CITY OF LOS ANGELES

TEXTILE RECOVERY PROJECT

PHASE 2 FINAL REPORT

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CPSC
California Product Stewardship Council℠

LA SANITATION
environment
CITY OF LOS ANGELES

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Executive Summary

Renowned as the home of the Fashion District, Los Angeles sees opportunities for better materials management and promotion of textile reuse and repair in addition to establishing a value chain for end-of-life products. The effort to manage textile waste in Los Angeles aligns with objectives from **LA's Green New Deal**, **Comprehensive Plastics Reduction Program**, and **LA City's Textile Policy Goal**.

A collaborative effort initiated a centralized textile hub which will serve as a closed-loop market providing consistent material streams for upcycling and recycling.

www.calpsc.org/catextilehub

PHASE 2 ACCOMPLISHMENTS

3 recyclers & 4 upcyclers	7 Fiber sorting and 1 education events	1000+lbs sorted at Homeboy Threads	1000+lbs processed & made into new products

Next Steps:

The LA Textile project is awaiting approval to progress into Phase 3 (2025-2028) and recruiting sponsors and co-funders, including applications to private and federal grants. Scope of Phase 3 includes:

MAINTAIN LA TEXTILE WORKING GROUP

Foster dialogue and strategy development for the textile hub alongside promoting textile sustainability ahead of global sports events: FIFA World Cup 26, Super Bowl LXI (2027) and Olympics LA28.

ESTABLISH A LOCAL TEXTILE PROGRAM PRIOR TO LA28

Initiate political levers via contracts, permits, ordinance, or executive order to establish a local textile program to divert textile waste into circular supply systems and create green jobs.

COORDINATE ACADEMIC AND VOCATIONAL TRAINING PROGRAMS

Create webinars, repair workshops, collaboration opportunities, and curriculum development for textile education. Also, access to lab testing.

START THE PHYSICAL AND VIRTUAL HUB

Assess requirements and recommendations for building and operating a textile hub owned by the City of Los Angeles. Expand website functionality.

1.0 INTRODUCTION

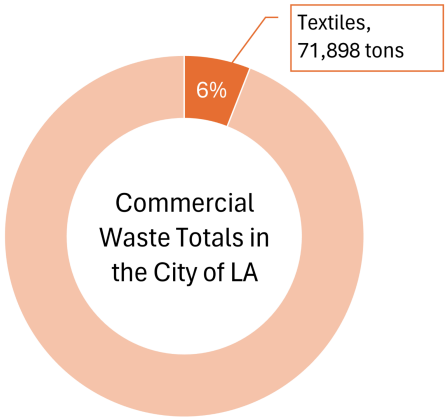
1.1 Background on LA's Drivers of Textile Circularity

Textiles is a growing waste stream ripe with opportunities for better materials management and promotion of repair/upcycle businesses aligned with textile reuse and repair. The volume of garments facing end-of-life have been identified to increase exponentially due to low-cost "fast fashion" and decluttering trends encouraging closet cleanouts. One of the primary challenges in achieving textile circularity is the intricate system involving diverse processes and stakeholders who often communicate in different terms.

The effort to manage textile waste in Los Angeles aligns with objectives from LA's Green New Deal, Comprehensive Plastics Reduction Program, and LA City's Textile Policy Goal. In 2019, the City of LA launched LA's Green New Deal, which is founded upon the commitment to the Paris Climate Agreement, emphasizing immediate actions to attain a zero-carbon grid, zero-carbon transportation, zero-carbon buildings, zero waste, and the efficient utilization of water resources. Comprehensive Plastics Reduction Program involves measures to reduce or eliminate the production and use of single-use plastic products and encourage reuse of other items to the extent feasible, in order to reduce or eliminate the input of single-use plastics into the City's waste stream and the environment. For LA City's Textile Policy Goal, the city collaborates with partners, such as the California Product Stewardship Council, to repurpose materials suitable for reuse in textile products, and to enhance fiber-to-fiber recycling.

Textiles in the City of Los Angeles comprise a large portion of the industrial GHG footprint, from manufacturing to waste recovery and landfilling. The current textile system relies heavily on imported fabrics and garments that are not designed for reuse, repair, or recycling. The current textile waste recovery system relies on unregulated exports to secondhand markets, downcycling, burning for waste-to-energy, or landfilling. The City of Los Angeles landfills over 70,000 tons of commercially generated textile waste annually (6% of the total commercial collection in black bin and 2% in blue bin), within City limits, excluding residential and post-consumer textiles.

Percentage of Textile in the Commercial Waste Stream of the City of LA



In 2020, LA Sanitation and Environment (LASAN) secured a grant from the Goldhirsh Foundation LA2050 Grants Challenge to establish a local textile reuse market through creating recovery roadmaps and piloting textile recovery models. The project was contracted to the California Product Stewardship Council (CPSC), a 501(c)(3) nonprofit with the mission to help various industries develop complex end-of-life solutions for hard to manage materials. CPSC has been leading several textile recovery projects to make partnerships and policy development that expand circular fiber systems with reduced cost-burden on local government and taxpayers through producer engagement. CPSC's pilot projects include textile sorting and repair pilots in San Francisco, textile

waste characterization with the County of Los Angeles, a pilot textile waste audit project with GreenWaste San Jose, and the Calrecycle Recycling Market Development Zone.

1.2 LA Textile Pilot

The goal of the LA pilot project is to create a circular and streamlined model for textiles, in line with LA's Green New Deal goals. Summary of project activities are outlined in Figure 1. In Phase 1 (2020-2022), the project collected information on sources of commercial textile waste, fiber content, and established processes to manage unwanted textiles including high occurrences of landfilled blended fabrics. A full report is available online.

Phase 2 utilized the foundation laid down by Phase 1 and established a LA Textile Hub. A sorting site was secured to sort unwanted textiles collected from LA for further processing. Training documents were developed in order to streamline the textile recovery process from pre-sorting by generators to collection to recycling/upcycling. Collaborations in Phase 2: LA Fiber considered participation in the pilot and decided best to wait for a permanent program with ongoing funding.

