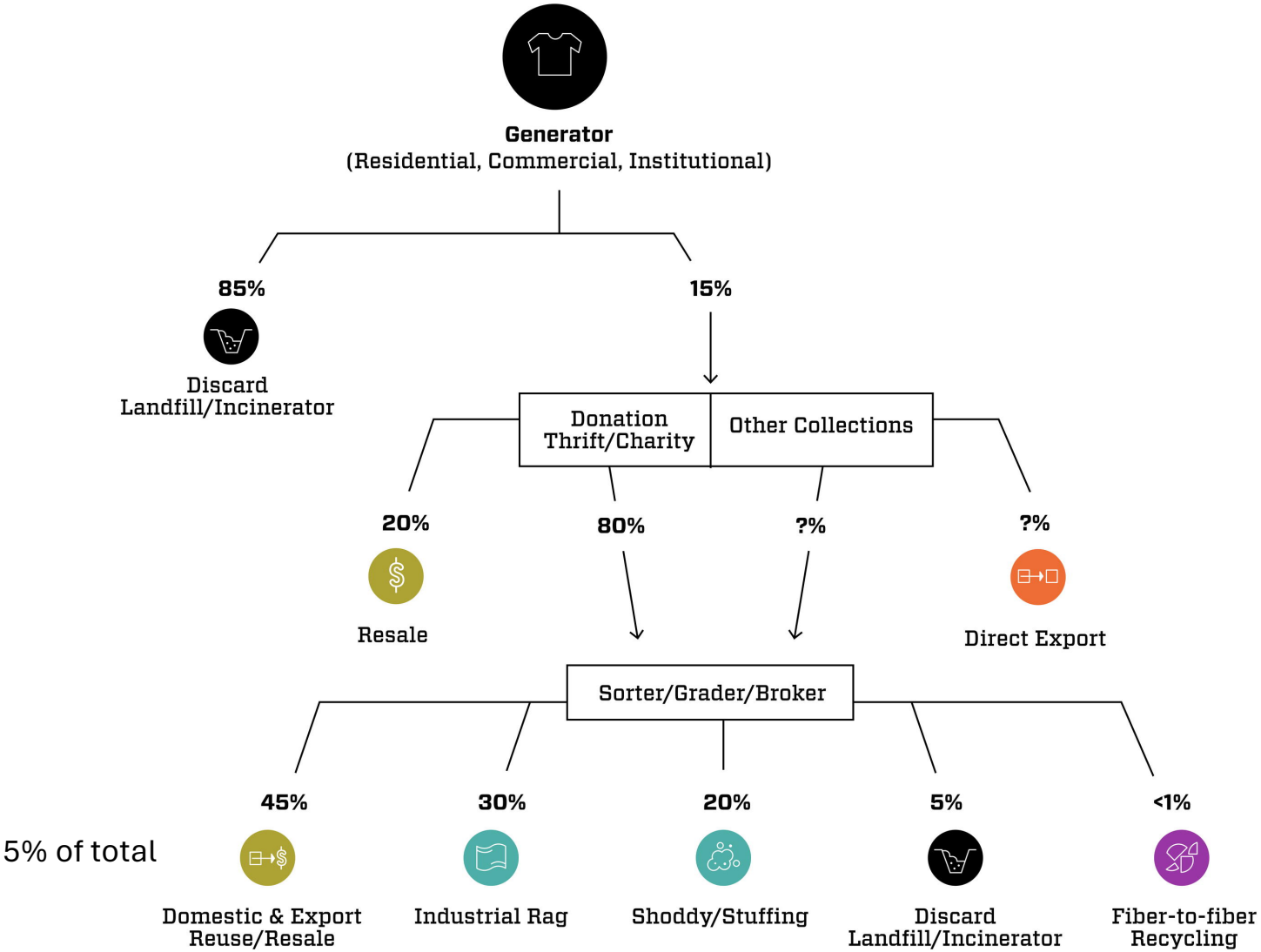
Textiles


Generator
(Residential, Commercial, Institutional)
85%
Discard
Landfill/Incinerator
15%
Donation
Thrift/Charity
Other Collections
20%
Resale
80%
?%
?%
Direct Export
Sorter/Grader/Broker
45%
Domestic & Export
Reuse/Resale
30%
Industrial Rag
20%
Shoddy/Stuffing
5%
Discard
Landfill/Incinerator
<1%
Fiber-to-fiber
Recycling

5% of total

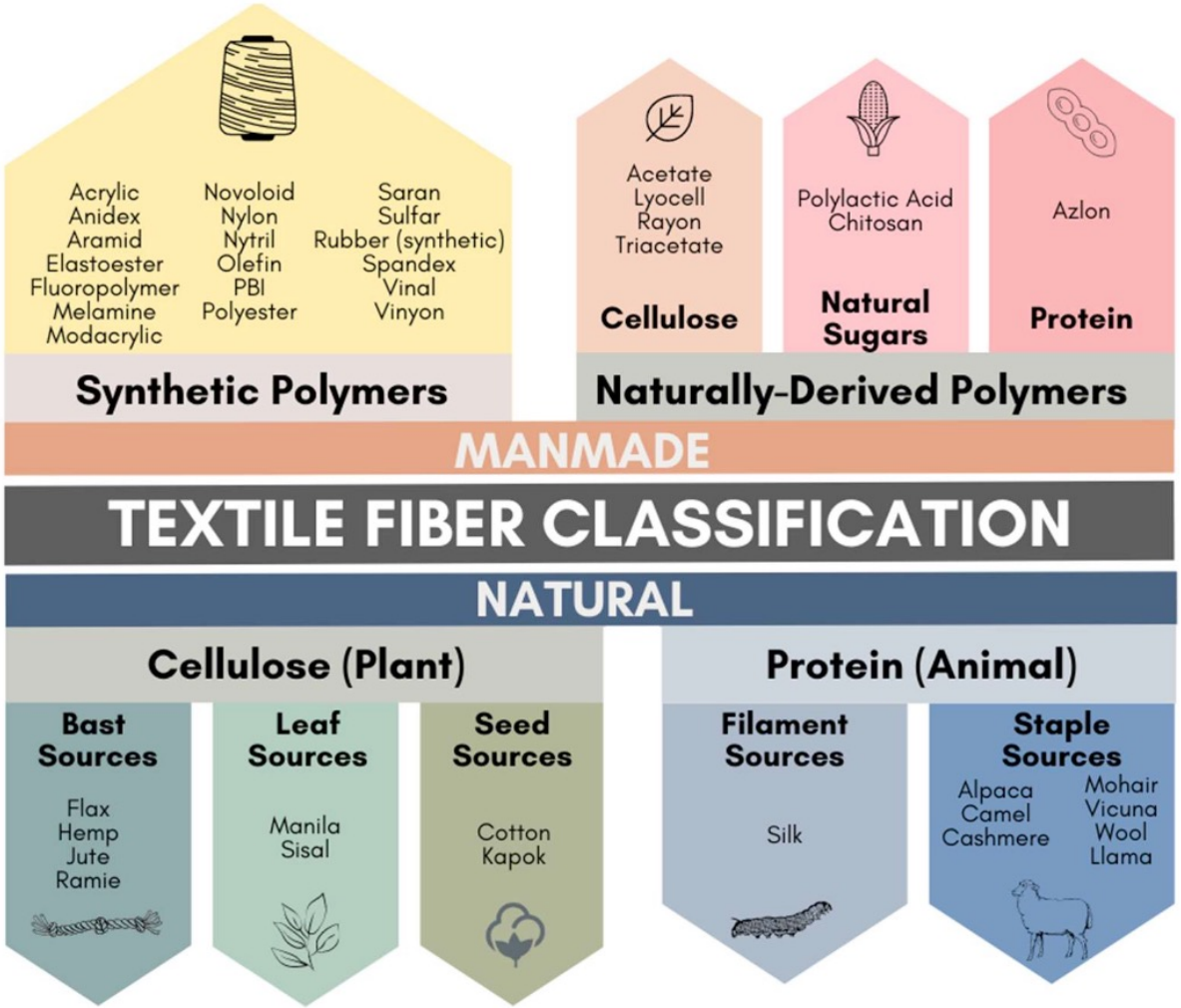


Figure 1: Classification by fiber type (adapted from [5, 6])

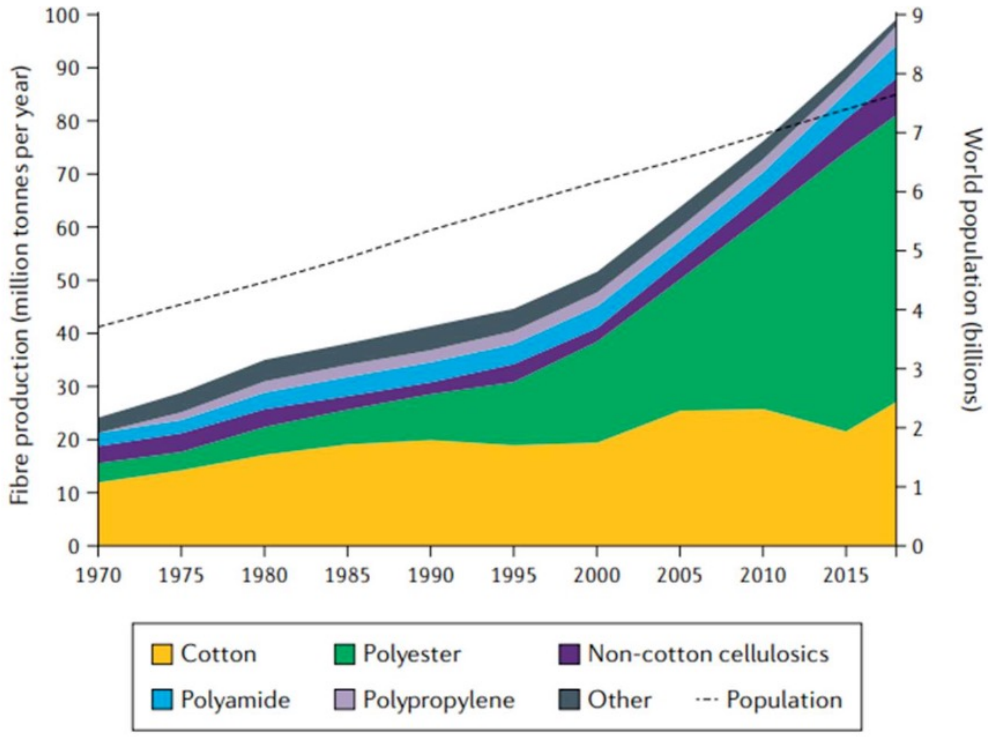


Figure 3: Growth in textile production by fiber type and total world population (used with permission from [1])

Textiles

Textiles include clothing, shoes, bedding, towels, upholstery fabrics and carpeting

But mostly Clothing

2018 each person in the US discarded 103 lbs of clothing

EPA estimated that the generation of textiles in 2018 was 17 million tons. This figure represents 5.8 percent of total MSW generation

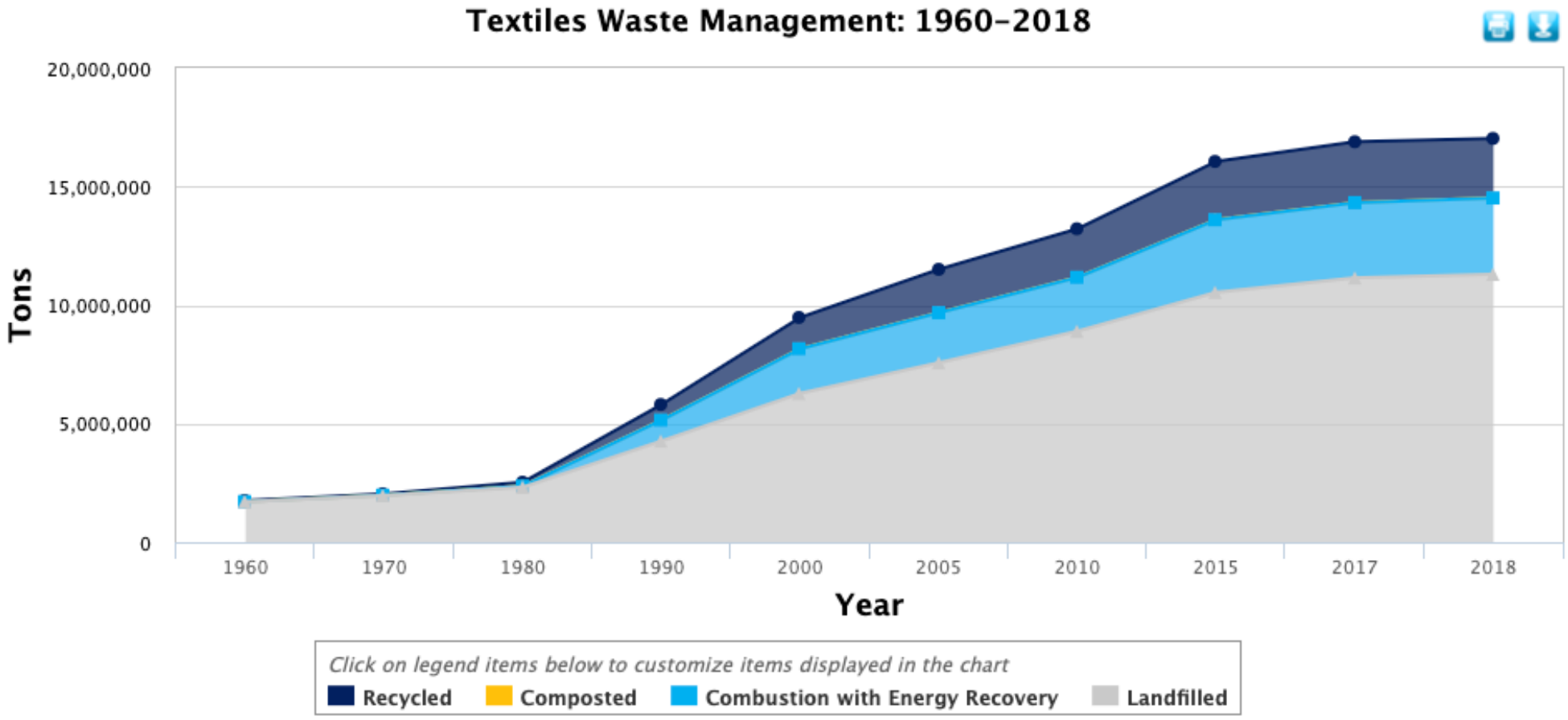
The recycling rate for all textiles was 14.7 percent in 2018, with 2.5 million tons recycled. Within this figure, EPA estimated that the recycling rate for textiles in clothing and footwear was 13 percent based on information from the American Textile Recycling Service. The rate for items such as sheets and pillowcases was 15.8 percent in 2018.

