



TEXTILE CIRCULARITY IN THE US: CURRENT LANDSCAPE, BOTTLENECKS, AND CRITICAL GAPS

NIST Workshop on Facilitating a Circular Economy for Textiles

Tuesday, September 21, 2021



Managing change
in a resource-
constrained world.



ORGANICS
MANAGEMENT



WASTE
RECOVERY



GLOBAL CORPORATE
SUSTAINABILITY

since 1986

AGENDA

- TEXTILE RECOVERY – CURRENT STATE
- TRANSITIONING TO A CIRCULAR ECONOMY – OVERCOMING BOTTLENECKS AND CRITICAL GAPS
- TEXTILE RECOVERY – A VISION FOR THE FUTURE STATE





WHAT ARE YOU WEARING TODAY?

- Where did you get it?
- Do you know what it's made of?
- How long have you had it?
- How long will you keep it?
- How often do you wear it?
- **What will you do with it when you no longer want it?**



TEXTILE WASTE LANDSCAPE

WHAT ARE WE WALKING INTO? WHAT IS THE SIZE AND NATURE OF THE PROBLEM?

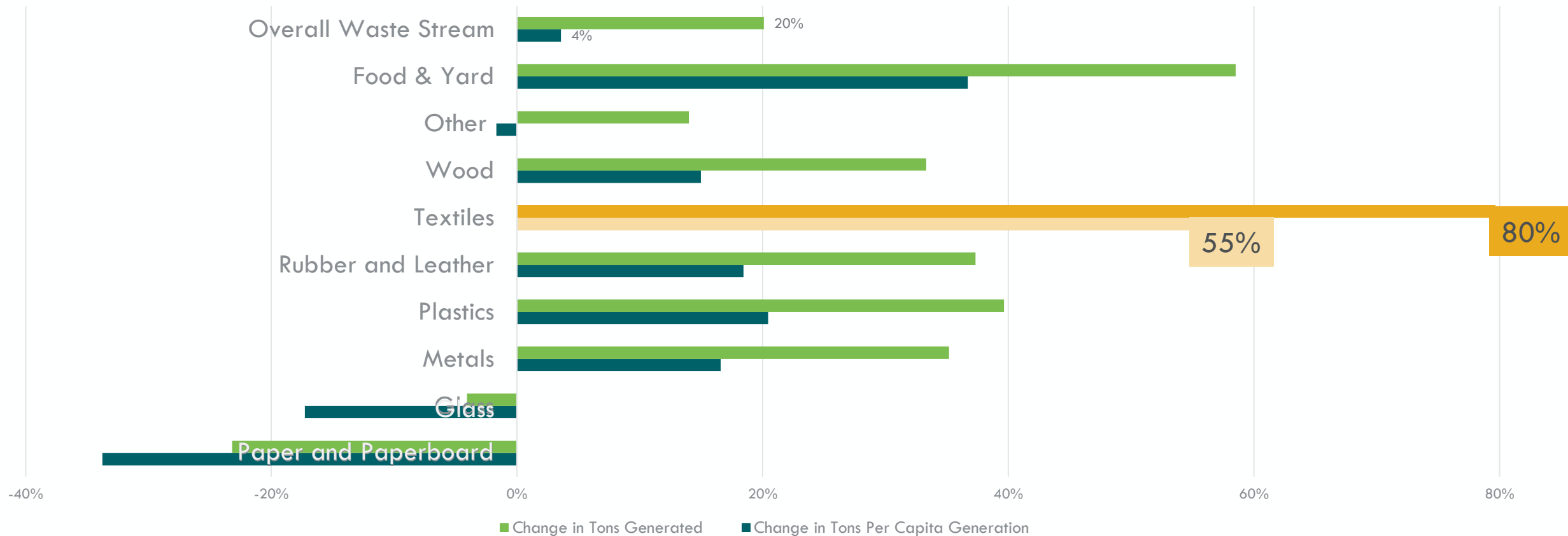
TYPES OF TEXTILE WASTE

- Clothing and apparel
- Home and hospitality textiles
- Contract textiles
- Uniforms and workwear
- Upholstery fabrics
- Post-industrial
- Overstock, deadstock, off-spec, damages, returns



TEXTILE WASTE IS GROWING FASTER THAN ANY OTHER MATERIAL IN THE US WASTE STREAM

PERCENT CHANGE IN ABSOLUTE TONS AND TONS PER CAPITA WASTE GENERATION 2000-2018



RRS analysis based on US EPA data

WHY IS IT GROWING SO FAST?

FAST FASHION

- More fashion cycles
- Instagram culture
- Consumptive, disposable mindset
- 100 billion items of clothing produced each year
- Fashion brands are now producing almost twice the amount of clothing today compared with before the year 2000.
- We keep clothing less than half as long. More than 50 billion garments are thrown away within 12 months of being made.