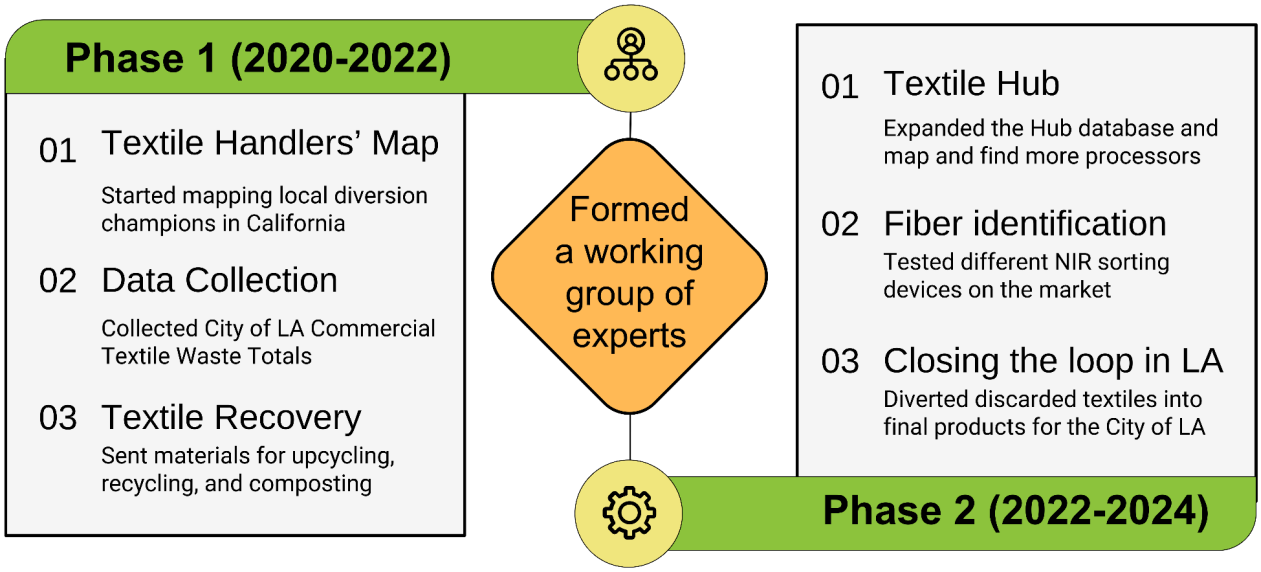


Figure 1. Key Projects Activities in LA Textile Pilot Phase 1 and Phase 2

Note: A detailed list of project objectives and outcomes and the training documents can be seen in Appendix C.

1.3 Partners, Co-funders and Collaborators in Textile Pilot Phase 2

LA Sanitation and Environment (LASAN)

LASAN is responsible for the collection, treatment, and recycling of solid waste and wastewater generated by residents, businesses and industries in the City of Los Angeles and surrounding communities. LASAN serves over

four million residents through four broad program areas: Solid Resources, Clean Water, Watershed Protection, and Environmental Quality (Livability). LASAN protects the public health and environment while enhancing the quality of life in the City of Los Angeles neighborhoods.

California Product Stewardship Council (CPSC)

California Product Stewardship Council (CPSC) is leading policy development in California that expands circular fiber systems with reduced cost-burden on local government and taxpayers through producer engagement. At the same time, CPSC is spearheading several textile recovery projects, making partnerships and proof of concept for textile circularity. CPSC's previous pilot projects include:

- Two in the City and County of Los Angeles (Summary HERE);
- Two with the City and County of San Francisco in partnership with Goodwill to test feasibility and pilot a repair program for damaged garments (Summary HERE);
- San Jose Green Waste Pilot Project (Summary HERE);
- Napa Shoe Research (Report HERE).