Textiles

1960-2018 Data on Textiles in MSW by Weight (in thousands of U.S. tons)

Management Pathway	1960	1970	1980	1990	2000	2005	2010	2015	2017	2018
Generation	1,760	2,040	2,530	5,810	9,480	11,510	13,220	16,060	16,890	17,030
Recycled	50	60	160	660	1,320	1,830	2,050	2,460	2,570	2,510
Composted	-	-	-	-	-	-	-	-	-	-
Combustion with Energy Recovery	-	10	50	880	1,880	2,110	2,270	3,060	3,170	3,220
Landfilled	1,710	1,970	2,320	4,270	6,280	7,570	8,900	10,540	11,150	11,300

Sources: American Apparel and Footwear Association, International Trade Commission, the U.S. Department of Commerce's Office of Textiles and Apparel, and the Council for Textile Recycling.


Textiles Waste Management: 1960-2018
20,000,000
15,000,000
10,000,000
5,000,000
0
Tons
1960
1970
1980
1990
2000
2005
2010
2015
2017
2018
Year
Click on legend items below to customize items displayed in the chart
Recycled
Composted
Combustion with Energy Recovery
Landfilled

Textile Waste

Post-industrial:	Waste generated before it reaches the consumer, i.e., during the manufacturing process. Often called pre-consumer waste [18]. Tends to be the cleanest and easiest stream of which identify material compositions.	DEFINITIONS
Post-consumer:	Waste generated by the consumer after use. Highest volume stream but includes blends of all fiber types and often contain contaminants.	
Residential:	Post-consumer textiles worn by general consumers or used in residential settings	
Non-residential:	Post-consumer textiles used for professional uniforms, hospital linens, and industrial, commercial, and institutional (ICNI) applications	

Textile Waste

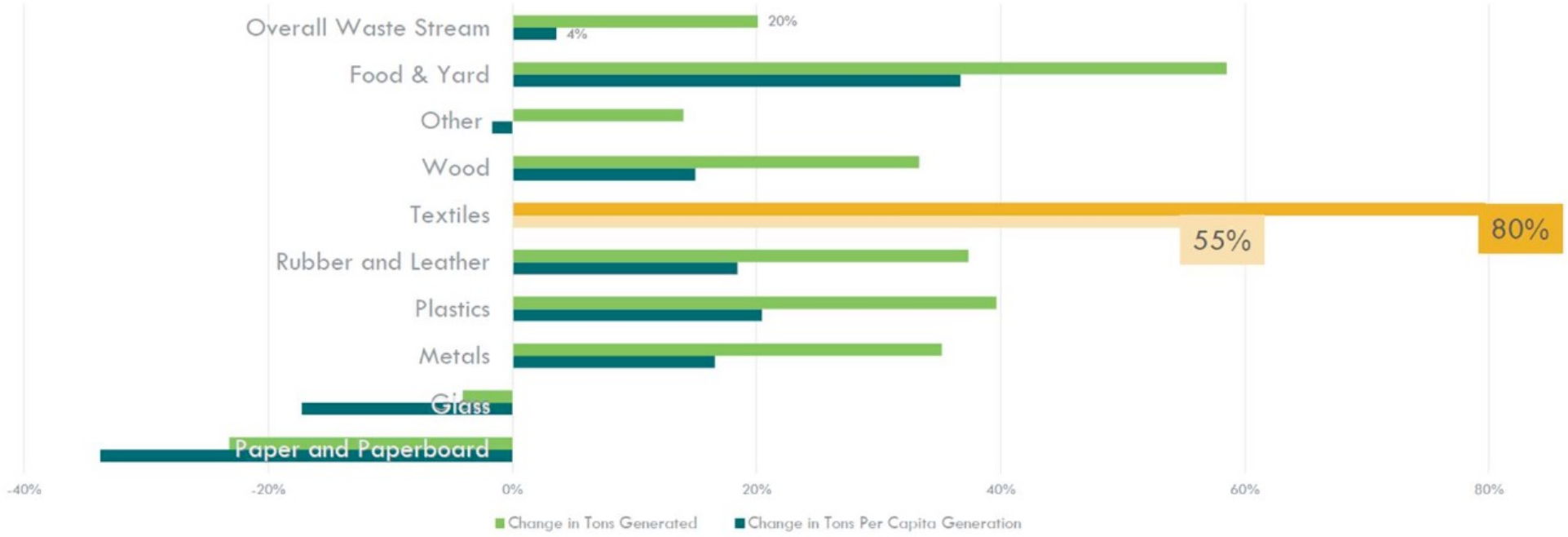


Figure 4: Percent change in absolute tons and tons per capita waste generation 2000-2018 (used with permission from [17])

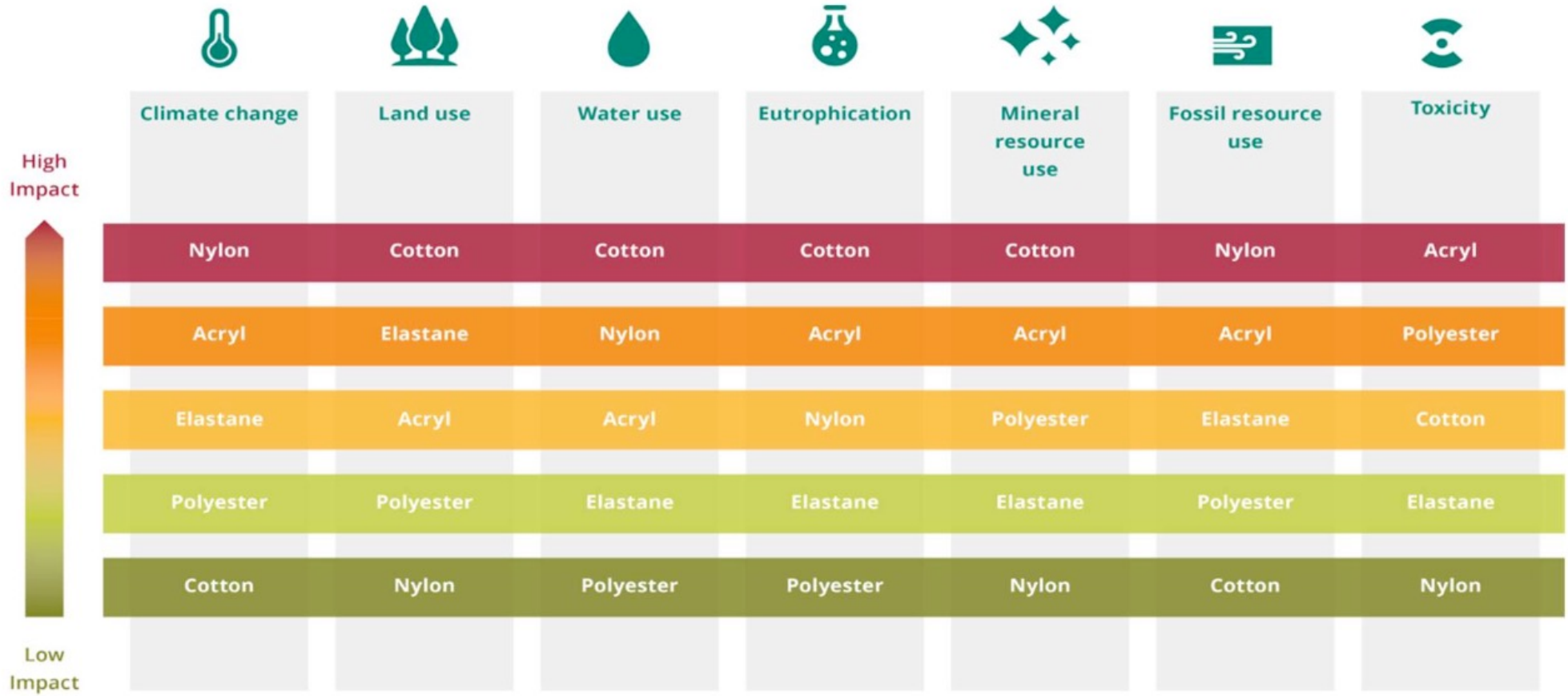


Figure 6: Impact of manufacturing of 1 kg dyed woven fabric (used with permission from [9])

Textile Greenhouse Gas

- Annually the industry consumes 1 trillion kilowatt hours of electricity
- GHG emissions from textile production total 1.2 billion tons of CO2 equivalent
- The fashion industry contributes around 10 % of global GHG emissions annually
- Textiles is the 5th leading industry in terms of GHG emissions in the European Union
- Industry emissions are projected to increase more than 60 % by 2030

Textile Water Use

- The fashion industry is the world's second largest consumer of the world's water supply
- 20 trillion liters of water are used by industry every year
- Water use in the fashion industry is expected to increase by upwards of 50 % by 2030
- 20 % of water pollution is from textile treatment and dying
- 17 % to 20 % of ALL industrial wastewater comes from the textile industry (citing the World Health Organization (WHO))
- Fashion is the second biggest polluter of clean water in the world, after agriculture (citing the WHO)
- In China, the textile industry is the leading cause of water pollution

Textile Chemicals

1. Agrochemicals are used on natural fiber crops
2. Synthetic fibers necessitate different degrees of chemicals
3. Spinning and weaving, utilize lubricants, accelerators, and solvents
4. Wet processing of fabrics uses chemicals such as bleaches, dyes, processing aides, and water and stain repellents
5. Per- and polyfluoroalkyl substances (PFAS) are widely used for “waterproof,” “water resistant,” or “stain-resistant”

Textile Microplastics

- Emissions are mainly from China, with large percentages from North America, Southeast Asia, and Western Europe
- Fashion accounts for 20 % to 35 % of microplastic flows to the ocean (citing McKinsey)
- At least 35 % of microplastics in our oceans, drinking water, and air are from textiles
- Microfibers are in our food (salt, beer, tea, drinking water, seafood), air, water, ingested by organisms across the planet and found in our feces

Textile Social Impacts

Employment: variable numbers 65 million people, 85 % of whom are women or 300 million people worldwide

Low-income regions of the world lack occupational health and safety regulations, minimum wage requirements, or child labor restrictions

Collapse of the Rana Plaza building in Dhaka, Bangladesh, which housed five garment factories and resulted in the death of over 1,100 people (24 April 2013)

Recent changes in Textiles causing problems

1) **”Fast-Fashion”**
2) **increased production of synthetic fiber (e.g., polyester, nylon)**
3) **Value chain is setup for linear economy**

Agriculture or petrochemical, garment industry, distribution, retail
Produce => Use => Dispose model

Figure 2: Current value chain of textiles (used with permission from [8])

Transition to Reuse Repair Recycle

Currently 15% much is shipped to the developing world

Goodwill (for example)

$ Textiles donated to Goodwill $

Regional Collection Warehouse
Goodwill Retail Stores
Goodwill Outlet Stores
Salvage Buyers (Export)
Landfill (5%)

Shipped to Africa

“Fast-Fashion”

- Traditionally, 4 fashion cycles produced per year, today fast fashion produces 50+ cycles/year
- 100 billion items of clothing are produced each year
- Fashion brands produce almost 2x the amount of clothing today than they did before the year 2000
- On average, consumers wear a garment seven times before getting rid of it
- More than 50 billion garments are thrown away within 12 months of being made

Textiles

Fast fashion is the business model of replicating recent catwalk trends and high-fashion designs, mass-producing them at a low cost, and bringing them to retail quickly while demand is at its highest. The term *fast fashion* is also used generically to describe the products of this business model, particularly clothing and footwear. Retailers who employ the fast fashion strategy include Primark, H&M, Shein, and Zara,[1] all of which have become large multinationals by driving high turnover of inexpensive seasonal and trendy clothing that appeals to fashion-conscious consumers.

Clothes for sale at a Zara store in Hong Kong

In 2014, the average person purchased 60 percent more articles of clothing and kept said clothing for half as long compared to the year 2000.

Clothes for sale at a Zara store in Hong Kong

The former "Big Biba" building, circa 2006

Retailers who employ the fast fashion strategy include Primark, H&M, Shein, and Zara,[1] all of which have become large multinationals by driving high turnover of inexpensive seasonal and trendy clothing that appeals to fashion-conscious consumers.

A H&M store in Downtown Montreal

Textiles

The global fashion industry is responsible for 8–10% of global carbon emissions per year, to which fast fashion is a large contributor.


LESS _ LESS
NEW = CO_2
Fast Fashion
KILLT das KLIMA
SCIENCE
NOT
OPINION
SYSTEM CHANGE
NOT
CLIMATE CHANGE
RENEWABLE
Wear

To make fast fashion more sustainable:

•**Zero-waste pattern cutting:** This technique eliminates potential textile waste right at the design stage, where the pattern pieces are strategically laid like a jigsaw puzzle onto a precisely measured piece of fabric.