TRADITIONAL: 2 CYCLES PER YEAR



TYPICAL FAST FASHION: 50 CYCLES PER YEAR



Source: True Cost

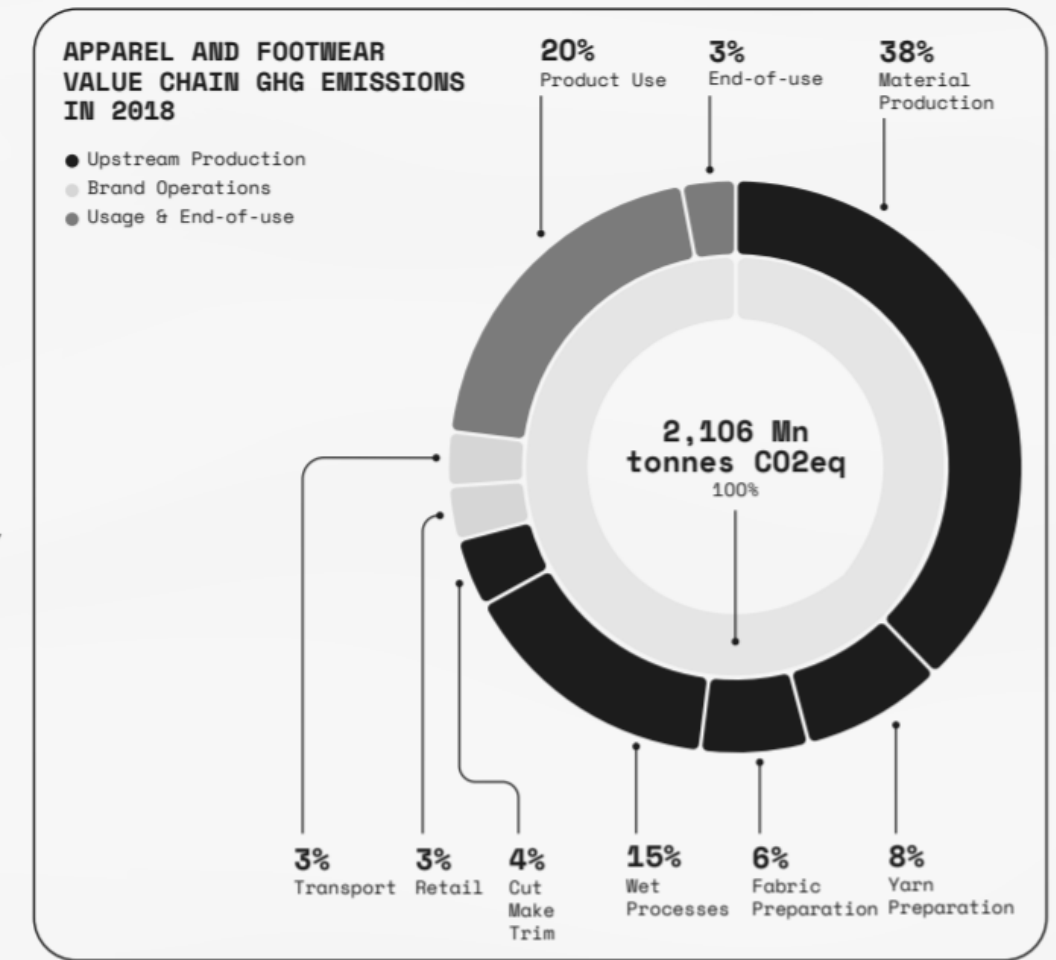
 WORLD RESOURCES INSTITUTE

IMPACT 02/07/2019 05:45 am ET | Updated Feb 07, 2019

How Instagram Influencers Fuel Our Destructive Addiction To Fast Fashion

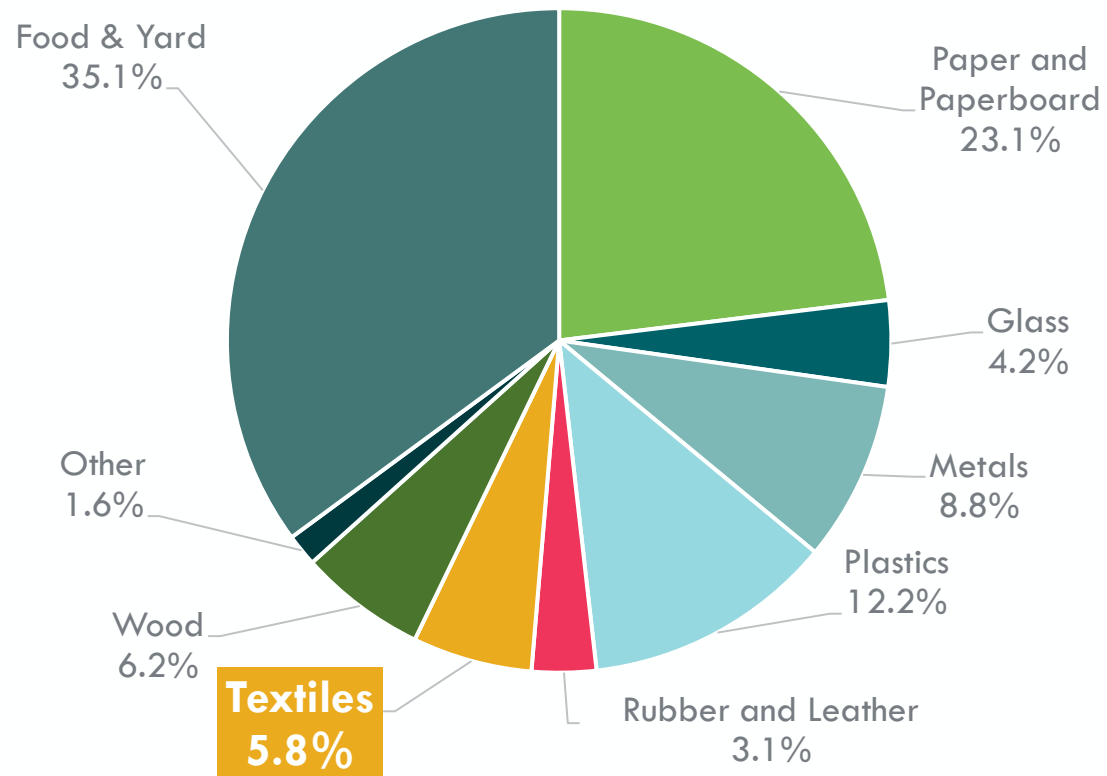
ENVIRONMENTAL AND SOCIAL IMPACTS OF FAST FASHION

- **Climate.** The fashion industry contributes around 10% of global greenhouse gas emissions annually.
- **Water.** The fashion industry is the world's second largest consumer of the world's water supply.
- **Pollution.** WHO estimates that 20% of industrial water pollution comes from textile manufacturing.
- **Chemicals.** Over 8k chemicals used in textile production - dyes, surface treatments. These chemicals can be harmful for the environment, factory workers and consumers.
- **Microfibers.** At least 35% of microplastics in our oceans, drinking water, and air are from textiles.
- **Labor justice.** Rana Plaza, forced labor, child labor, health and safety conditions