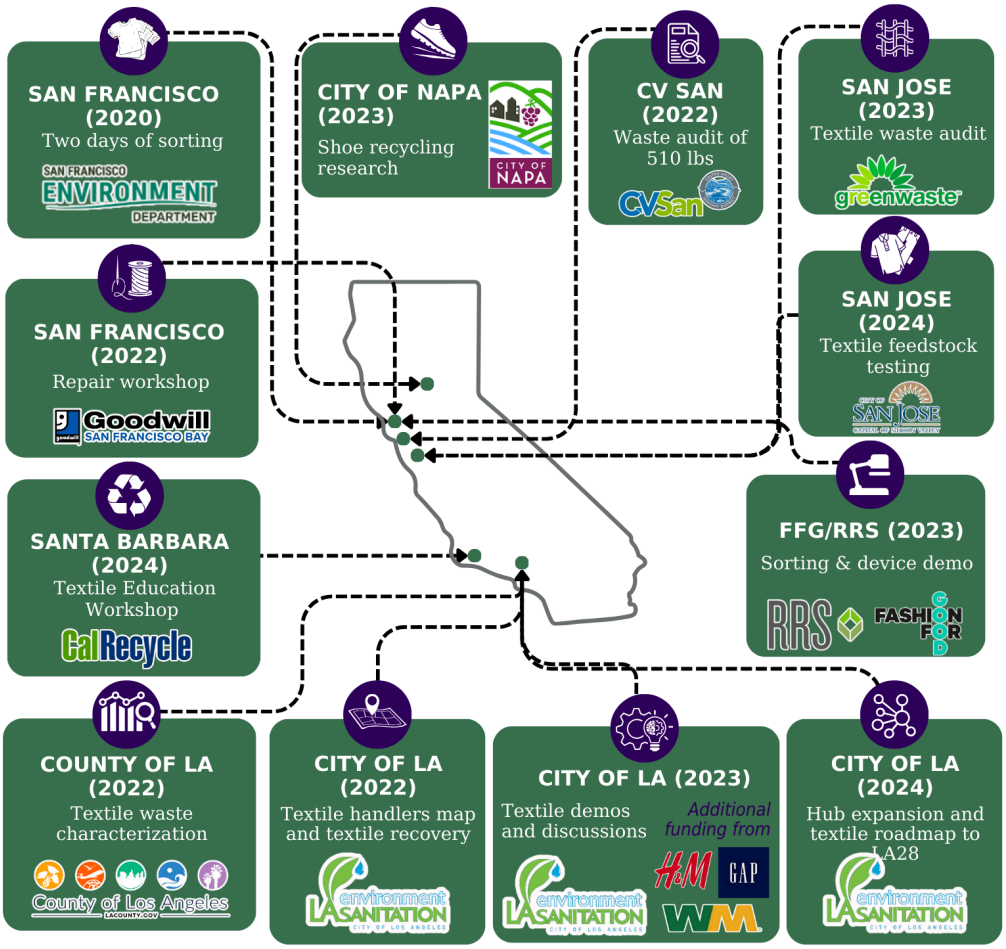


Figure 2. Map of CPSC's Textile Pilot Projects

Co-funders

Phase 2 receives financial support from co-funders such as WM Inc., WARE, Athens, Gap Inc., H&M, and Pls Return It. Homeboy Threads supported the pilot by contributing the space and labor for sorting the collected materials. Outerknown provides additional support to turn the recycled fibers into final products.

Los Angeles Cleantech Incubator (LACI)

Los Angeles Cleantech Incubator (LACI) is a non-profit organization dedicated to creating an inclusive green economy in Los Angeles. LACI's Innovators and Incubation startup programs have been incubating over 16 businesses in the textile circularity space. LACI hosted a charette in February 2024 with 55 attendees who discussed Policy + Incentives for Textile Waste, Infrastructure, Technology Integration for improved material ID and Broad Collaboration & Education within the ecosystem. LACI played an integral role in starting the textile sustainability program at CSU Northridge. LACI provided the list of startups that are in the Textile or circular economy space at LACI.

Educational Institutions

Phase 2 successfully connected with leading educational institutions in Los Angeles with plans to expand the educational component of the Hub in Phase 3. A centralized textile hub needs to consider embedded educational opportunities to give the future generations of textile industry workers a chance to learn circularity early on. Case study for educational institutions can be seen in Appendix A.

LA Textile Working Group

As part of the textile pilot Phase 2, CPSC hosts the Los Angeles Working Group with the City of LA, other governmental and non-governmental stakeholders and industry leaders (Figure 3.) to strategize for the on-going pilot projects and future extensions for textile recovery in the City. The working group includes representatives from LASAN, WM, Inc., Homeboy Industries, Resource Recycling Systems (RRS), Athens Services, Gap, Inc., Patagonia, H&M, Nature USA, Ware Disposal, Inc., Pls Return It, Southern California Fibershed, UCLA, Quantis, R3 Consulting Group, Inc., CSULB, and LACI. The LA Textiles working group meets monthly to discuss project updates, challenges, and future opportunities.

Figure 3. Members of LA Working Group

2.0 Los Angeles Textile Hub

2.1 LA Textile Hub Goals

The goal of the pilot project led by LASAN is to create a centralized hub (or multiple hubs) with a physical location to receive/sort textiles and a virtual HUB for the website/marketplace. In Phase 2 (2022-2024), the virtual LA Textile Hub was launched on the CPSC's website for public use. Building upon experiences from Phase 2, Phase 3 will focus on acquiring a physical sorting hub enabling a local textile recovery program in the City of LA, with key steps including:

- Understanding space, energy, and other requirements for the facility while considering reporting and performance standards for partners.
- Identifying a location that meets these requirements.
- Submitting permits, applying for loans, and contracting with technology companies and vendors.
- Working with haulers and top generators to facilitate the drop-off of textiles at the hub.

2.2 Sorting for Circularity

The complexity of textiles which comprises blends, dyes and components like large prints poses a challenge for recycling facilities. The challenge is compounded by the lack of a mandatory disclosure requirement for blends comprising less than 5% on garment tags. For program efficiency, pre-processing is needed to sort materials and prepare quality feedstocks for processors. Among

currently available technologies for textile material recognition, Near-Infrared Spectroscopy (NIR) stands out as the most promising and market-ready option, already commonly used in the industry.

Phase 2 partnered with providers, and conducted field tests for a number of NIR-based fiber identification devices on the market which differ in size, functionalities and price range. Featured fiber identification devices include BASF trinamiX, Matoha FabriTell, Thermo Fisher Scientific Summit X, Sortile, Tomra AutoSort and Refiberd.

Phase 2 demonstrated that **handheld devices** provide mobility and convenience enabling field workers, businesses, and even consumers with the ability to conduct on-the-spot fiber identification. **Tabletop devices** offer robust capabilities suited for detailed fiber analysis and data collection. Their applications span across textile sorting, research, quality control checks where precise fiber identification with data collection capability is needed. **High-capacity textile sorting machines** offer a scalable and adaptable solution to handle large quantities of diverse materials entering material recovery programs. Demand is increasing for high-capacity machines equipped with automated high speed sorting technology, like Valvan or TOMRA, to be utilized in Materials Recovery Facilities.

2.3 Demonstration of Closed Loop Potential

To demonstrate the concept of closing the textile circular loop as close to the city as feasible, Phase 2 collaborated with partners (Figure 4) and sorted more than 2,000 pounds of cotton and cotton-poly blends within LA, for subsequent local and regional processing (Figure 5). Then, the pilot successfully connected the processors with the end market. As a result, new products will be made by using the recycled materials sourced from LA for the local market by Outerknown, a California-based clothing brand that focuses on sustainability using eco-friendly materials. Details of case studies can be seen in Appendix A.