•**Minimal seam construction:** This technique allows faster manufacturing time by lessening the number of seams that are necessary to stitch a garment.

•**Design for disassembly (DfD):** The main intention of this strategy involves designing a product in such a way that it can be easily taken apart at the end of its lifespan and this allows the use of fewer materials

•**Craft preservation:** This technique combines and incorporates ancestral craft techniques into modern designs and in a way it ensures preservation of traditional craftsmanship through innovation.

•**Pull factor framework:** Brands such as L.L.Bean and Harvey Nichols have implemented a pull factor framework, which is a new methodology that strives to make sustainable innovation more enticing for consumers and producers alike.

Key Challenges for Cyclic Textiles

1. Infrastructure and systems for collection of waste textiles
   not well established

2. Sorting and grading
   rely on expensive manual labor, No harmonized sorting standards

3. Commercial-scale recycling
   fiber-type dependent, require pure feedstock, separation of blends and removal of dyes, additives, and finishes

4. Textile circularity is not economical

5. Large-scale reuse, repair, and recycling is hindered by high transportation, labor, and processing costs

Opportunities for Advancement

1. Harmonization of terminology, standards
2. Publicly available databases, registries and repositories
3. Advanced labeling strategies
4. Improve sorting-grading and preprocessing
5. Advanced recycling process development
6. Product design, recycled content requirements
7. Alternative businesses models
8. Standards for collection, recycling feedstock, sustainable procurement, and microplastic fiber testing
9. Policy economic incentives, public procurement, bans, mandates, EPR
10. Education and outreach
11. Economic assessment
12. Communication across sectors and value chain

Textile Collection

Challenges to Textile Collection

- No established infrastructure for convenient, consistent, widespread, and reliable collection
- No harmonized textile collection rules or standards
- Materials must be clean, dry, and have no odor or hazardous chemicals to maintain value
- High transportation costs

Opportunities to Advance Textile Collection

- Need significant evolutionary change, not incremental improvement
- Expanding collection on the scale necessary requires involvement from brands, retailers, as well as legislation
- Need harmonized collection rules with an emphasis on preserving the quality without contamination
- Consumers need to recognize the value of used textiles and know options and best practices for collection

CHALLENGES & OPPORTUNITIES

Textiles

- Rubber-band shoes together when you donate them, so they stay together! There is no resale value in one shoe, and donation centers don't necessarily have the capacity to search for missing partners.
- Similarly, bag or band together infant and children clothing sets, such as pajamas.
- Keep in mind that pure-fiber textiles, such as 100% cotton or wool, are recyclable, while blended textiles currently are not.
- New synthetic (e.g., polyester) clothing is a significant source of microplastics in the environment. But roughly 90% of those microplastics are lost in the first three launderings. Buying these items secondhand can help reduce the problem.

Textile Sorting and Grading

Challenges to Textile Sorting and Grading

- Currently relies on manual labor, which is expensive
- Human eye is incapable of identifying fiber composition
- Existing technologies are incapable of screening for current styles and trends or identifying rips, stains, or wear
- No harmonized sorting standards or criteria
- Fiber identification, especially with fiber blends

Opportunities to Advance Textile Sorting-Grading

- Development of high-speed automated sorting systems
- Dedicated domestic sorting facilities
- Digital identification on products

CHALLENGES & OPPORTUNITIES

Textile Reuse and Repair

Challenges to Reuse and Repair

- Lagging consumer and industry acceptance that reuse is the preferred path with the least social and environmental impacts
- Materials must be clean and dry and have no odor or hazardous chemicals
- People throw unwanted materials away and do not understand reuse capabilities
- General public lacks knowledge, tools, interest, or time to repair garments
- High transportation costs – especially if dealing with large volumes
- Disenfranchised repair industry
- Fast fashion clothing quality is inferior, not suitable for resell or conversion and appropriate only for lower uses, e.g., wiping rags

Opportunities to Advance Reuse and Repair

- Education regarding garment repair, as well as sources for repair support
- Consumer education on donating and purchasing used products
- Build industry acceptance and support for resell and repair industries

CHALLENGES & OPPORTUNITIES

$150/pair
$ 90 for last years model
Resole costs
$50-60
Difficult to justify resoling

Textile Recycling

Recycling:	Converting textile waste into something of roughly the same value; Often referred to as fiber recycling (e.g., recovery of fibers back into fibers). This term is often also used as a catch-all for all forms recovery pathways (whether up-, down-, open-, or closed-loop).
Upcycling:	Turning wasted textile material into something of higher value; Often referred to as fabric recycling (e.g., making new garments with materials from allegedly old or used textiles)
Downcycling:	Turning wasted textile material into something of lower value (e.g., industrial rags, shoddy/stuffing, carpet padding, insulation)
Closed-loop recycling:	The material from a product is recycled and used in a similar or identical product
Open-loop recycling:	Material from a product is recycled and used in different products (often referred to as cascade recycling)

DEFINITIONS

Challenges to Textile Recycling

- Recycling economics require subsidization *[Both]*
- No dedicated funding for scaling of recycling technologies *[Both]*
- Removal of dyes, additives, finishes (e.g., functional coatings) *[Both]*
- Only conducive for pure fiber (not blends) *[Mechanical, some Chemical]*
- Degradation of fibers (length, strength, softness) during processing *[Mechanical]*
- Post-consumer textiles do not produce high-quality recycled fiber *[Mechanical]*
- High temperature, pressure, time, and cost requirements *[Chemical]*
- Some processes use/produce hazardous chemicals *[Chemical]*
- Requires pure, reliable, high-volume feedstock *[Chemical]*
- Separation of poly/cotton blends *[Chemical]*
- No processes for select fiber types (Nylon 6,6, elastane) *[Chemical]*
- Unknown energy consumption and overall environmental impacts *[Chemical]*

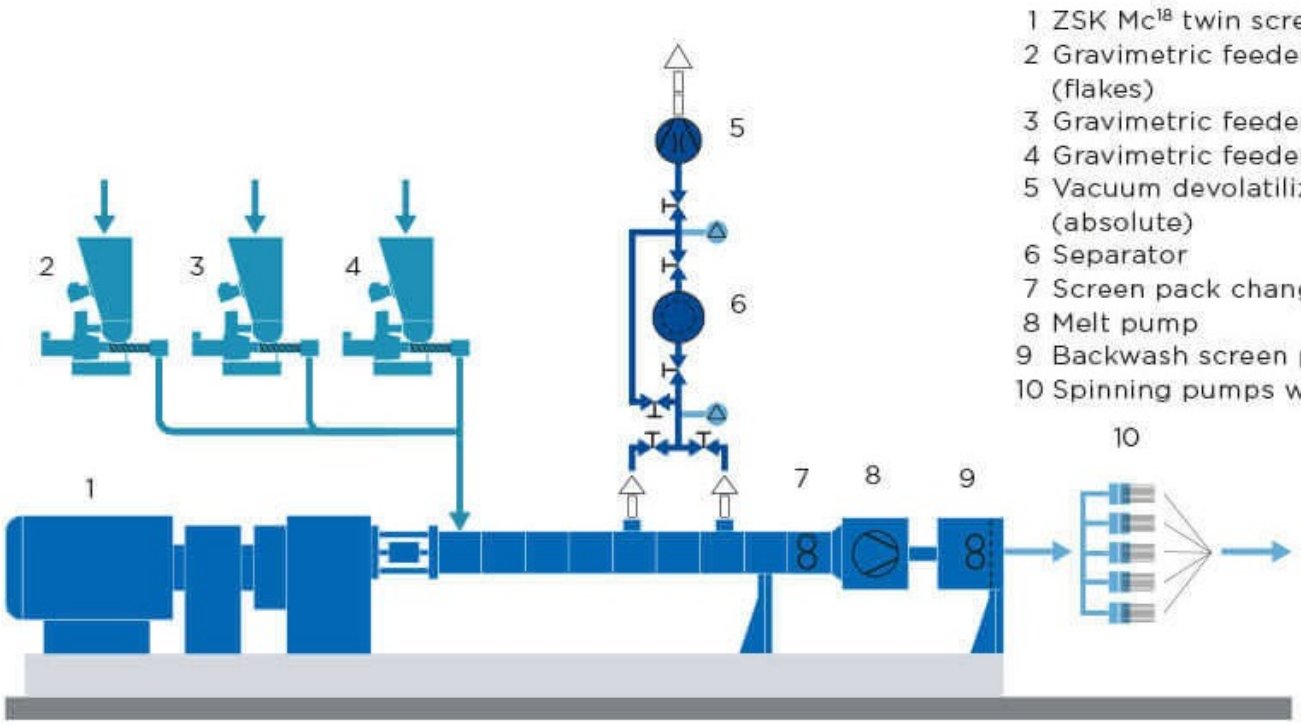
Opportunities to Advance Recycling

- Development of post-consumer textile supply chain
- Development of domestic recycling options
- Advancements in separation of components (e.g., carpets)
- Advancements in separation of blended fibers
- Standardized methods for removal of buttons, zippers, etc.
- Methods to separate and process non-cellulosic/polyester content (e.g., elastane)

CHALLENGES & OPPORTUNITIES

Recycled Plastics to Textiles

Typical set-up for devolatilizing recycled material - bottle to fiber

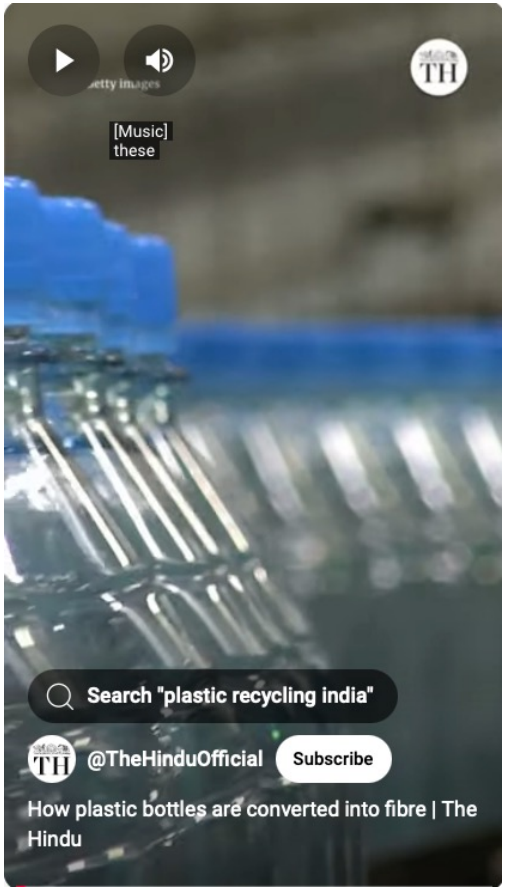


1 ZSK Mc^{18} twin screw extruder
2 Gravimetric feeder for recycled PET bottles (flakes)
3 Gravimetric feeder for new PET product
4 Gravimetric feeder for masterbatch
5 Vacuum devolatilization at 1-5 mbar (absolute)
6 Separator
7 Screen pack changer SWZ
8 Melt pump
9 Backwash screen pack changer
10 Spinning pumps with filters and spinnerets

Recycled Plastics to Textiles

Bottles to Fibers Video

- Polyester most widely used fiber
- 14 % comes from recycled inputs
- Target is 45 % by 2025
- Competition with bottle recycle



Stakeholders to be Included

- Charity and thrift sector
- Sorters/graders (domestic & international)
- Global reuse end markets
- Technology providers (sorting and identification technologies)
- Equipment manufacturers
- Textile and apparel brands, manufacturers, and retailers
- Small and medium-sized enterprises (SMEs), including designers and intermediaries (e.g., wholesalers, distributors)
- Local repair businesses
- Local environmental community
- NGOs and advocacy groups
- Haulers, collectors, and bin operators
- Regional waste and recycling managers and waste auditors
- Academic institutions
- Professional experts in textile production and recovery
- Industry associations such as SMART, the Council for Textile Recycling, Textile Exchange, etc.

COLLABORATION

Unclear or Controversial Terms

- Biodegradable vs bio-based plastics
- Contaminant (e.g., chemicals introduced by design vs result of product use)
- Downcycling vs upcycling
- Open loop vs closed loop recycling
- End-of-life
- “Made with recycled materials”
- Pre-consumer, post-consumer vs post-industrial
- Recycling vs reuse vs repurpose
- Recycling rate
- Residential, non-residential vs commercial waste
- Sustainable
- ‘Waste’ vs ‘secondary raw material’

TERMINOLOGY

Textile Labels

CHALLENGES & OPPORTUNITIES

Labeling Challenges

- Fiber composition on labels is often inaccurate
- Labels are designed for consumer, not circular partners
- Labels are often removed
- Only fibers that comprise 5 % or more of a product need to be identified
- Non-fibrous materials not required to be identified

Labeling Opportunities

- Digital product identification/product passport
- Transparency of materials and chemicals in products

CHALLENGES & OPPORTUNITIES

Design Challenges

- Contradiction between design for durability and design for recycling (DfR)
- Current design does not consider the full lifecycle of product
- How to include EoL procedures into design?

Design Opportunities

- Need to commit to purity (not mix fiber types)
- Increase demand for sustainable fiber types (e.g., organic, recycled)
- Need to design with the full lifecycle in mind
- Design for performance/fashion AND recyclability
- Increased communication and feedback loops
- Development of design guidelines to inform DfR

DfR (design for reliability) is a process that ensures a product, or system, performs a specified function within a given environment over the expected lifetime.