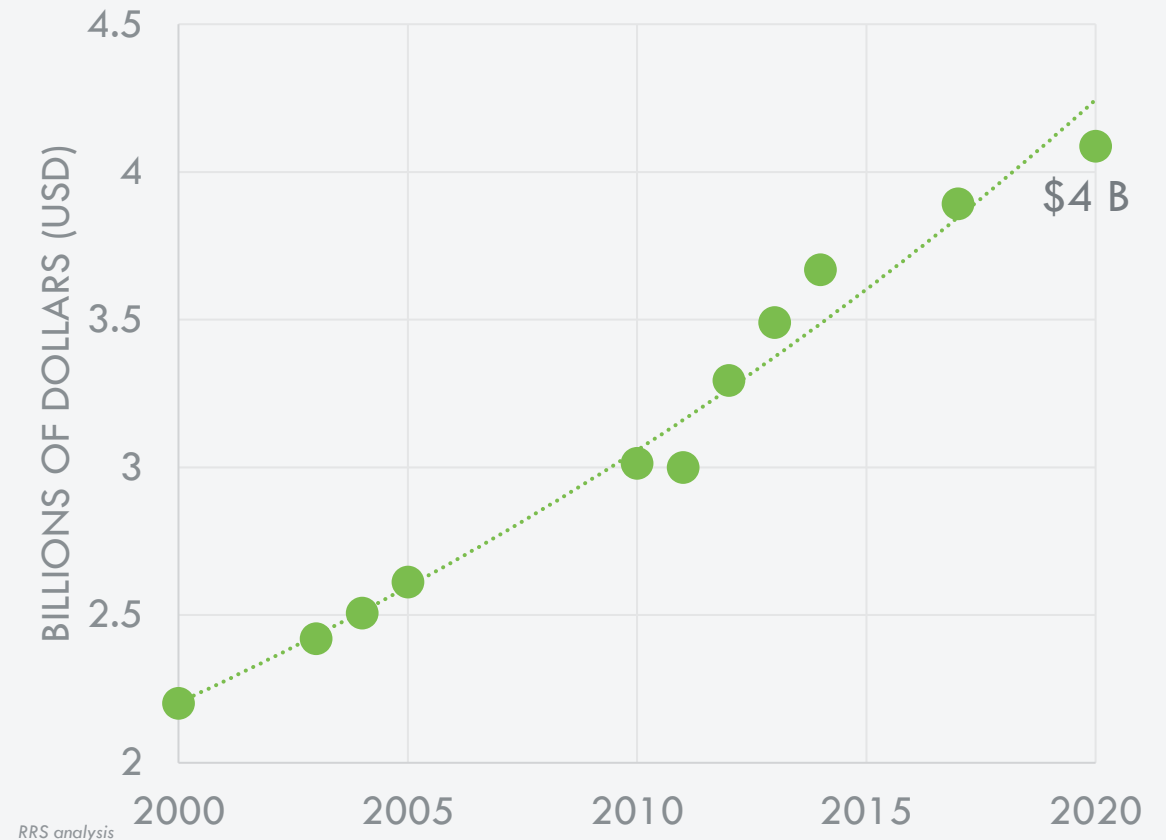
TEXTILES ARE NOT AN INSIGNIFICANT PIECE OF THE PIE

2018 US MSW: 17 MILLION TONS TEXTILE WASTE
OF 292 MILLION TONS TOTAL MSW



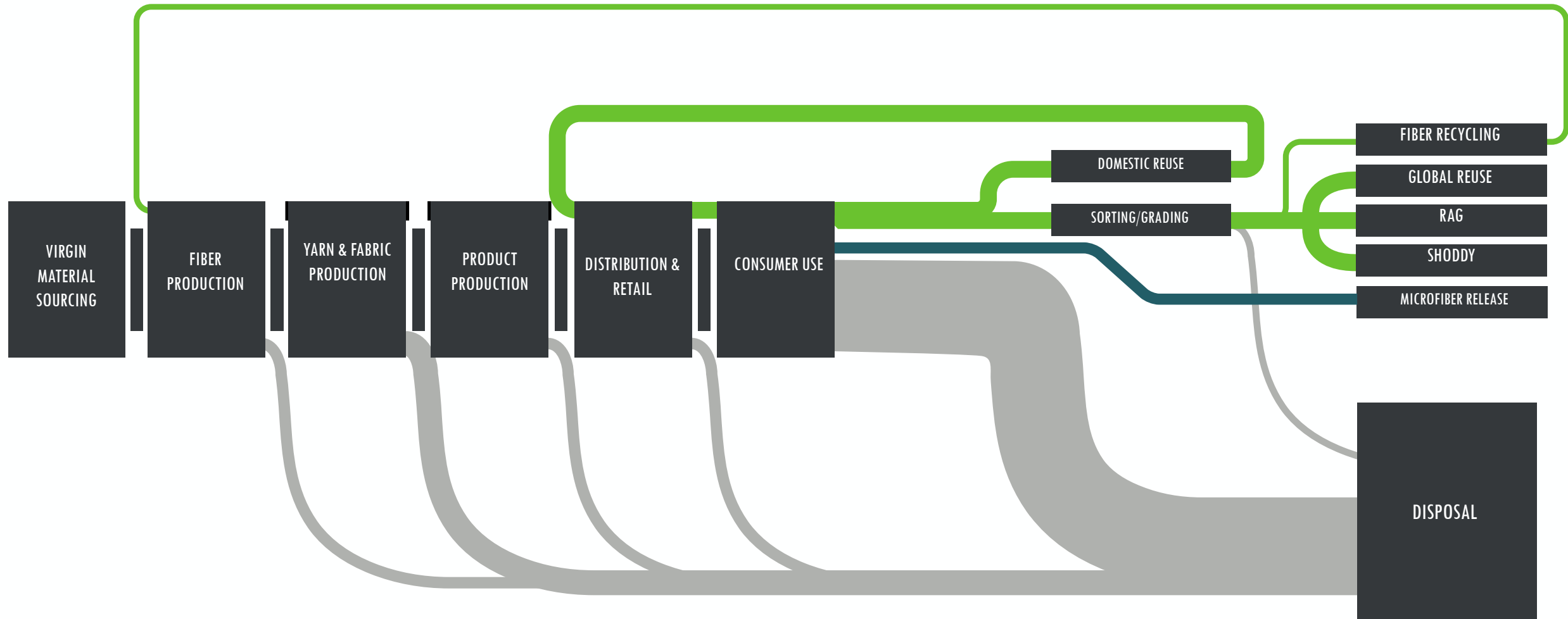
Source: EPA

ANNUAL COST TO COLLECT & DISPOSE OF TEXTILES IN THE U.S.,