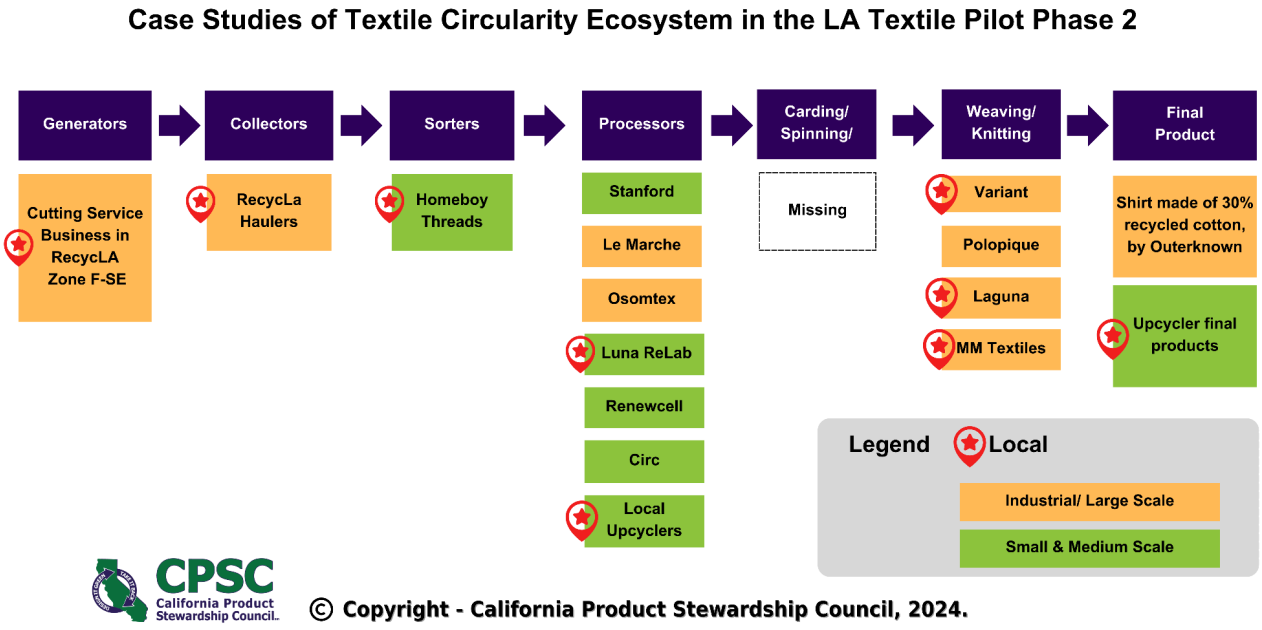


Figure 4. Current Capacities of California Textile Circularity Ecosystem

The textile recycling life cycle involves a comprehensive series of stages as follows.

- **Collection:** The process begins with the collection of post-consumer or post-industrial discarded textiles. In the case of LA City, permitted waste haulers collect and transport the waste from the generators to designated processing facilities. Regarding reuse, thrifts and reuse centers play a crucial role in redirecting unwanted textiles for resale or donation. There are also mail-back options, allowing individuals to send their discarded textiles directly to the brands or manufacturing facilities.

- **Sorting and Quality Assessment:** Upon collection, the textiles undergo sorting based on criteria such as fiber type, colors, and quality suitable for reuse (upcycling or redesign) or recycling. The number of sorting facilities remains small in comparison to the volume of textile waste generated. In LA, the majority of sorting facilities are characterized by small to medium-scale operations.

- **Upcycling and Redesign:** During collection and sorting stages, items identified for reuse can be separated, diverting them from conventional recycling streams. If the materials can be used, these materials undergo cleaning, repair, or occasionally redesign to enhance their functionality, aesthetics, or sustainability within existing textile products. Upcycling involves transforming discarded textiles into new products through creative and innovative approaches.

- **Preprocessing:** Following sorting, the textiles are prepared for recycling through various methods, including cleaning, removing non-textile elements (like zippers or buttons), and sometimes cutting or shredding the materials into smaller pieces for easier processing.
- **Recycling:** The prepared textiles are sent to recycling facilities where they undergo specialized processes. These may include mechanical recycling methods such as shredding, or Enzymatic Digestion (cellulose/polyester) or Chemical Recycling (repolymerization of Dimethyl terephthalate - DMT monomer). Currently, the majority of textile recycling facilities operate on a small to medium scale.
- **Carding, Spinning, Weaving:** After being broken down into fibers, these recycled fibers are carded into silver and then spinned into yarns and weaved into fabrics suitable for manufacturing new textile products. These processes often include subprocesses for finishing.
- **Manufacturing New Products:** Finally, these spun recycled fibers are used to create new textile products like clothing, bedding, or other fabric-based items.