Needs for End Market Development

- Need downstream demand for feedstocks in combination with feedstock availability and quality
- Need brand uptake agreements that support a domestic recycler economy
- Need to rebuild domestic manufacturing
- Need to retrain consumers to appreciate the value in a product, away from reduced cost
- Need new business realities: Decrease in clothing purchasing, increase in sharing economy, e.g., swapping, leasing, renting

NEEDS

Table 2: Policy Approaches to Facilitate a Circular Economy for Textiles at the Local, State, and/or Federal Level (adapted from [17, 43, 70])

Policy Approach	Description
Partnerships:	With recovery stakeholders (incl. charities) and require reporting
Public Database:	Provide publicly accessible database of textile processors
Green purchasing:	Require public agencies to procure environmentally preferable products and include contracts with repair and recycling
Disclaimer laws:	Require disclaimers on products (e.g., recycled content)
Disposal bans & mandatory recycling:	Prohibit textiles from entering landfills/incineration; effective only when alternative collection and processing options are available and easily accessible
Extended Producer Responsibility (EPR):	Require brand owner to take financial and/or operational responsibility for EoL management of post-consumer textile waste with specified performance standards
Fees:	Eco-modulated fees (i.e., varying levels of fees on virgin raw materials and products that do not meet different thresholds of minimum recycled content criteria)
PFAS and Microplastics:	Increased research on toxicity and source reduction
Development Incentives:	Encourage the domestic development of recovery infrastructure and supply chains through grants, low-interest loans, tax incentives, zoning allowances, etc.
Incentives for sustainable sourcing:	Reduce cost pressures and reward brands/retailers who implement sustainable sourcing, use sustainable materials, make fewer new products, manage repair programs, e.g., through favorable duty treatment, tax incentives, etc.
Product and performance standards:	May include recycled content standards, mandatory retailer takeback, product certifications, etc.
Remove subsides:	On virgin fossil fuels and cotton production
Labeling standards:	Include traceability of supply chain and provide data necessary for recovery/recycling
Preferential duty benefits:	Selective tariff rates to influence where products are made and with what materials

Engagement and Education Approaches to Support Textiles Circularity

EDUCATION

Industry Education

- Webinars and courses about transitioning from linear to circular business models
- Training programs to support repair, recycling workforce
- Certification programs in circular materials management

Academic Education

- Crafting classes/activities
- Lessons about material origin, characteristics, durability, and recyclability
- Link to textiles to climate change
- Lessons about consumer role in (un)sustainable consumption
- Lessons about recycling processes, role of design
- The social benefit of conscientious consumerism and donation

General Public Education/Services: Repair

- Do it yourself (DIY) education (e.g., fix-it classes)
- Repair Cafes
- Lending libraries of repair equipment (e.g., sewing machines)
- Knitting clubs, repair clubs

General Public Education/Services: Recycling

- Where and how to donate used textiles
- What textiles can and should be donated/recycled
- What happens to textiles once they are donated or recycled

California “Carpet Stewardship Law” CA AB 2398 2010

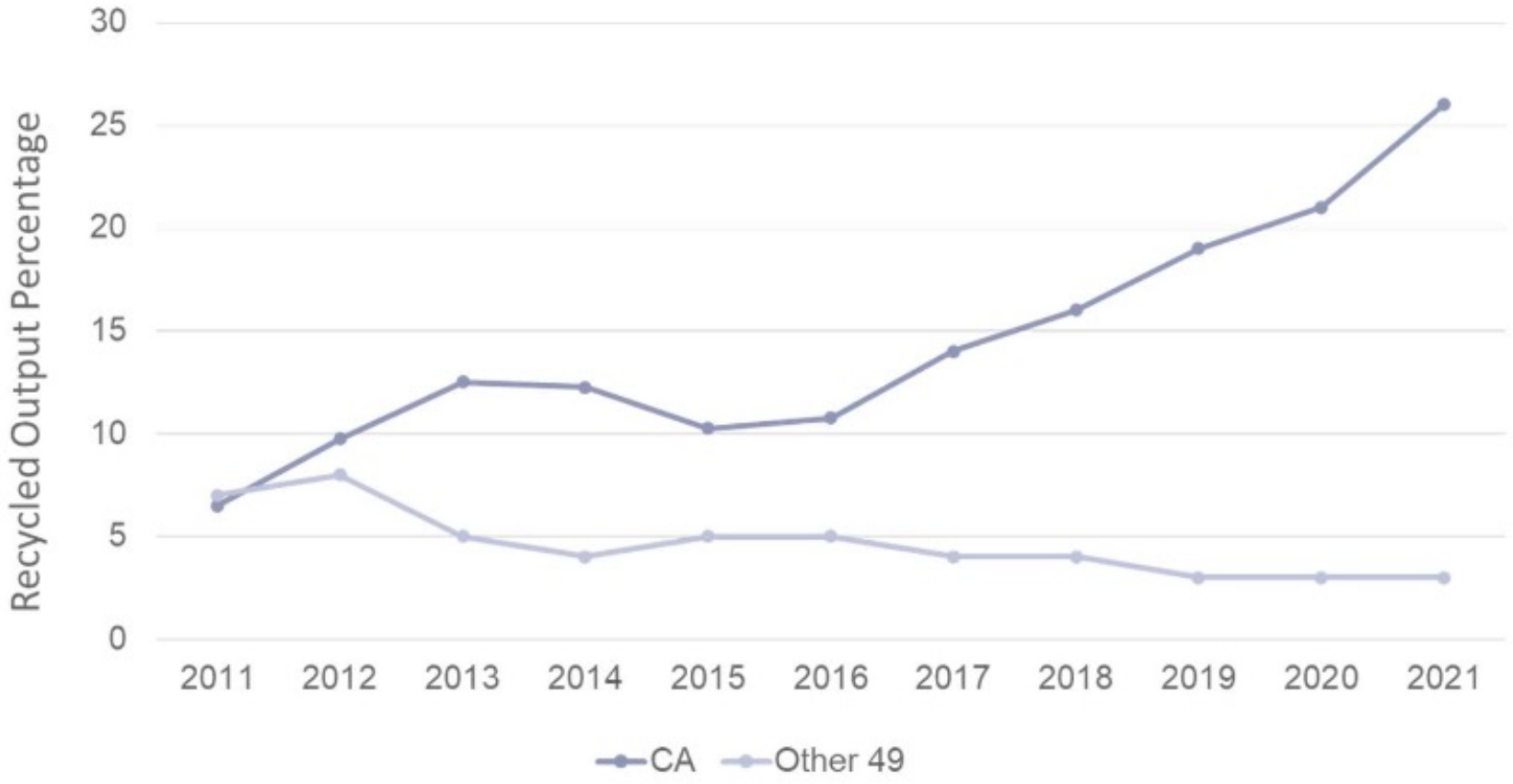
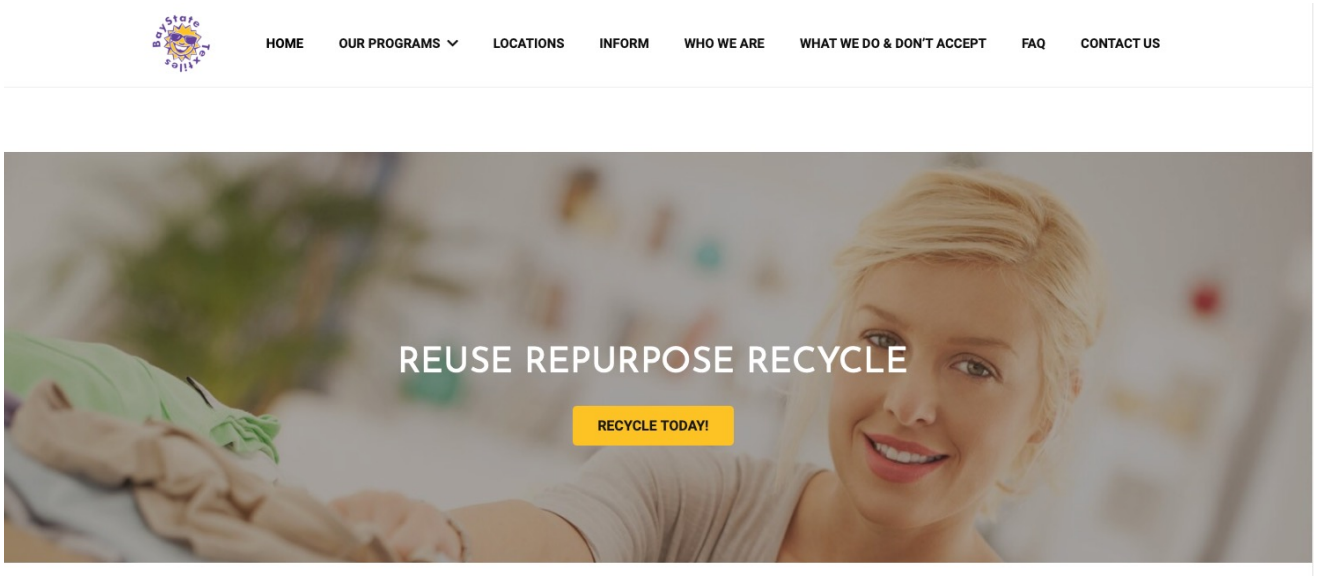


Figure C: Comparison of recycled carpet output between CA and other 49 US states [83]

Ambercycle


cycora™ by Ambercycle
ac
Our technology enables circularity
2:08 / 3:04
CC

Bay State Textiles

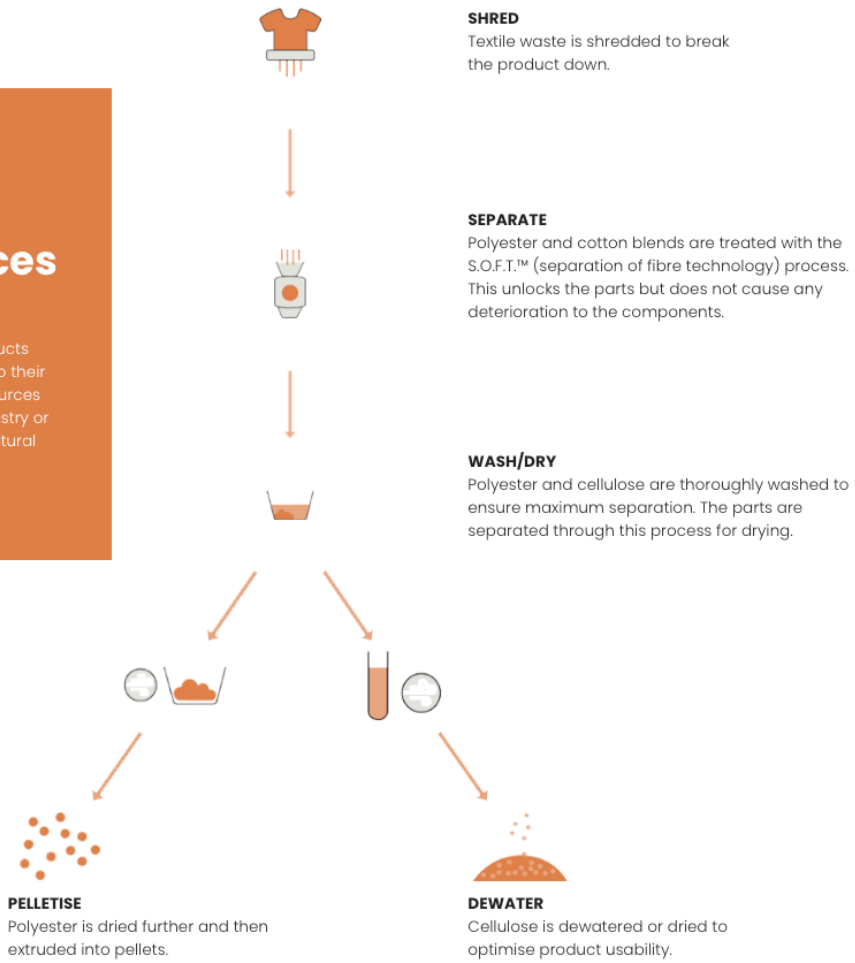


Blocktex (Australia)

STEP 2

Recovering valuable resources

Our S.O.F.T.™ (separation of fibre technology) process works by separating everyday products such as sheets, clothing and towels back into their individual raw materials. The recovered resources can then be reused back into the textile industry or into other industries such as building, agricultural and manufacturing.



SHRED
Textile waste is shredded to break the product down.

SEPARATE
Polyester and cotton blends are treated with the S.O.F.T.™ (separation of fibre technology) process. This unlocks the parts but does not cause any deterioration to the components.

WASH/DRY
Polyester and cellulose are thoroughly washed to ensure maximum separation. The parts are separated through this process for drying.

PELLETISE
Polyester is dried further and then extruded into pellets.

DEWATER
Cellulose is dewatered or dried to optimise product usability.

Bureo Fishing Nets to Sweaters

A New Wave of Recycled Material, From Fishing Nets to Finished Goods

Giving discarded fishing nets a fresh start, NetPlus material is a high-quality, high-impact solution embraced by industry-leading brands ready to take their materials program to the next level. From performance fabrics to hat brims and more, the possibilities with NetPlus material are endless.