2000-2020

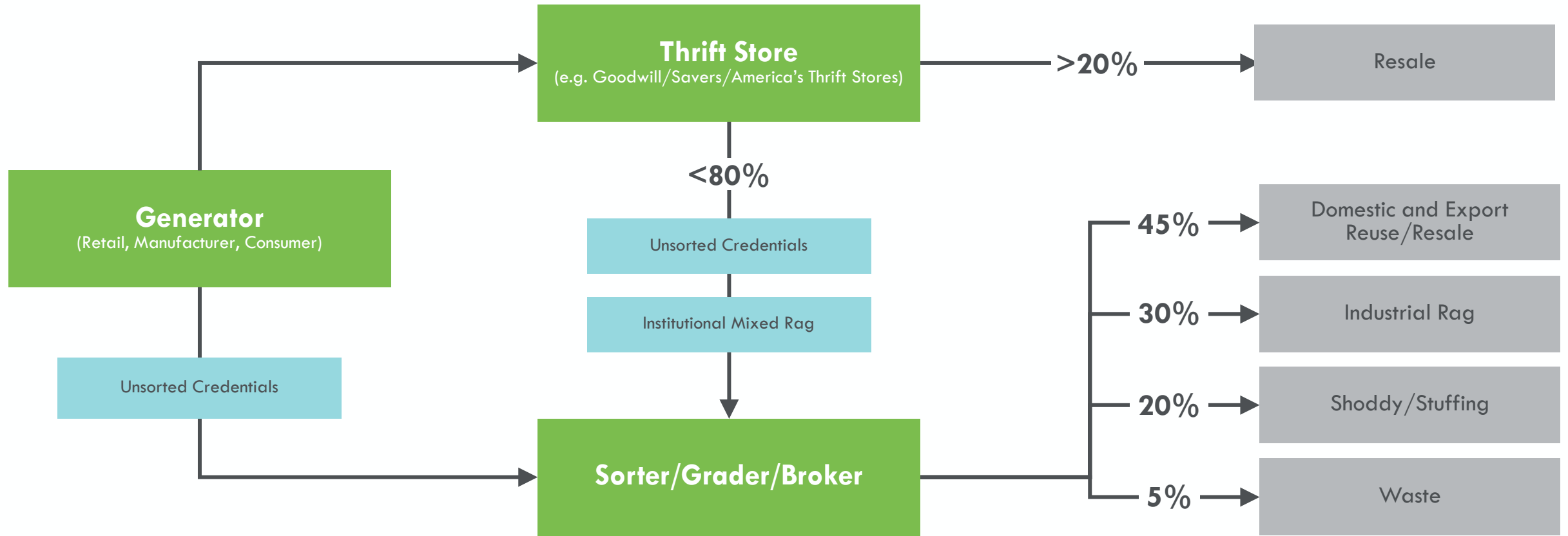


RRS analysis

ONLY 15% OF TEXTILE WASTE IS RECOVERED TODAY



THE RECOVERY NETWORK IS COMPLEX



Based on charity estimates and data from SMART

Export dynamics: EAC import ban, lack of traceability, open dump disposal.