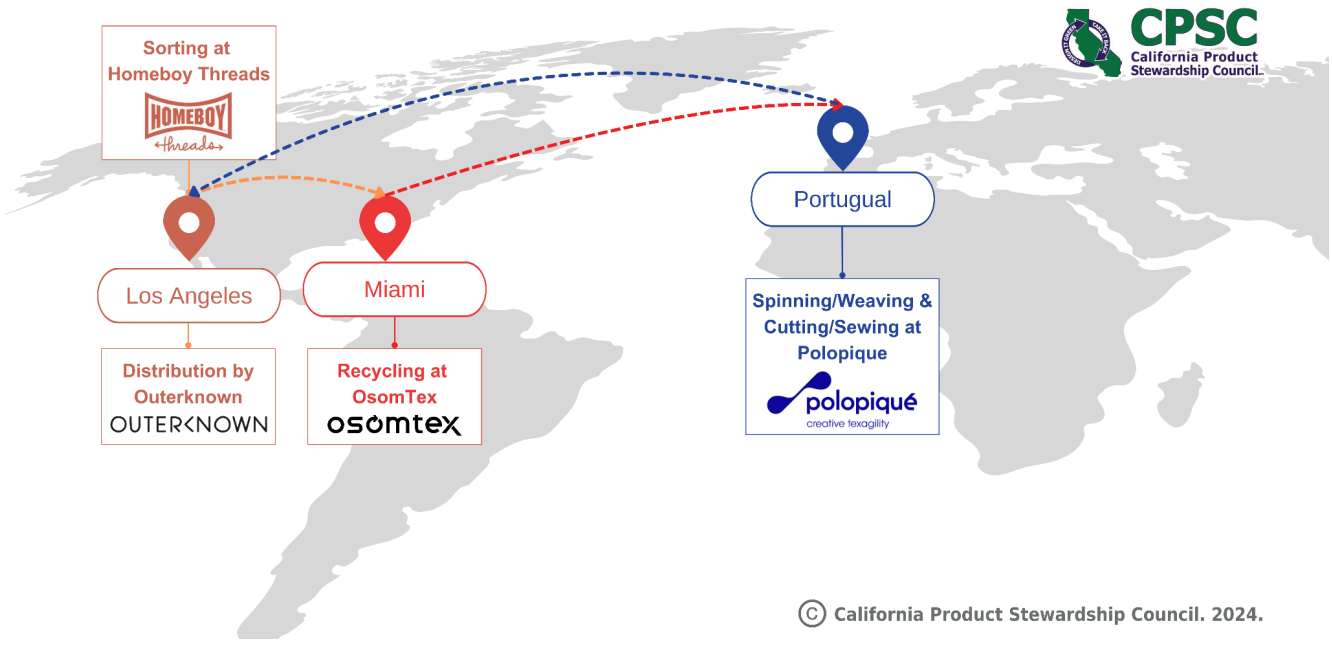


Figure 5. Material Flow Map of Materials Handled for the Textile Recovery Pilot in Los Angeles Phase 2 Project

2.4 Estimation of Job Employment

Creating a textile hub with infrastructure for collecting, sorting, and recycling textiles can boost domestic manufacturing and job opportunities. Product stewardship and extended producer

responsibility programs in California have a history of job creation and transparent reporting. Annual Reports from the California Carpet Stewardship Program, the California Mattresses Stewardship Program, and France's Textile EPR program detail the number of jobs supported by the program and volume of diverted materials. Additionally, references to reuse jobs and EU markets were considered.

To estimate job creation potential, full-time equivalents (FTEs) for textiles are calculated by applying the FTE/Ton metrics to the textile waste tonnage reported at the local and state levels. The average annual textile waste collected in Los Angeles is 75,137 tons (Source: LA Pilot Project Phase 1). Total annual textile waste in California (2018) amounts to 1,199,461 tons (Source: CalRecycle's 2018 Disposal-Facility-Based Characterization of Solid Waste in California).

Projections from existing programs and references in the calculations presented in Appendix B, a **Textile program would create 1,070 jobs in Los Angeles, and 17,086 jobs Statewide.**

2.5 Estimation of Greenhouse Gas Emission

The LA textile recovery pilot aims to reduce waste going into landfill or incineration by enabling material reuse and recycling. Throughout the pilot, efforts have been made to estimate greenhouse gas (GHG) emissions, providing insights into the carbon footprint associated with textile recycling and emission reduction opportunities. The calculation of GHG emissions associated with the Phase 2 activities is attached in Appendix B. With the working group's feedback considered in the calculation, the **GHG reduction for the volume of textiles diverted in Phase 2 is 39.23 MTCO2, equivalent to 8.7 gas powered cars driven for one year.**

Additionally, Columbia University has developed a detailed GHG emission estimator for LASAN, enabling the comparison of potential GHG emission reductions between a base case scenario and alternative waste recovery approaches for post-industrial textile waste in Los Angeles. Eco-Catalyst, in collaboration with San Jose State, also created a GHG calculator for textiles that LASAN can consider adopting in the absence of a standardized method. Analyses are available upon request.

It should be noted that there is not yet a standardized GHG calculation methodology in the textiles industry. The complex nature of unknown fiber blends, chemical treatments, and unknown end-of-life processes have caused most GHG calculators to be irrelevant in textiles applications. It is also important to acknowledge that existing methodologies employed in these assessments may have biases and limitations. For example, Higgs-Index has been criticized as it incorporated unfounded calculations which resulted in synthetics having a lower GHG footprint compared to natural fibers. The US EPA's Waste Reduction Model (WARM) does not include an option for selecting a material input that would be inclusive of textiles composed of natural fibers. Globalized supply chains further complicate efforts to accurately map the industry's supply chain, adding complexity to GHG calculations. Fashion trends and textile recycling technologies are rapidly evolving, making it challenging to update GHG calculations accordingly.

3.0 Gaps in Education, Information and Infrastructure

3.1 Education: Coordination with Educational Institutions

Many Universities in Los Angeles have classes directly related to the hub, such as textile sciences, apparel management technology, design, and merchandising. However, there is no central list of textile-related courses in LA, nor is there opportunity for workers in the textile factories to gain low-cost access to these classes. It is important to collaborate with educational institutions to bolster textile education and job training aligned with the market and available innovations. The Los Angeles textile hub could offer education directly from experience and bring research/innovation back to the hub. Gastonia and the North Carolina hubs provide strong models for integrating textile education with industry. In these models, successful transitioning from traditional industries like textiles to a knowledge-based economy was enabled by educational institutions, such as Duke University and the Research Triangle Institute, that brought together researchers, entrepreneurs and investors, driving regional innovative capacities and robust industrial development.

Table 1. List of Institutions offering Textile Education and Ongoing/Future Pilot Collaboration

Institution, Department & Program	Collaboration Opportunities
California State University, Northridge (CSUN) ✣ Department of Family and Consumer Sciences, ✣ The Fashion Design and Merchandising program (undergraduate)	(Pilot phase 1) Compost and deadstock trials webinar (Pilot phase 2) Design presentation by CSUN students at a demo event
FIDM/Fashion Institute of Design & Merchandising Los Angeles ✣ Bachelor of Arts, a minor & three associate degrees	(Pilot phase 1) Webinar
University of California, Los Angeles (UCLA) ✣ School of the Arts and Architecture; Textile Council; ✣ FAST (Fashion and Student Trends) Club	(Pilot phase 2) Participation in Working Group meetings
Columbia University ✣ School of Professional Studies, Career Design Lab	(Pilot phase 2) The LASAN team partnered with Columbia University to work with graduate students to research elements of the pilot, visit Los Angeles to tour pilot partners, and stay involved in the working group. Final presentation by the students was held on May 7, 2024.