Discover NetPlus

Carpet Recovery America

CARPET AMERICA RECOVERY EFFORT

Developing Market Based Solutions for the Recycling & Reuse of Post-Consumer Carpet

English

About | Recovery Effort | California | States | News/Blog | Conference | VPS Program | Contact Us

Recovery Effort/ Collector Finder Map

Recovery Effort

Source Reduction

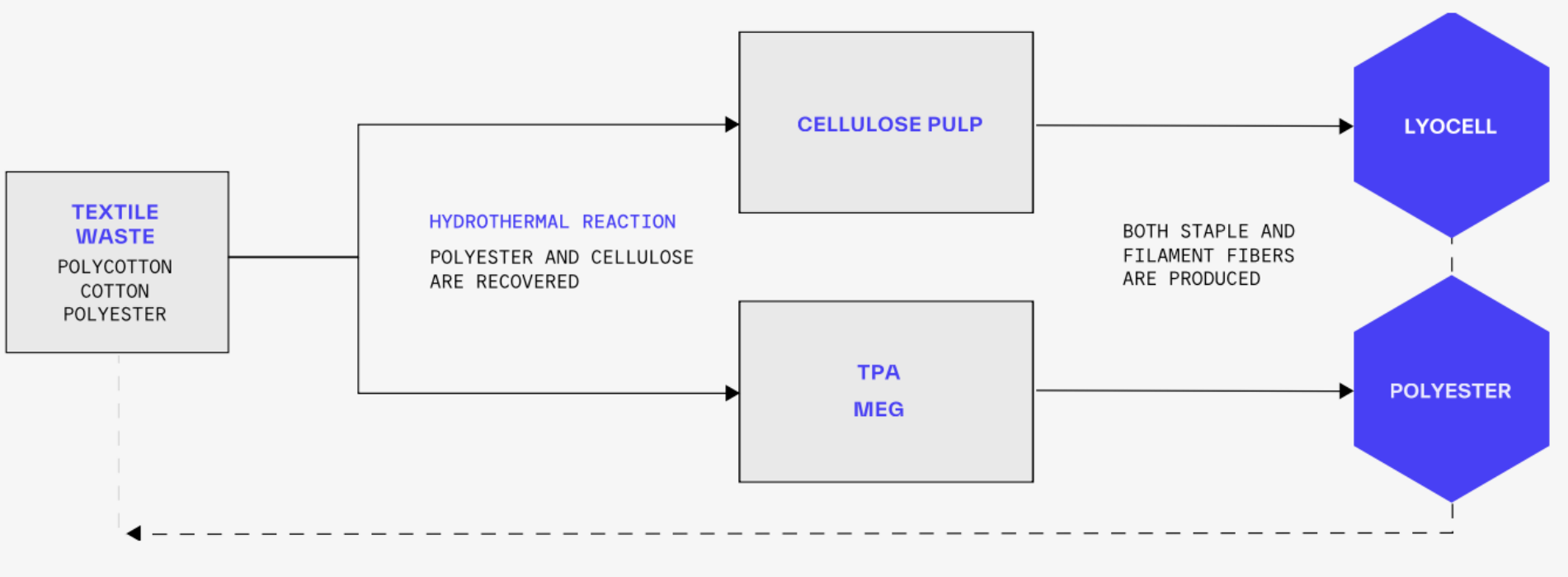
Innovation

Specs-Bid Template

Collector Finder Map

If you are seeking a collection site in California, please CLICK HERE.

CIRC Chemical Recycler of Textiles



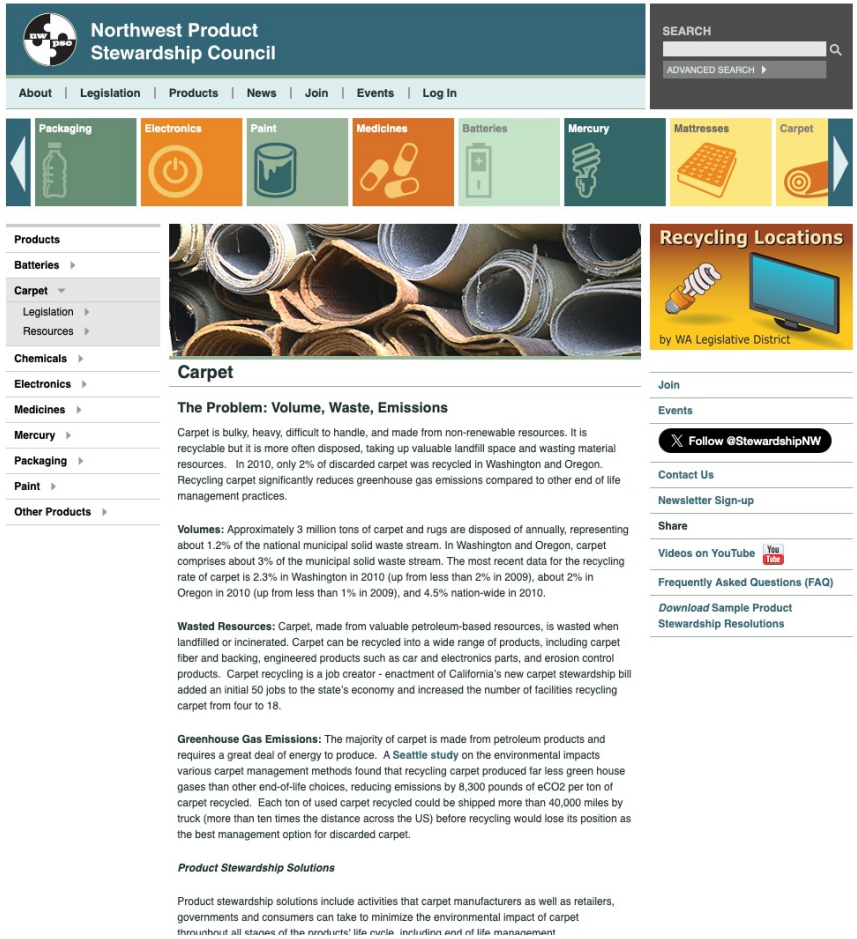
Circular Polymers for Carpet Waste

About Circular Polymers

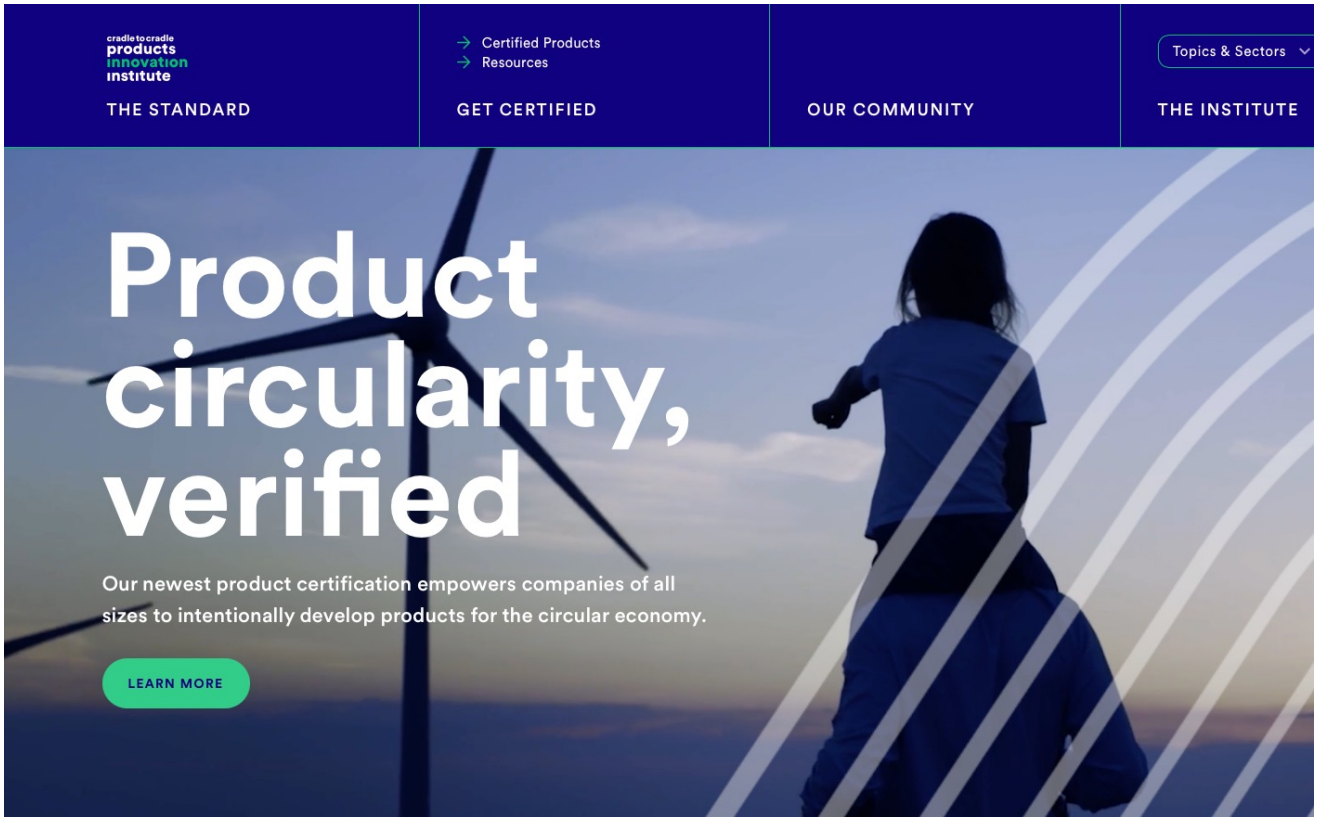
Circular Polymers' disruptive technology transforms post-consumer discarded carpet into new polymer raw materials for use by multiple industries.

Learn More

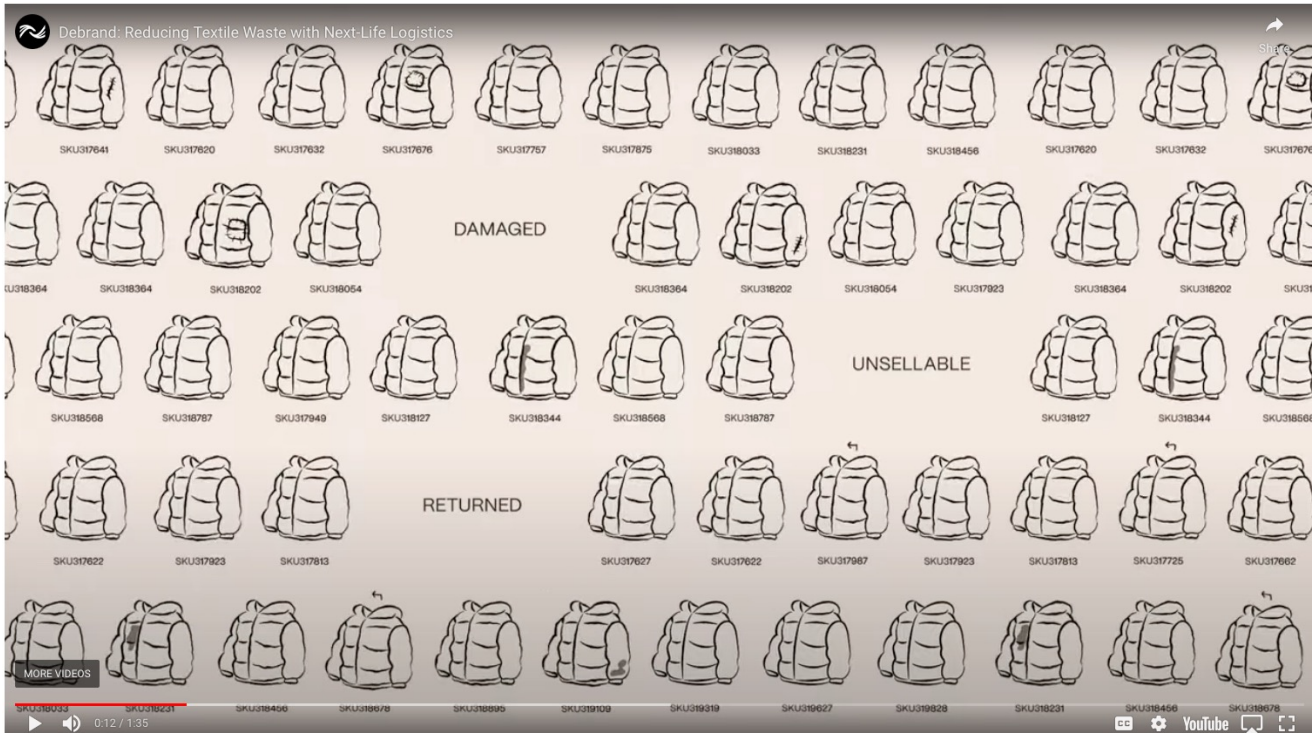
Product Stewardship Councils



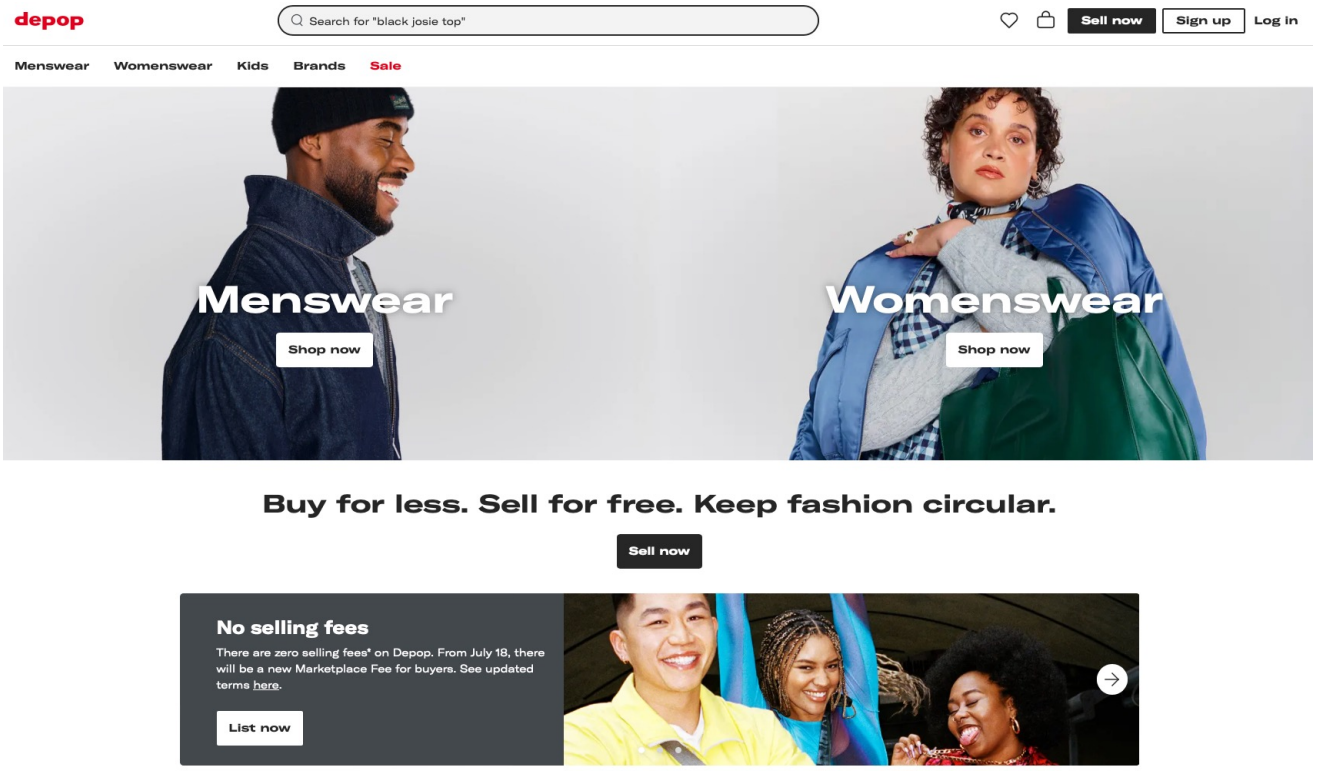
Cradle to Cradle Certification of Companies