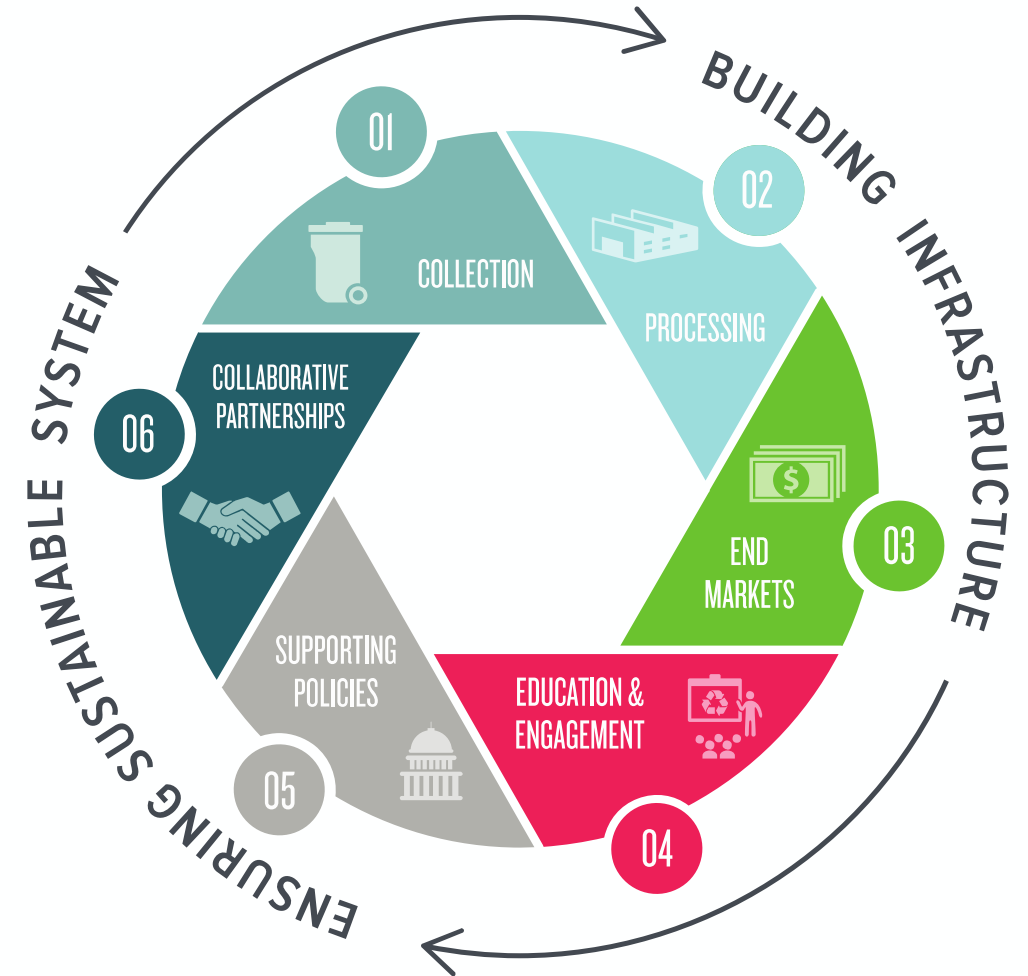


SO HOW DO WE CREATE CHANGE?

WHAT ARE THE GAPS?
HOW DO WE OVERCOME THEM?

SIX ELEMENTS OF A SOUND RECOVERY VALUE CHAIN

- 01 Widespread convenient collection systems;
- 02 Regional textile sorting facilities (textile MRFs);
- 03 Mechanical and advanced recycling technologies to convert inputs into global commodities. Robust end markets with brand uptake agreements that support a domestic recycler economy;
- 04 Compelling outreach that drives engagement with consumers, brands, and communities;
- 05 Thoughtful supportive policies that create a level playing field and incentivize textile recovery and infrastructure development; and
- 06 Innovative strategic partnerships that increase the circularity of pre-consumer and post-consumer textiles and decrease textile waste going to landfill.



Collection is the beginning of the recovery value chain. Collection programs for textiles should be convenient, consistent, reliable, and transparent. However, they also need to be cost-effective and practical.

COMMON TEXTILE COLLECTION APPROACHES AND CONSIDERATIONS

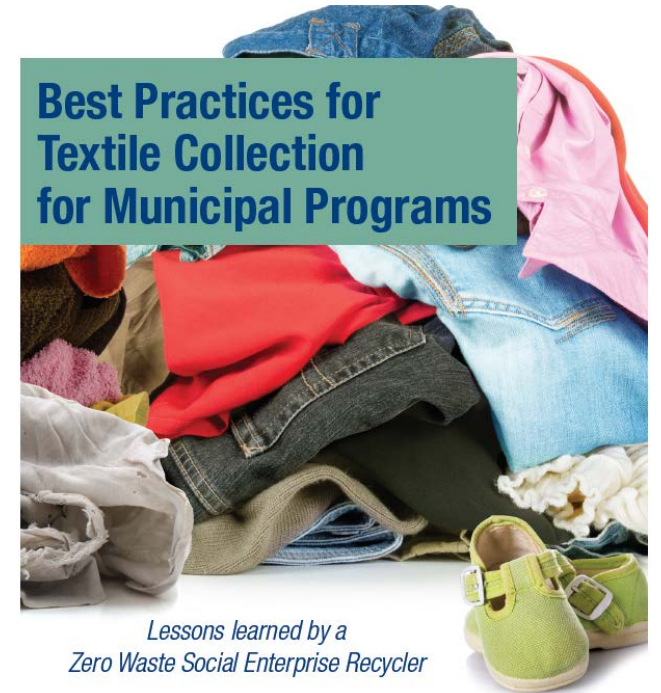
There are a wide variety of options for increasing recovery of textiles from MSW,

- Charity collections
- Bin collection
- Curbside collection
- Store take-back
- Mail back

A few municipal examples:

- St Paul, MN – [Eureka](#) collected textiles separately from other recyclables and bagged as part of the residential recycling program for almost two decades before stopping the program.
- San Francisco, CA – San Francisco ran a pilot program to collect textiles in the blue bin, then changed to on-demand pick ups. It was deemed too expensive.
- New York, NY – the NYC Department of Sanitation operates [ReFashionNYC](#), a program in which a contractor places and services collection bins in apartment buildings of a certain size.
- Austin, TX – The city partnered with [Goodwill Central Texas](#) to collect clothing curbside via pre-scheduled request.
- Boston, MA – The city of Boston partnered with a [clothing bin operator](#) to collect textiles from residents.