Institution, Department & Program	Collaboration Opportunities
California State University, Long Beach (CSULB) ✣ School of Art, Fiber Program	(Pilot phase 2) Advisory board. Two presentations.
University of Southern California (USC) ✣ Center for Smart Omni-Functional Textiles; Minor in Fashion	Collaboration opportunities in future phases such as workshop, upcycling challenge and curriculum development
California State University, Los Angeles (CSULA) ✣ Department of Art, certificate programs in Fashion, Fiber and Materials	Collaboration opportunities in future phases such as workshop, upcycling challenge and curriculum development
Los Angeles Trade Technical College ✣ Fashion design and fashion technology programs	Collaboration opportunities in future phases such as workshop, upcycling challenge and curriculum development
Loyola Marymount University ✣ College of Communication and Fine Arts - Loyola Marymount University (lmu.edu)	Collaboration opportunities in future phases such as workshop, upcycling challenge and curriculum development
Santa Monica College ✣ Fashion - Santa Monica College	Collaboration opportunities in future phases such as workshop, upcycling challenge and curriculum development

3.2 Information: Textile Data

Our case studies revealed a lack of transparency and primary data throughout the textile industry's supply chain. **Limited data quality and availability** pose challenges for projecting infrastructure

requirements for textile recovery, as well as for calculating life cycle emissions, particularly in the transportation, reuse, and end-of-life phase (Eco-Catalyst Inc).

In Phase 1, the pilot established a baseline of the City of LA's textile commercial waste, leveraging the data obtained from the waste characterization from the recycLA Service Provider (RSPs) and LASAN. This serves as a starting point for targeting specific RSP zones for the textile recovery efforts and informs decisions related to deciding the sorting site location and the available materials for reuse and recycling. Establishing a robust reporting system is needed to track production volumes and to capture the volume and specifications of materials entering waste streams accurately. The labeling case study in Appendix A can be referred to for more information.

3.3 Infrastructure Gaps: Regional Textile Circularity Value Chain

Based on the pilot's findings, the current gaps in infrastructure for a Los Angeles textiles circularity program are identified as follows.

- **Sorting at Mass Scale** — A significant challenge in the textile recycling process is the absence of efficient sorting systems on a large scale. Currently, sorting discarded textiles is mostly done manually, relying on garment tags or handheld/tabletop fiber identification devices. This manual process not only compromises accuracy, but also adds to the costs of preparing feedstocks for recycling.

- **Recycling - Beyond Shredding** — Current recycling methods mainly involve shredding materials. However, for cotton scraps, a key step called 'ginning' is missing. 'Ginning' cotton scraps is essential to separate and refine fibers, enabling them to be spun into new yarn or fabric. The absence of this step limits the effectiveness of cotton recycling efforts. Similarly for synthetics, a fiber-to-fiber recycler needs to make a pellet that can then be extruded into a fiber/yarn.

- **Commercial Upcycling** — While traditional recycling focuses on breaking down materials to create new ones, upcycling involves transforming waste materials into products of higher value. Currently, there is a lack of systems and infrastructure to support scale local upcycling initiatives. Suay's Sew Shop works in this space for repair/redesign workforce training and needs funding to scale.

- **Carding and Spinning** — The biggest gap in textile circularity within California lies in the carding and spinning phase of creating high-quality recycled textile yarns. While some up/recycling processes exist, and several fabric mills exist, the gap between fiber and fabric is the yarn spinning phase. Special attention to this section will ensure the capability to efficiently spin recycled fibers into usable yarns.

- **Additional Support - Testing, R&D, etc.** Scaling textile circularity initiatives requires additional support to streamline the whole value chain from material production to sorting to recycling process. This includes elements like comprehensive testing methodologies to ensure the quality of recycled materials, dedicated R&D efforts to innovate and improve recycling technologies, and the development of supportive infrastructure and policies to streamline the circular process.

4.0 NEXT STEPS OF ACTION

4.1 Continue LA Textile Working Group Meetings

As the pilot project advances into its next phase(s), it is crucial to maintain the regular LA textile working group meetings while extending invites to new members. These meetings will serve as a platform for continuous dialogue and strategy development, focusing on addressing infrastructure gaps, promoting innovative solutions, and formulating policies and investments crucial for sustainable textile management.

4.2 Coordinate academic and job training education around textile circularity

Building upon the groundwork laid in Phase 2, where connections were established with universities in Los Angeles, the next crucial step for the pilot project is to coordinate academic and job training programs focused on the textile industry. This aims to address critical gaps in the industry by nurturing a skilled local workforce equipped with specialized knowledge in textile engineering, sustainable materials management, merchandising and sustainable design. Recommendations include:

- Organize training opportunities and certificate(s), such as Fashion Technology or Repair
- Provide opportunities to participate in pilot projects to give students hands-on experience in textile circularity.
- Organize student-led meetings to encourage engagement in pilots and policy.

4.3 Build and Operate A Textile Sorting Hub

As the City of Los Angeles is aiming to create a local textile program and establish a textile hub, a feasibility study is recommended to analyze factors like site suitability, market demand, and operational requirements. Below, we outline key factors to consider in a feasibility study based on the findings of this pilot project.

Box 1: Property location requirements
☐ Min square footage: 75,000+ sq ft

Box 2: Building development requirements
☐ Room for high capacity sorting machines ☐ Adequate space for receiving trucks

☐ Located in suitable city districts based on recycLA zones (Zone 9 & 14) and Council Districts ☐ Zoning requirement: industrial	☐ Energy capacity ☐ Submitting permits, applying for loans, and contracting with technology companies and vendors.