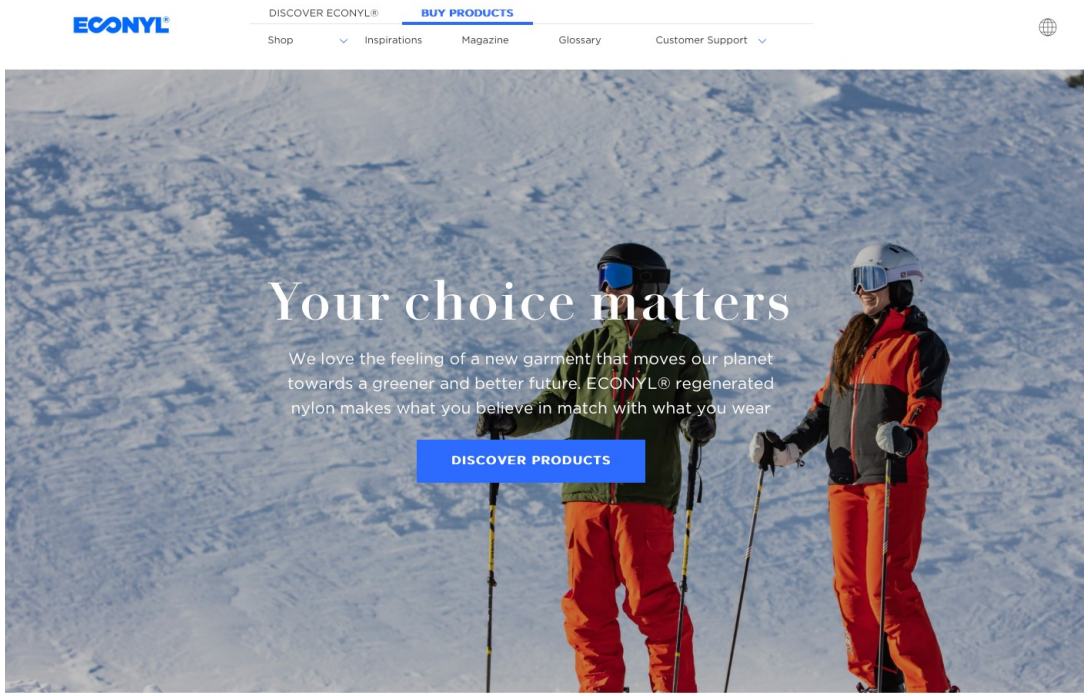
DeBrand Damaged etc cloths



Depop for clothes resale



Econyl regenerative nylon



That's why we created this Digital Hub: a place where our community can get together, make conscious purchases of products made with ECONYL®, and learn more about how to be truly sustainable. These garments can Live & Repeat, changing shape and function, and so we can help preserve our planet's resources. From waste to garment, over and over again, in a virtuous and infinite loop.

EON Circular Data Protocol (a sticker)

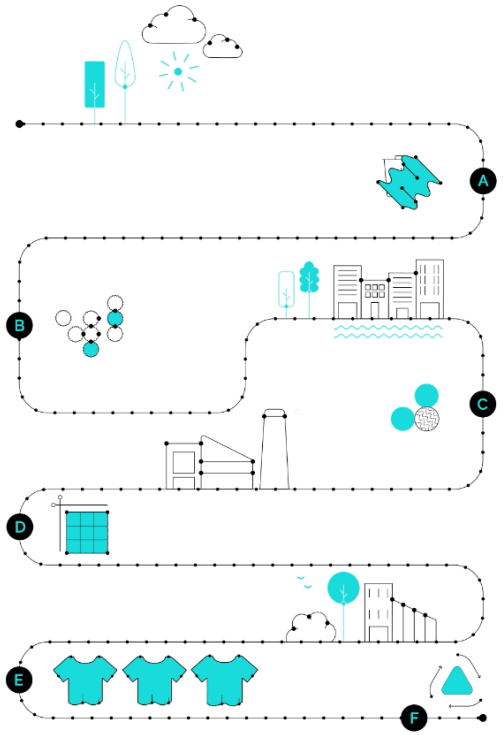
Evrnu cotton recycling (Seattle)

NUCYCL®

How the process works

- **A** COLLECT, SORT, SHRED TEXTILE WASTE
- **B** LIQUIFY/PURIFY INTO LIQUID PULP
- **C** EXTRUDE PULP INTO FIBER
- **D** WEAVE/KNIT FIBER INTO FABRIC
- **E** FABRIC IS THEN TURNED INTO GARMENTS
- **F** UNWANTED GARMENTS GET RECYCLED AGAIN AND AGAIN

The cycle starts with used cotton-rich textiles and production waste, which we work with textile recyclers, brands and retailers to source. The textile waste is then shredded, liquified, purified, and transformed into Nucycl® lyocell fiber, which looks and performs the same as, if not better than, virgin fiber. This 'new' regenerative fiber can be recycled again and again to make new products over and over.



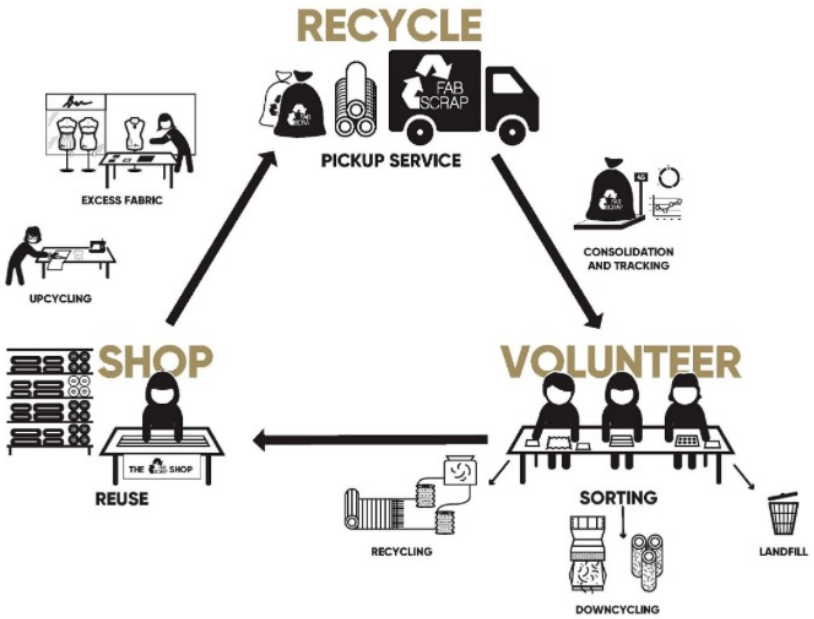
FabScrap Brooklyn fabric recycling

FABSCRAP

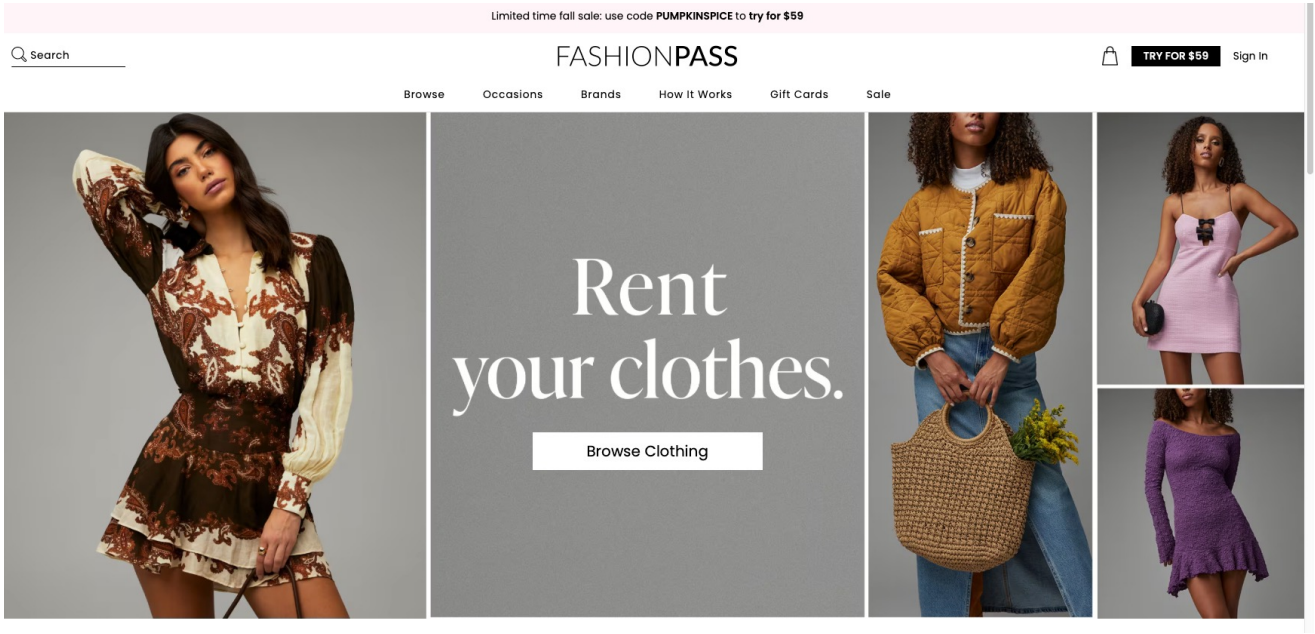
is a convenient and transparent recycling and reuse **SERVICE**,

is an affordable and accessible materials **RESOURCE**, and

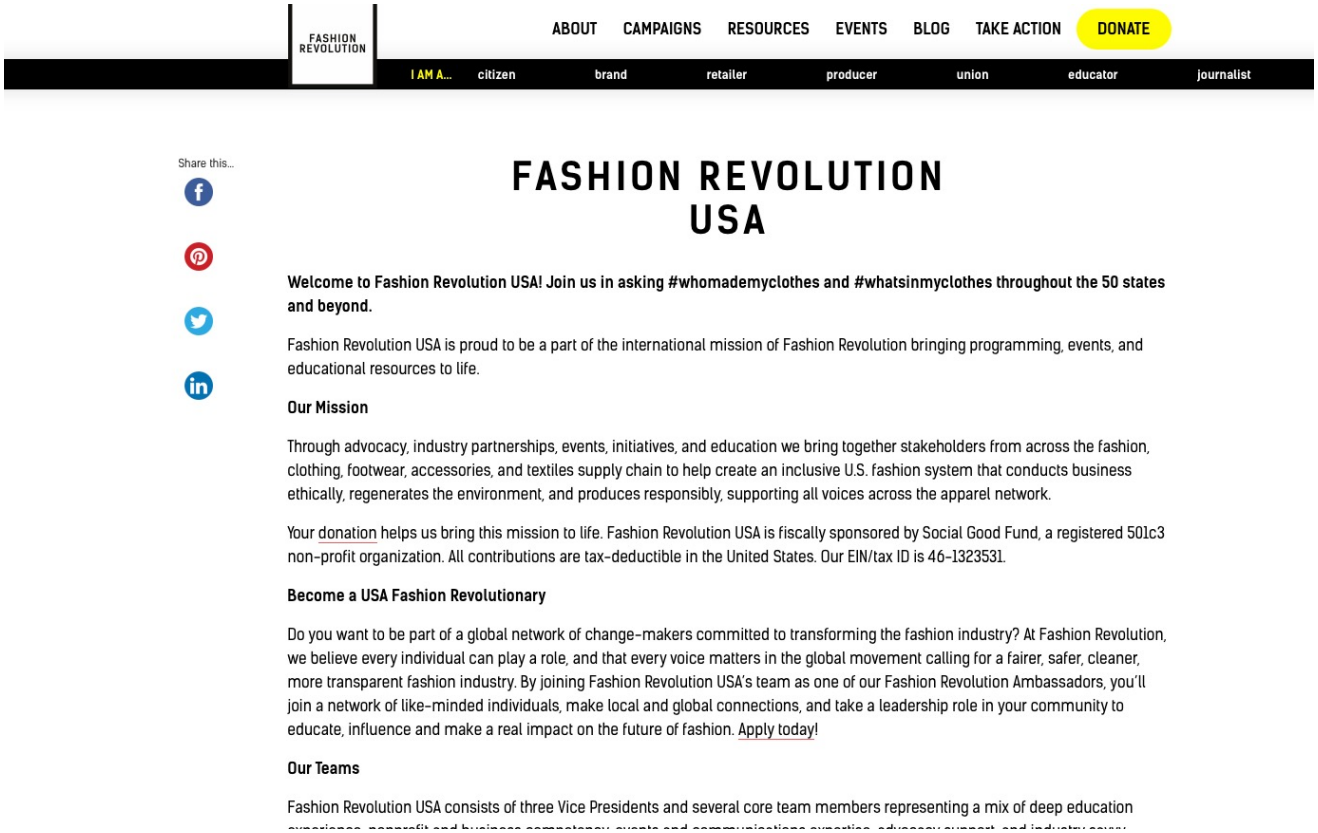
is educating and empowering a diverse **COMMUNITY** of changemakers