Best Practices for Textile Collection for Municipal Programs



*Lessons learned by a
Zero Waste Social Enterprise Recycler*

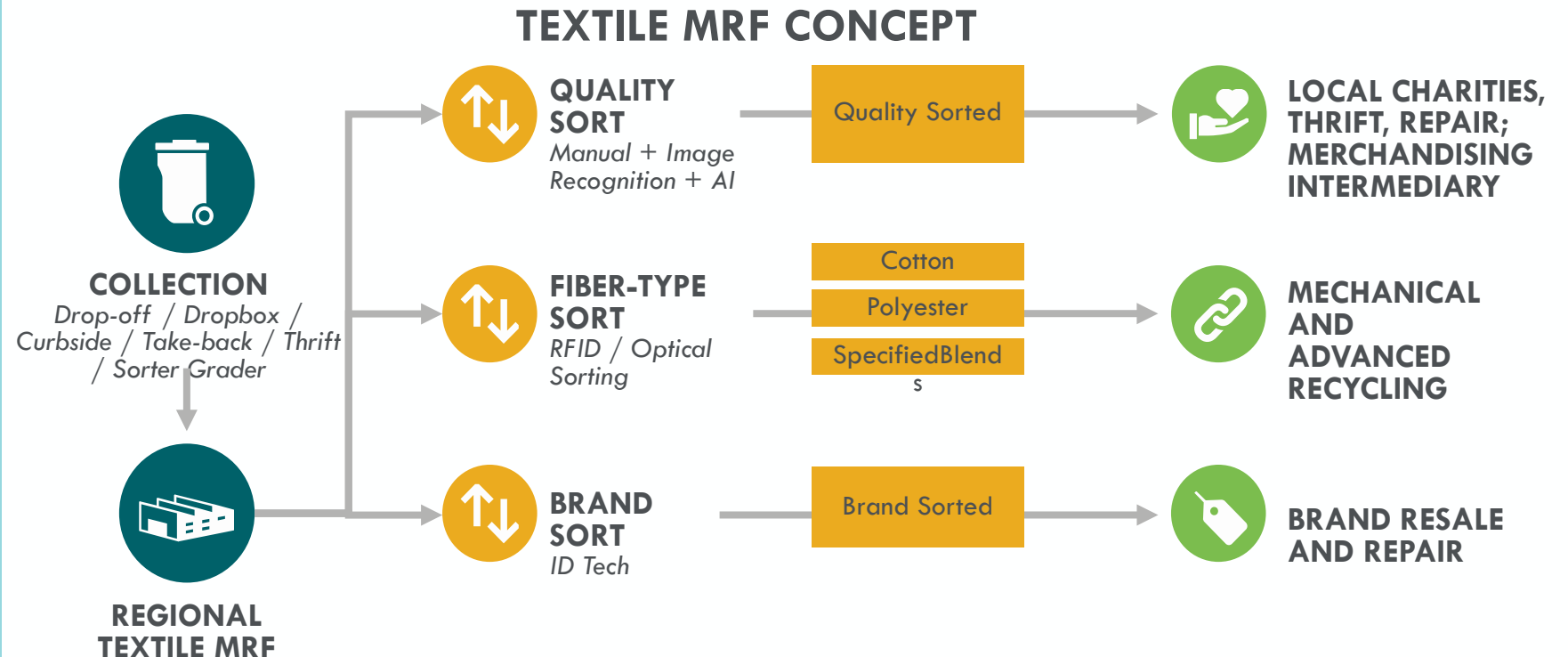
EUREKA!
RECYCLING AND MORE

PROCESSING: REGIONAL TEXTILE SORTING FACILITIES

Once collected, textiles need to be sorted for cascading uses and end markets. Currently, sorting largely happens manually by sorters and graders overseas. A domestic textile sorting facility could allow for the development of regional textile recovery hubs and increased waste diversion.

Collaboratively, we need to answer questions like:

- How far can textiles be economically transported?
- How much sorting capacity is needed for the region?
- What equipment and technologies are needed for accurate and cost-effective sorting?
- Which grades have the highest value and are easiest to produce?
- What partners are available to participate?
- How will the MRF be funded?
- Who will operate the MRF?



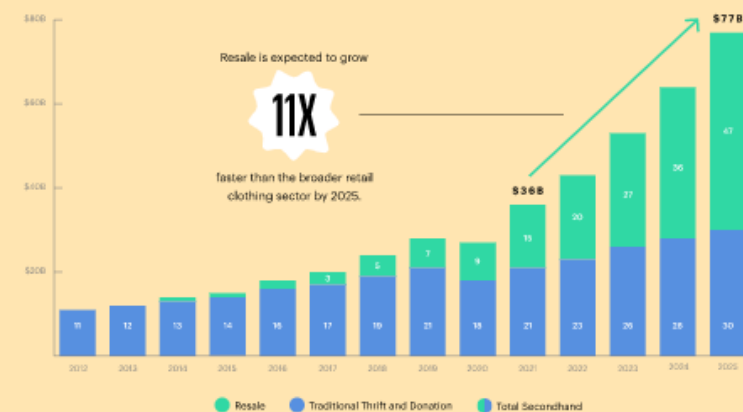
There are a variety of end markets for textiles, each at different stages of maturity. There are traditional reuse end markets (thrift, donation, export); emerging reuse markets (recommerce, resale); traditional recycling markets (rag, shoddy, mechanical fiber recycling); and emerging recycling end markets (molecular fiber to fiber recycling).

END MARKET CONSIDERATIONS

- Which end markets are most suitable for the types of textiles collected?
- What grades of reusable textiles do domestic end markets want?
- Will brands pay premium prices for recycled content?
- Will the commodity value be enough to finance collection and processing?
- How transparent are downstream flows? Can/will downstream vendors supply data? Do they have any certifications?
- What kind of market development support is available in a municipality or region (grants, low-interest loans, tax incentives, zoning allowances, etc.)?

Secondhand Market is Projected to Double in the Next 5 Years, Reaching \$77B

Resale, the sector of secondhand that includes more curated assortments, is driving the growth.



Source: ThredUp 2021

Widespread and effective outreach and education is needed if we are going to improve the 15% recovery rate for textiles. Residents need to know where and how to donate used textiles, and many want to know what happens to textiles once they are donated or recycled. Controlled education campaigns can also help to address misconceptions about textile reuse and recycling, such as where donated clothing ends up or what can/should be donated.

EXAMPLES OF PUBLIC EDUCATION CAMPAIGNS

ReClotheNY

DID YOU KNOW? CLOTHING CAN BE RECYCLED!

In New York, **1.4 billion pounds** of **clothing, shoes, & other household textiles** are put in the trash each year.

That's an estimated **\$130 million** worth!
Donating and recycling clothing, shoes, and other household textiles in New York could:

- Create up to **1,000 recycling jobs**
- Help your neighbors in need – donated, wearable clothing is re-worn
- Minimize clutter in your home and closet
- Protect our environment. Recycling the 2 million tons of clothing thrown away each year in the U.S. has a greenhouse gas reduction impact equivalent to **removing 1 million cars** from the nation's roads

Only 15% of textiles are reused or recycled – the rest goes straight to a landfill.
Nearly 95% of those textiles can be reused or recycled. Let's close that gap!