Other considerations for formulating a feasibility study are as follows,with key steps including:

- ❖ Determining feedstock availability by zone by fiber type by auditing the hauler waste streams with handheld fiber identification devices.
- ❖ Measuring current market capacity for reuse and recycling by fiber type.
- ❖ Understanding scope, costs, and reporting requirements for program data.
- ❖ Working with haulers and top generators to facilitate the drop-off of textiles at the hub.
- ❖ Textile volume and purchase commitments from recyclers, mills, and brands.
- ❖ Political considerations in the different council districts.

4.4 Establish Local Textile Program Prior To LA28

Another opportunity to expand the scope of work would be to establish a local textile program prior to the forthcoming global mega sports events, including FIFA World Cup 26, Super Bowl LXI (2027) and the 2028 Summer Olympics, also known as Los Angeles 2028 (LA28). Textiles are expected to constitute a significant portion of the waste stream during the preparation and implementation phases of these events.

Currently, neither the City nor the state has a permanent recycling program in place for textiles. While there is pending active legislation, even if it is passed in 2024, implementation will not take place by 2028. Therefore, the establishment of a local program - whether temporary or permanent - is needed to ensure the textiles generated are managed properly. This will contribute significantly to LA's Green New Deal's target of achieving zero waste by 2050 and fostering the creation of green jobs, aiming for the generation of 400,000 green jobs by 2050.

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APPENDIX A

Case Studies

Los Angeles Textile Recovery Pilot

CASE STUDY: PROCESSORS

SUMMARY OF PHASE 2 ACCOMPLISHMENTS

AT A GLANCE

PILOT'S IMPACTS

- **1,500 lbs** diverted
- Recycled products for LA
- Upcycled high quality aprons, bags, jackets.

CHALLENGES

- No efficient sorting
- No shared infrastructure for collection & transporting
- No local yarn spinning
- Limited end market

RECYCLING

The pilot phase 2 successfully sorted & processed 1,000+ pounds of cotton & cotton-poly blends through mechanical processes.

DOWNCYCLING

While the pilot did not engage in downcycling, it is worth noting that some collaborators may send some leftover materials for shredding - for insulation and carpet padding purposes.

UPCYCLING

The pilot project partnered with local upcyclers in LA to repurpose discarded textiles into innovative high-quality new products. Featured products included

- aprons crafted by Eorte,
- bags by Hamilton Perkins,
- denim jacket by Threadhaus,
- clear bags and Denim Repair Kits developed by Circular Fashion LA.

Los Angeles Textile Recovery Pilot

CASE STUDY
PROCESSORS (CONT.)

Gap in the Market

LIMITED LOCAL INFRASTRUCTURE

Given the **limited textile processing and manufacturing infrastructure in LA and in west coast**, the pilot had to transport sorted materials to Miami for recycling and to Portugal for spinning, weaving, cutting and sewing processes. Refer to other case study for summary of challenges for manufacturers taking recycled content yarn and fabric back to the market as new products.

LIMITED END MARKET

Phase 2 collaborated with Outerknown and Hamilton Perkings to distribute final products in the city of LA. However, it was challenging to find responsible end markets that work with recycled fabrics. This underscores the need for textile EPR program to incentivize and hold value chain responsible for final disposition.

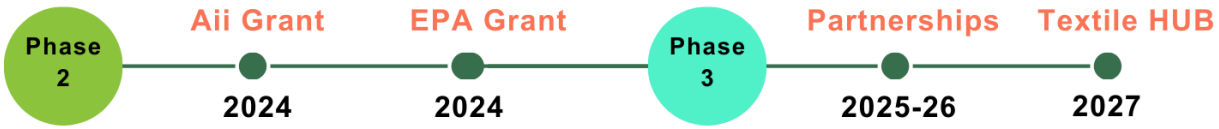
NO SORTING HUB

Processors need **consistent feedstock**s to maintain efficient operations and produce high-quality recycled materials. However, the **absence of effective sorting systems** poses a significant challenge in ensuring the consistency of feedstocks at a reasonable cost. Addressing this challenge requires investment in establishing a sorting hub with high-capacity sorting equipment.

Next Steps

- Design a textile HUB prior to mega sport events such as **LA28** and **Super bowl 2027**
- Invest in high capacity sorting technology
- Establish shared infrastructure
- Develop Marketplace
- Expand FTE research

Pilot Timeline



Los Angeles Textile Recovery Pilot
CASE STUDY
EDUCATIONAL INSTITUTIONS

SUMMARY OF PHASE 2 ACCOMPLISHMENTS

The pilot phase 2 partnered with

- graduate students from Columbia University to research elements of the pilot, and stay involved in the working group.
- CSUN students to showcase their redesign presentation at a demo event (Photo: Left)
- university students to create a student-led working group.

AT A GLANCE

PILOT'S IMPACTS

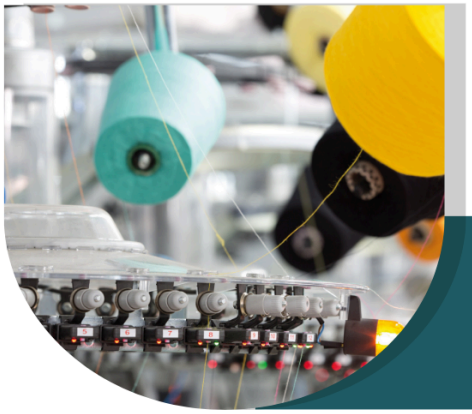
- Donated materials for research & redesign
- Students' design presentation
- Students-led working group

CHALLENGES

- No coordinated educational hub and collaboration opportunities
- Limited workforce training

Next Steps

- Apply for the EPA EJ grant to support workforce training.
- Organize training such as repair workshops for students & educators.
- Support textile engineering & science programs and testing labs.
- Organize students-led working group meetings to engage in policy recommendation.



Los Angeles Textile Recovery Pilot
CASE STUDY MANUFACTURERS

SUMMARY OF PHASE 2 ACCOMPLISHMENTS

AT A GLANCE

PILOT'S IMPACTS

- Sent **816 lbs** of recycled yarns to LA based mills

CHALLENGES

- Limited local fabric mills that work with recycled yarns in California
- Difficulties such as recycled yarn's lack of lubrication, drop stitches and inconsistency in feel

LAGUNA

Laguna received yarn from Osomtex, 50% recycled cotton/ 50% recycled PET. Notably, these yarns are not locally sourced from LA but rather from recyclers, collaborating in the pilot, who have already made these yarns from waste sourced elsewhere.