Fashion Pass Rent your cloths

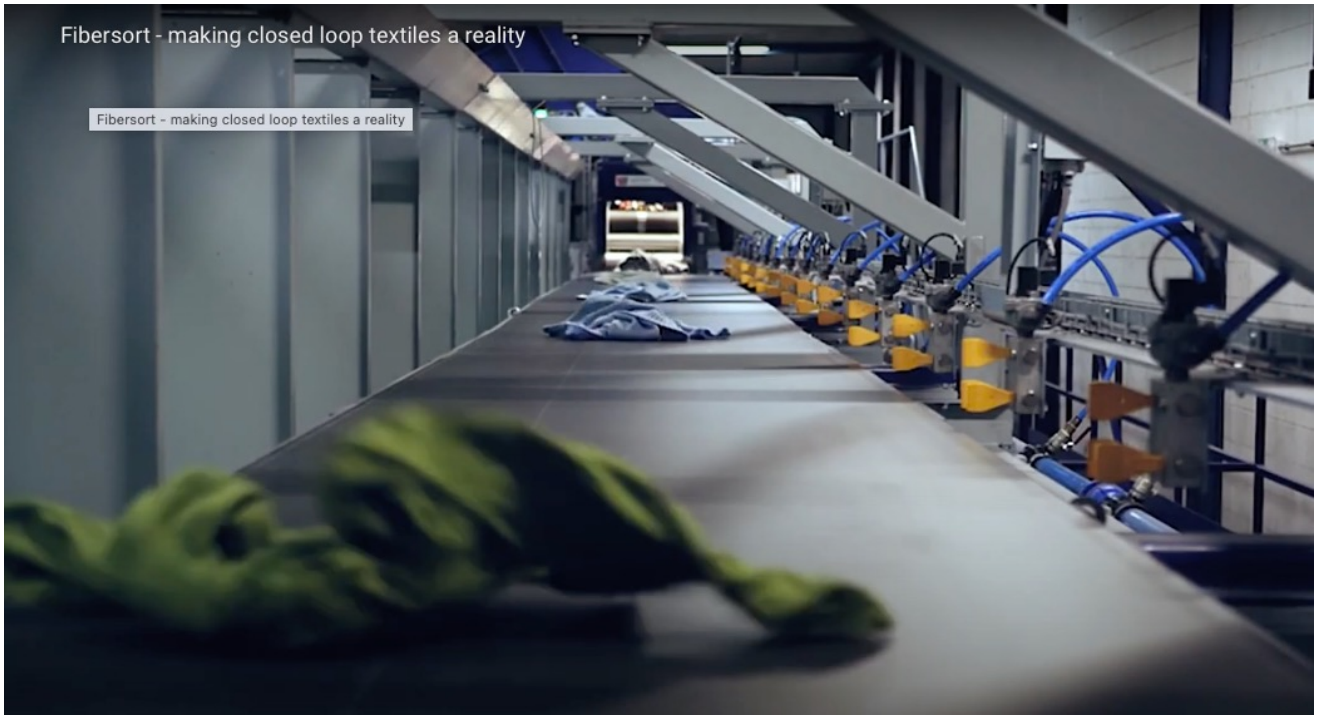


Fashion Revolution USA Activist Organization



FiberShed Something about sheep I guess

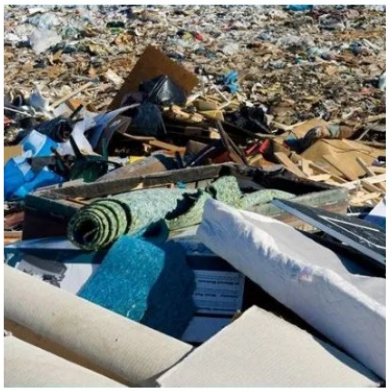
FiberSort using IR to detect fabric types



GeoHay recycled carpet to water control

GeoHay
The Clear Advantage

Home About Industries Contact Contact us

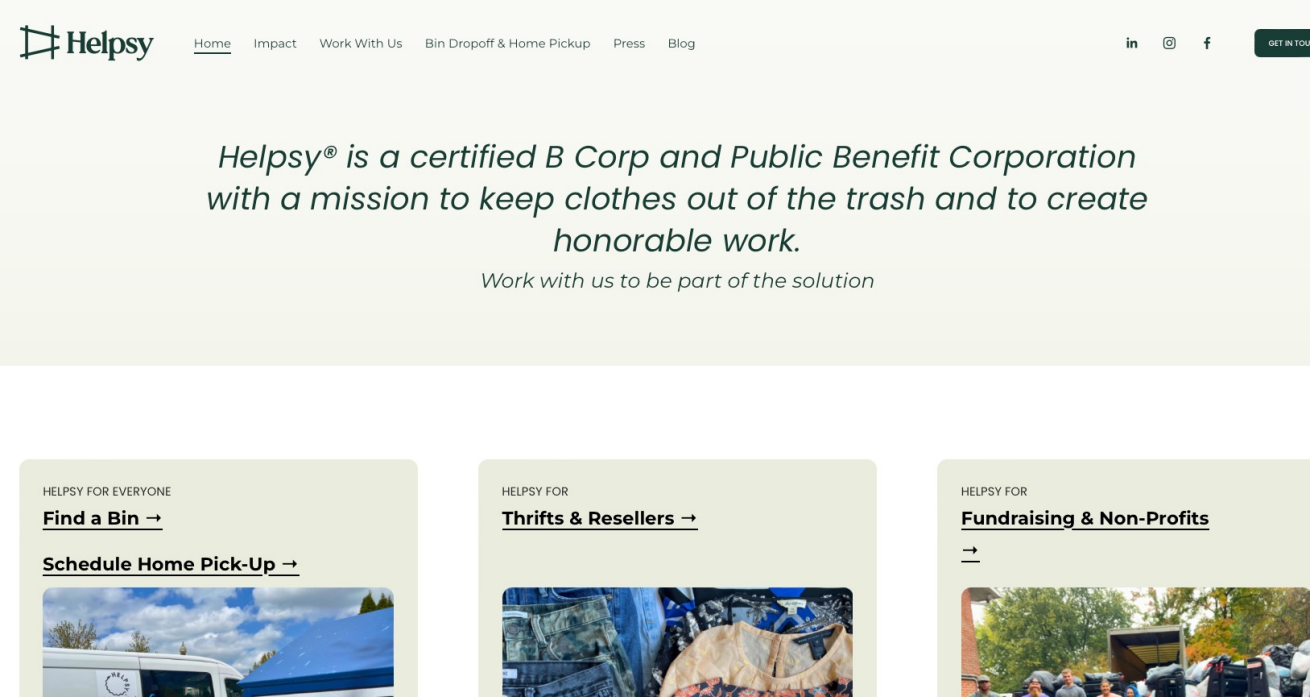



Our Mission Statement:

GeoHay is the clear advantage for water management. GeoHay products provide solutions for erosion and sediment control along with water filtration and diversion. Our products are made from recycled carpet and exceed the EPA's regulations for storm water discharge and sediment control. GeoHay products are versitile. They are effective working exclusively or as a complement to an application where high performance is required. Either way, GeoHay products make a positive impact on the environment.

Global Fashion Exchange (swap clothes San Francisco)

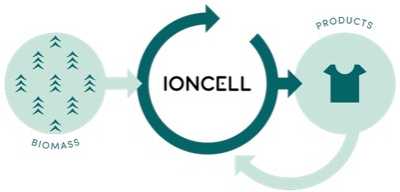
Helpsy looks like goodwill



Ioncell ionic liquids for cellulose recycle (Finnish)

Ioncell® in a nutshell

- The Ioncell® process uses a novel solvent called ionic liquid. It's an environmentally friendly solvent that can be recycled and isn't flammable like many others.
- Ioncell® fibers feel soft and are strong even when wet. They're tenacious and work well in both clothing and technical applications.
- The Ioncell® process could revolutionize the recycling of textile waste. It enables waste textiles to get a new life as high-quality fibers.



Want to be among the first ones

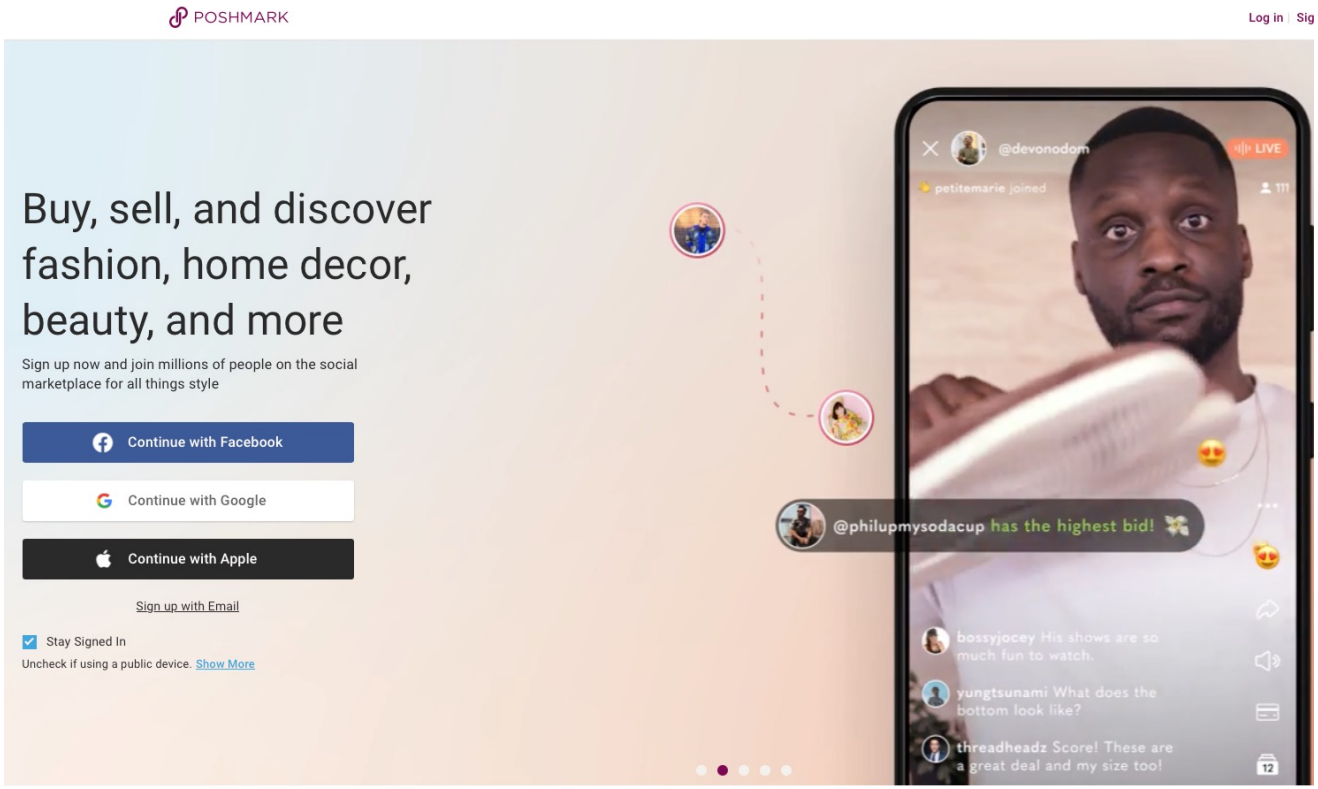
Oeko Tex certification for fabrics

OEKO-TEX® STANDARD 100 is a label for textiles tested for harmful substances. It sets the benchmark for textile safety, from yarn to finished product. Every item bearing the STANDARD 100 label is certified as having passed safety tests for the presence of harmful substances.