HOW DO I RECYCLE MY CLOTHING, SHOES, AND OTHER HOUSEHOLD TEXTILES?

1. Textiles that are no longer wearable can still be donated! Any torn, worn, or stained items can be recycled as long as they are clean, dry, and odorless.
2. What can you donate? Recyclable textiles include everything from linens to sweaters to shoes without a mate. For a full list of acceptable materials, [visit the Re-Clothe NY website](#).
3. Bring old textiles to the nearest collection point. Textiles should NOT be placed in the trash or in a household recycling bin. **Find drop-off locations [here](#).**



Oregon's Make Every Thread Count

FACEBOOK	TWITTER	PHOTO EXAMPLE
1. [Oregonians] have unique style. But when it comes to clothes, all Oregonians should choose quality over quantity. Visit http://bit.ly/2luoISv to find out how you can make every thread count.	1. [Oregonians] have unique style. Find how to #makeeverythreadcount to protect our 1-of-a-kind #environment: http://bit.ly/2luoISv	
2. How much did those jeans really cost you? Every item in your closet has a cost-per-wear—the longer you wear that shirt or pair of jeans, the more you get out of your investment. Find out how to make every thread count: http://bit.ly/2luoISv	2. How much did those jeans really cost you? Every item in your closet has a cost-per-wear: http://bit.ly/2luoISv	
3. Develop a long-term relationship with your clothes. Extending clothing life by just three months can reduce carbon, water and waste footprints by up to 10%. What clothing item have you held onto the longest? Find out how you can make every thread count at http://bit.ly/2luoISv	3. Develop a long-term relationship with your clothes. Find tips on purchasing & care to #makeeverythreadcount http://bit.ly/2luoISv	
4. All fabrics, natural or synthetic, have advantages & disadvantages. Consider fabric quality when buying clothes. Will it be comfortable and durable? Find out how to make every thread count: http://bit.ly/2luoISv	4. All fabrics have advantages & disadvantages. Consider fabric quality when buying clothes. #makeeverythreadcount http://bit.ly/2luoISv	
5. Compared to 15 years ago, we buy 60% more articles of clothing items a year, but only keep them about half as long. That means cluttered closets, wasted money, and a strain on our natural resources. Find out how to make every thread count: http://bit.ly/2luoISv	5. We buy 60% more clothing per year than we did 15 years ago, but only keep them for 1/2 as long #makeeverythreadcount http://bit.ly/2luoISv	
6. Your outfit is thirsty. It takes 1,500 gallons of water to make your favorite t-shirt and jeans. That's the amount of water a person drinks in 13 years. Find out how you can make every thread count at http://bit.ly/2luoISv	6. Producing a t-shirt + jeans uses 1,500 gallons of #water. Find out how you can #makeeverythreadcount http://bit.ly/2luoISv	



Thoughtful supportive policy can be a major catalyst in advancing the circular economy for textiles. It can create a level playing field, unlock investment, and encourage innovation and participation in recovery. Policy mechanisms range from light to heavy.

EXAMPLES OF POLICIES FOR TEXTILE MANAGEMENT

- **Economic Development Incentives** – Grants, low-interest loans, tax incentives, zoning allowances, etc., to encourage the development of recovery infrastructure and supply chains locally.
- **Green Purchasing** – Requires public agencies to procure environmentally preferable products. Green purchasing policies can stipulate minimum levels of recycled content, made locally, supplier certifications, and/or other environmental attributes for textile products.
- **Extended Producer Responsibility** – Requires the brand owner to take financial and/or operational responsibility for end-of-life management of postconsumer textile waste. Most appropriate at the state level or higher. France, Sweden, the UK and the Netherlands have, are developing, or are actively considering EPR.
- **Disposal Bans / Mandatory Recycling** – Effective only when alternative collection and processing options are available and easily accessible. “No ban without a plan”. Massachusetts has a textile disposal ban. It serves largely as an educational tool rather than an enforcement tool.
- **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)
- **Disclaimer Laws** – While states and localities are preempted from implementing tag and label laws, they can require disclaimers for things like recycled content.
- **Product and Performance Standards** – Includes things like recycled content standards, mandatory retailer takeback, product certifications, etc. The [California Product Stewardship Council's](#) Statewide Textile Recycling Advisory Committee is one of the preeminent organizations researching and guiding textile waste policy.

Public private partnerships are powerful tools in developing recovery systems, developing successful business models, and raising capital and financing for public and private infrastructure. The following stakeholders should be included in planning for textile recovery programs.

- Charity and thrift sector partnerships
- Sorters/graders (domestic and international)
- Global reuse end markets
- Technology providers (sorting and identification technologies)
- Equipment manufacturers
- Textile and apparel retailers, brands, and manufacturers
- SMEs, including designers and jobbers
- Local repair businesses
- Local environmental community
- Haulers, collectors, and bin operators
- Regional waste and recycling managers
- Academic institutions
- Professional experts in textile production and recovery
- Industry associations, such as the Secondary Materials and Recycled Textiles Association (SMART); Council for Textile Recycling (CTR); Textile Exchange (TE), etc.

SPECIAL FOCUS 1 OF 3: WASTE COMPOSITION STUDIES

Knowing the amount and types of textiles in the local waste stream will help inform management options for recovery. Understanding the quality, condition, and fiber types present in the textile waste informs value proposition for recovery. Data do not yet exist the United States.

