

These commitments, and others, provide focused and concrete goals. As progress is measured, these commitments provide broadscale comparability and enable participants to benchmark against one another. Signatories become resources for one another to advance toward a shared goal and scale solutions.

Conclusion

We now find ourselves at a key inflection point. We are inspired by the headway that has been made thus far, but are facing the urgency of a rapidly evolving world that needs to address the impacts of climate change, compounded by a global pandemic. As we navigate these unprecedented times, the transition to a circular economy has become more critical than ever. We need supply chains that are more resilient, systems that are less wasteful and societies that are more inclusive, fighting against environmental injustices that have put many at an unfair risk. The findings in this report reflect not only a shift in our thinking around production and consumption, but also lay the foundation for a sea change in how our global economy flows.

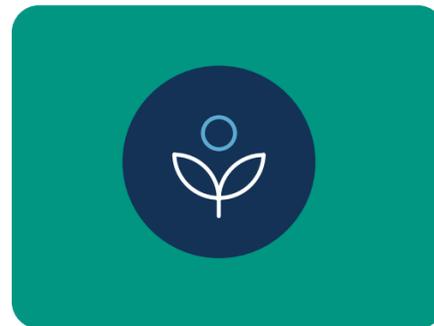
Changes in investment, innovation, policy and partnerships are driving the circular economy forward, but there is still much to do. Robust investments and strong market forces embolden us to maximize materials and their monetary value, now that we're proving the economics of doing so. Continuous innovations advance new ways to address challenges at every point in the value

chain, designing in sustainability and designing out waste. Policy weaves circularity into the fabric of the U.S., with New York, Houston, Austin, Phoenix and Charlotte leading the charge towards resiliency, as more cities follow suit. Lastly, but most certainly not least, unexpected partnerships unlock power and influence. Harnessing these synergies will steer us in the right direction.

The sustainable and profitable future that we all aspire for is within reach only when investors, corporations, governments, nonprofits, startups, communities and individuals are invited to come together and bring their own efforts and expertise to the table. It is by seeing and understanding the entire system from different vantage points that we can grow the circular economy to its full potential—achieving prosperity without compromising the planet. Collaboration is at the core of this work, and we ask that you join us in advancing solutions that build a smarter, stronger, more resilient and more sustainable tomorrow.

What's Next?

Together, Let's Drive Forward the Circular Economy



INVESTMENT

Catalyze additional capital flows from diverse sources into advancing and accelerating the transition to a circular economy



INNOVATION

Explore emerging materials, recovery technologies and delivery models that rethink the status quo and enhance circular systems



POLICY

Work collaboratively with policymakers to ensure enduring circularity, inclusivity and resiliency



PARTNERSHIP

Galvanize partnerships to drive impact at scale, benefit multiple stakeholders and drive system-wide change

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