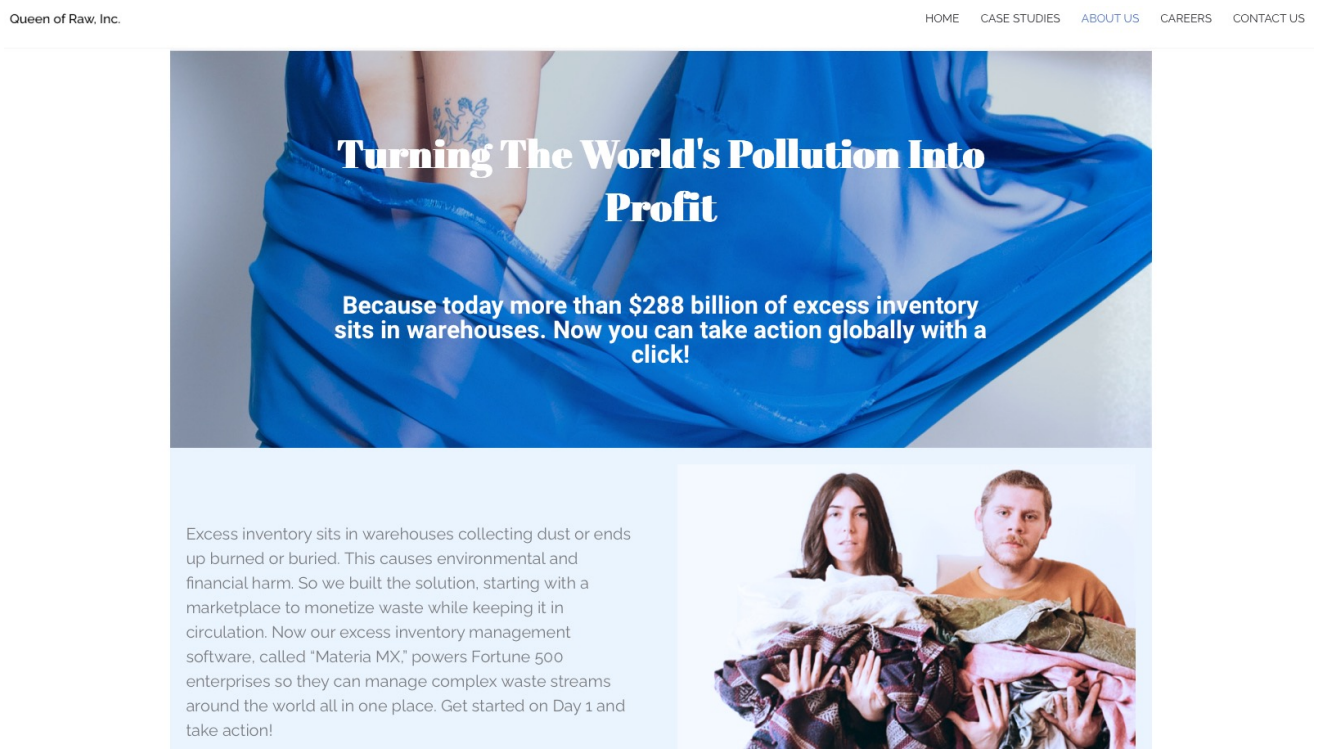
- The certified article is harmless to human health
- Every thread, button and accessory have been tested against a list of over 1,000 harmful substances
- The more intensive the skin contact, the stricter the **human ecology requirements** and laboratory tests
- We use globally standardised test criteria
- The certification complies with international requirements and regulations
- We review our limit values for harmful substances at least once a year

Watch the video to discover more

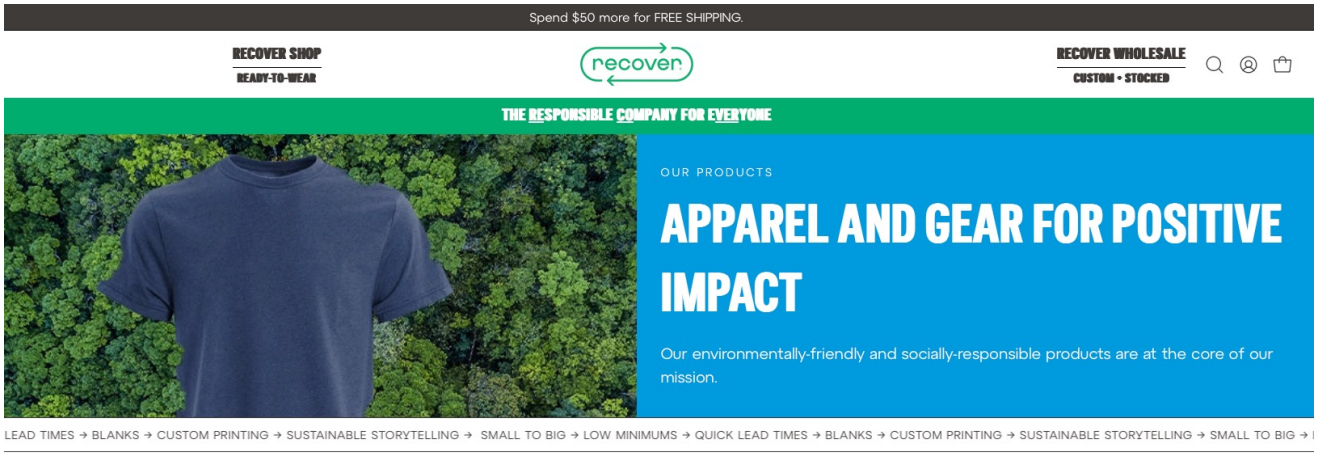
PoshMark.com on line goodwill

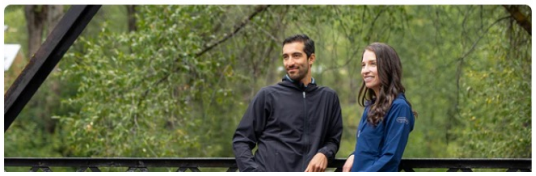


Queen of the Raw (Excess inventory)



RecoverBrands.com





NEW PRODUCT RELEASE

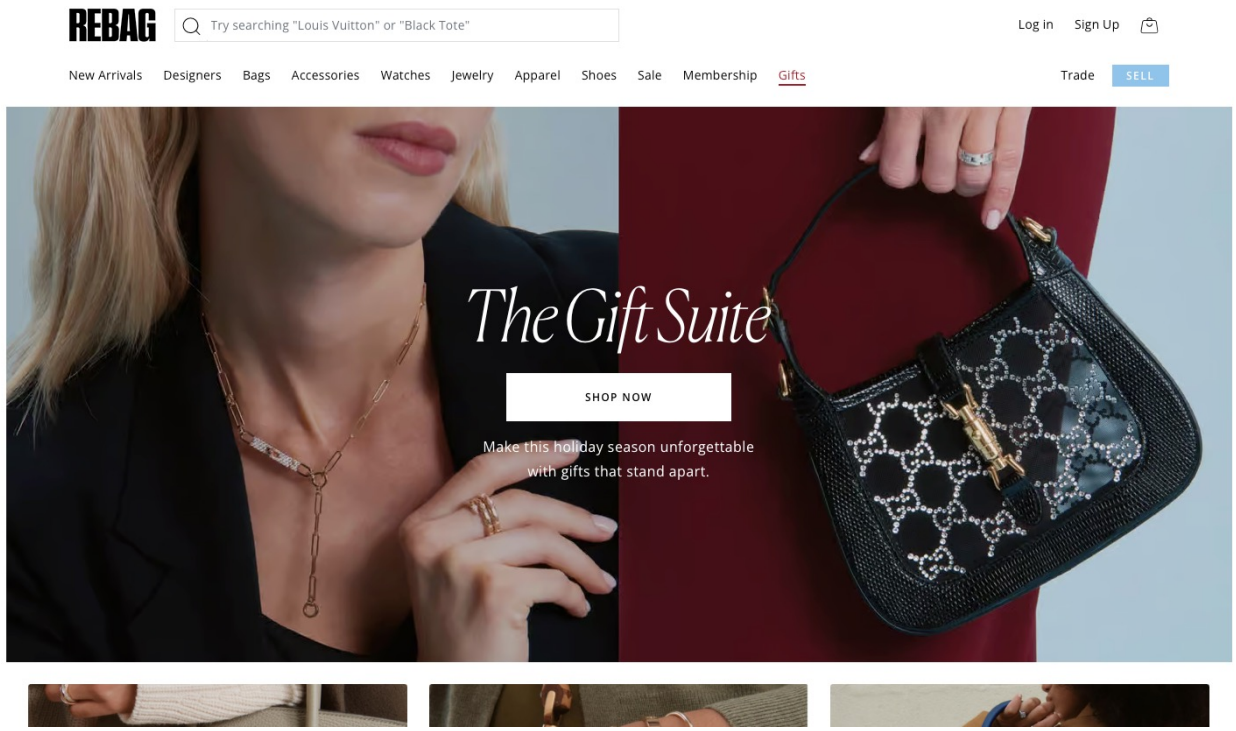
THE IMPACT JACKET

RecoverFiber (Spanish fiber recycling)

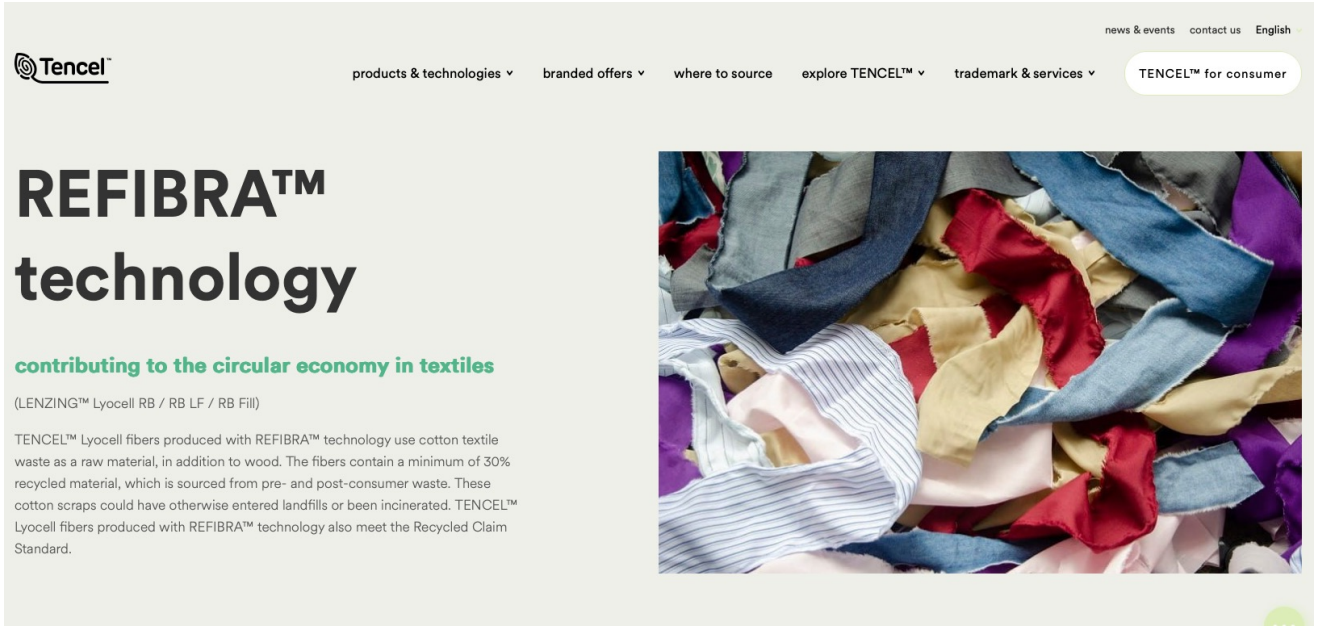
RECOVER PRODUCTION NETWORK

Recover™ is investing globally to increase recycling capacities. We want to achieve maximum output by being where the waste is, thereby close to both supply and demand and reducing simultaneously our carbon footprint.

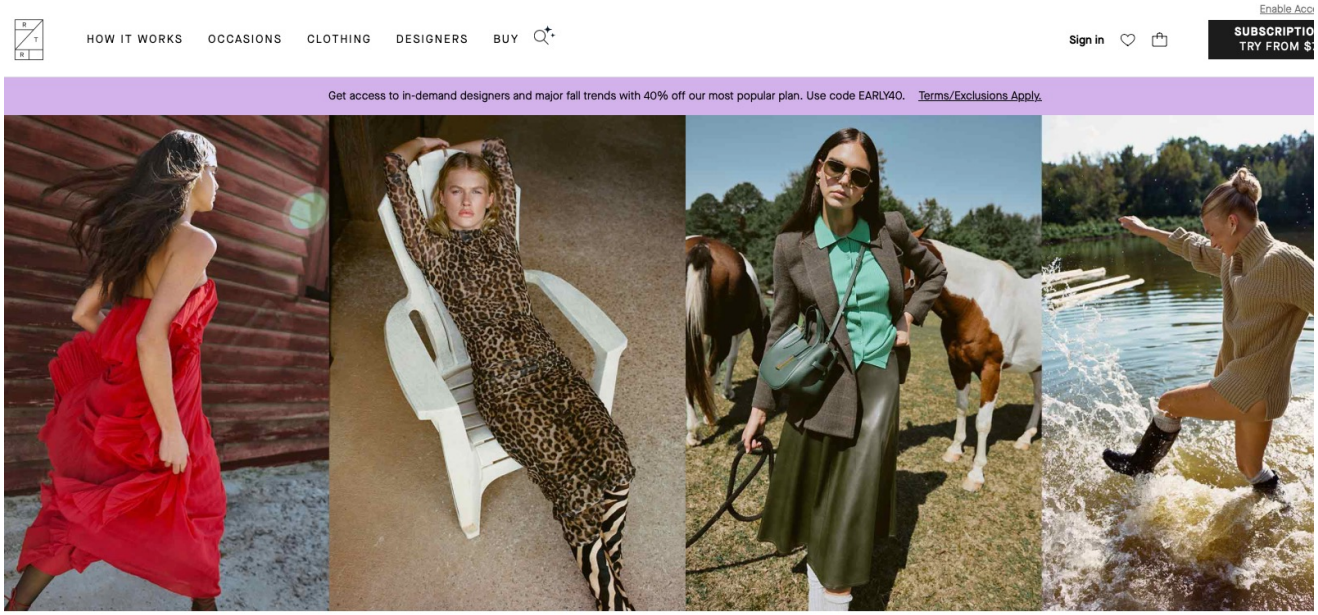
RedBags (Recycled Handbags)



Refibra Cotton recycling



Rent the Runway (rent clothes)



Textiles

Textiles