We need to know:

- **Generator Type.** Single family residential; multi-family residential; commercial – retail; postconsumer – thrift and donation; commercial – hospitality; commercial – healthcare; government (e.g., uniforms and prisons); post-industrial.
- **Product Type.** The National Association for Charitable Textile Recycling (NACTR) has proposed a [standard classification system](#) for municipal operators looking to evaluate the types of textiles in the waste stream. A standard approach allows for data aggregation and comparison across jurisdictions. NACTR's waste audit standards primarily address residential postconsumer textiles.
- **Quality and Condition.** Reuse potential depends on quality and condition. Textiles can easily become wet and dirty when mixed with refuse or recycling, especially after collection, compaction, and tipping.
- **Fiber Content.** Fiber blend information is important for determining the viability of textile-to-textile recycling. Pure cotton or polyester (or cotton/poly blends) has the highest value for recycling. It is also important to document the prevalence of items that are multi-material or multi-layered (like a jacket that has a liner) because those impact sortability. Note that label reading is unreliable since >40% of labels contain inaccurate fiber content information.¹

1. Source: Circle Economy research on clothing labels. Possible reasons: Textile supply chains are complex and have poor information transfer between nodes; less than 10% content fibers are not required to be disclosed; there are perverse tariff incentives for blending fibers



SPECIAL FOCUS 2 OF 3: RESIDENT SURVEYS

Resident surveys are a good way of collecting qualitative data regarding behaviors and motivations around textile consumption, use, and disposal.

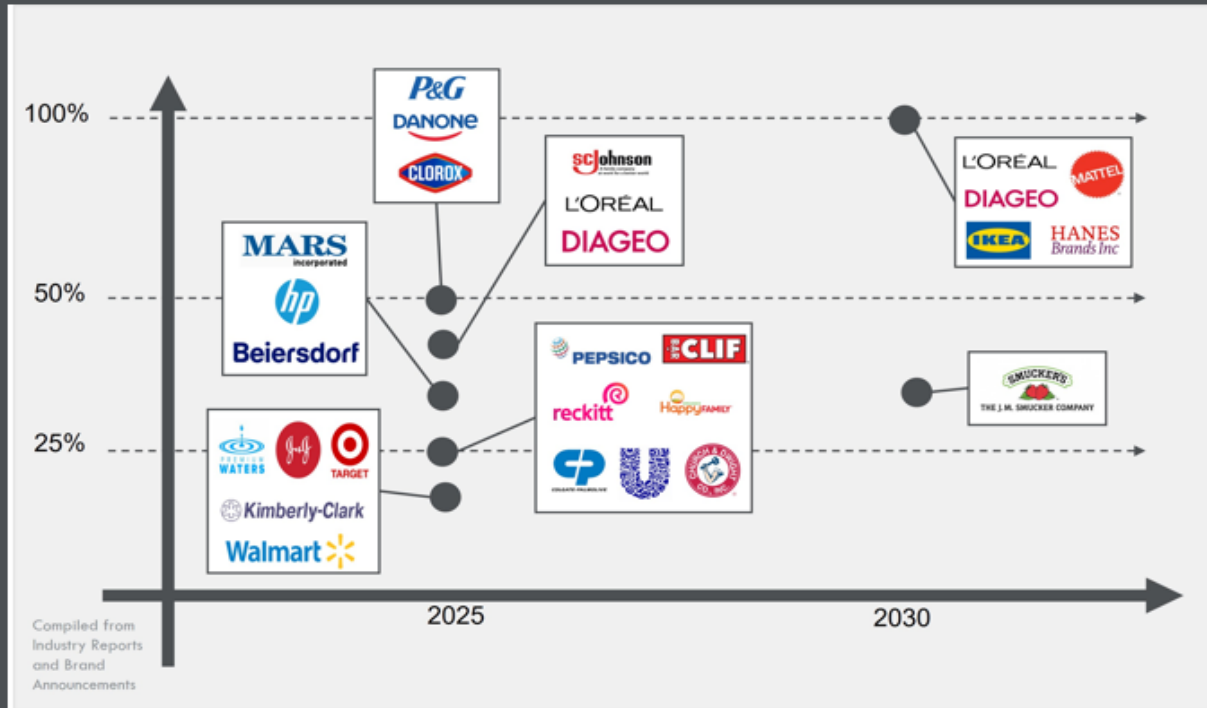
QUESTIONS TO ANSWER

- What are current consumption behaviors?
 - How often do people purchase new textile products? (clothing and apparel, home textiles, other)
 - What kind of retailers do they purchase from? Brick and mortar? Online? Discount? Off-Price? Luxury?
- Usage behaviors
 - How often do they wear or use different types of textile products?
 - How long do they keep the items?
- What are current disposal behaviors:
 - How often do people get rid of textiles?
 - How much textile waste do they generate?
 - What do they do with textiles they no longer want? Disposal, donation, online resale,
- Thrift & Charity Perspectives
 - How often do people donate to local thrift and charity stores?
 - How often to people shop at local thrift and charity stores?
- What are the necessary behavior change motivators
 - What would motivate someone to participate in recovery options instead of disposal?
 - On a continuum of recovery options, how likely are people to participate in different options?
 - What kinds of incentives would encourage behavior change?

SPECIAL FOCUS 3 OF 3: POLYESTER

Polyester is the most widely used fiber in the apparel industry, accounting for around 52% of the total volume of fibers produced globally¹. The recycled polyester market has tremendous crossover with packaging PET and we need to address both systems holistically to ensure adequate supply for all end uses.

VOLUNTARY CORPORATE COMMITMENTS TO PCR*



*Some commitments are purely PCR; others include bio-based content or otherwise sustainably sourced.

- Almost all recycled polyester derives from PET bottles.
- More companies voluntarily commit to recycled content (across all sectors) and recycled content mandates are emerging for packaging.
- This causes extreme strain on supply.
- Currently the textile sector benefits from being a lower cost outlet for rPET than packaging, esp. food-grade.
- As packaging companies are regulated, markets will shift and recycled content for T&A brands will be harder to achieve.
- Currently, only 14% of poly comes from recycled inputs.¹
- TE has a goal of reaching 45% rPET by 2025.¹



THANK YOU

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