VARIANT 3D

Variant 3D received recycled yarn from Osomtex 50% recycled cotton/50% rPET, and recycled nylon from Econyl. As mentioned above, materials are not sourced from LA.

ANTEX, MM TEXTILES

The pilot established contact with Antex & MM Textiles. MM Textiles did a tour with LASAN and Columbia, and attended Demo events.

Gaps in the Market

SPINNING

In manufacturing, the biggest gap lies in spinning fibers into usable yarns to create high-quality recycled textile products. There are three fabric mills in LA, and zero yarn mills in the state.

TESTING

Another gap lies in the absence of testing facilities for recycled yarns. These facilities are crucial for ensuring the quality and performance of recycled textile products.

Los Angeles Textile Recovery Pilot

CASE STUDY: LABELING TECHNOLOGY

SUMMARY OF PHASE 2 ACCOMPLISHMENTS

AT A GLANCE

PILOT'S IMPACTS

- Gave upcyclers a way to use smart labels to tell the story of each piece, how to care for it, and connect to customers
- Improved the software's user experience for repair, cleaning and upcyclers to quickly access and update digital records for labeled items and communicate with customers

CHALLENGES

- Federal labeling requirements appear to require printed labels with content information be applied even to textile items with smart labels
- Awareness of labeling technology options on the part of brands
- Labels must be removed during the de-trimming process for recycling

PLSRETURNIT

Labeling is one of the best tools available to brands to educate consumers about how their products come to market, what they're made of, and how to care for them. Further, PlsReturnIt's labelling technology makes it easy and affordable for brands to recondition, package and warehouse returned items for sale or branded resale, facilitate repair and cleaning for customers, receive repair and cleaning data that may influence future product development, and implement affordable take back programs.
This pilot project allowed PlsReturnIt to improve their software thanks to a more granular understanding of collecting, sorting, and recycling to better serve professionals in those spaces and support manual and automated processes through combinations of technology. The pilot also gave them the opportunity to make the user experience of updating records via their software even easier and more intuitive for repair, upcycling and cleaning professionals.

Next Steps

- Grow adoption of labeling technology by brands
- Apply for DoE ReX grant to facilitate domestic sorting, resale, upcycling, down cycling and recycling.

APPENDIX B

Supplementary Information

for Pilot Project Phase 2

Table 1: List of LA Working Group Meetings for Phase 2

No.	Date	No. of Members
1.	08/01/2023	10
2.	09/05/2023	15
3.	10/03/2023	15

Table 2: Collaborators in the Material Recovery Pilot

Stage	Partners	Materials Handled
Generator	RNC Cutting Services, etc.	2,000+ lbs of different materials including cotton and cotton-poly blends.
Collectors	RecycLa Haulers	2,000+ lbs of different materials including cotton and cotton-poly blends.
Sorter	Homeboy Threads	1,000+ lbs of cotton and cotton-poly blends were sorted by fiber types, color and quality.
Recycler	Stanford	20 lbs of cotton-poly were processed by using enzymatic digestion.
Recycler	Osomtex	1,000 lbs of cotton were processed by mechanical recycling.
Spinner	Outerknown	800 lbs of recycled cotton will be spinned into fibers.
Weaver	Outerknown	800 lbs of recycled cotton will be weaved into fabrics.
Cut/Sew	Outerknown	# Units TBD
Total weight of materials handled		**2000+ lbs**

Table 3: List of Case Study Fiber Identification Technologies for the Textile Recovery Pilot in Los Angeles Phase 2

Case Study	Location & Date	Summary
BASF/trinamiX	San Jose June 13, 2023	GreenWaste diverted a total of 5,460 lbs. (2.73 tons) of discarded textiles in 1.5 days, which equates to 960,960 tons annually at 22 days per month for 12 months. The total weight of 580 lbs. of materials was randomly selected garments for the detailed audit. The team scanned the garments with TrinamiX and checked the label tags manually; the audit found that there is an inconsistency between label tag and scanned data. For the purpose of reuse and diversion from the recycling line, the majority (87%) of discarded items were found to be repurposable and 35% resellable and 42% repairable.
BASF/trinamiX, Matoha	Los Angeles June 27, 2023	Around 30 attendees, that included representatives from local government, haulers, recyclers, designers and brands, were

Case Study	Location & Date	Summary
		able to engage with two portable fiber identification devices to understand their operations.
Thermofisher	Sacramento June 28, 2023	A fiber identification demonstration featuring Thermofisher's SummitX in Sacramento
Matoha	San Francisco July 18-19, 2023	A fiber identification demonstration featuring Matoha's FabriTell device at the Goodwill site.
Sortile	Los Angeles Sep 27, 2023	A fiber identification demonstration featuring sortile device at LASAN
Sortile	San Francisco Sep 28, 2023	A fiber identification demonstration followed up the preprocessing demo at GAP's headquarter office

Estimation of Job Employment

Table 4: Reported Total FTEs and Total Tons Managed by Established Programs and Other Citable References

Established Program	Actual FTE/Programmatic Ton	FTE Projections for LA	FTE Projections for CA
CA Carpet EPR Program - 2022	0.004524111	340	5426
CA Mattresses EPR Program - 2022	0.000642928	48	771
France Textile EPR (Total FTE) - 2022	0.009865478	741	11833
France Textile EPR (FTE only for sorting) - 2022	0.008011343	602	9609
Information Source	**Estimated FTE/Ton**		
Reuse and Recycling EU Social Enterprises network (RREUSE) (2015)	0.02	1503	23989
Nordic Council of Ministers (2015)	0.036666667	2755	43980
ReHubs by EURATEX (2020)	0.02	1503	23989
	Average	**1070**	**17086**

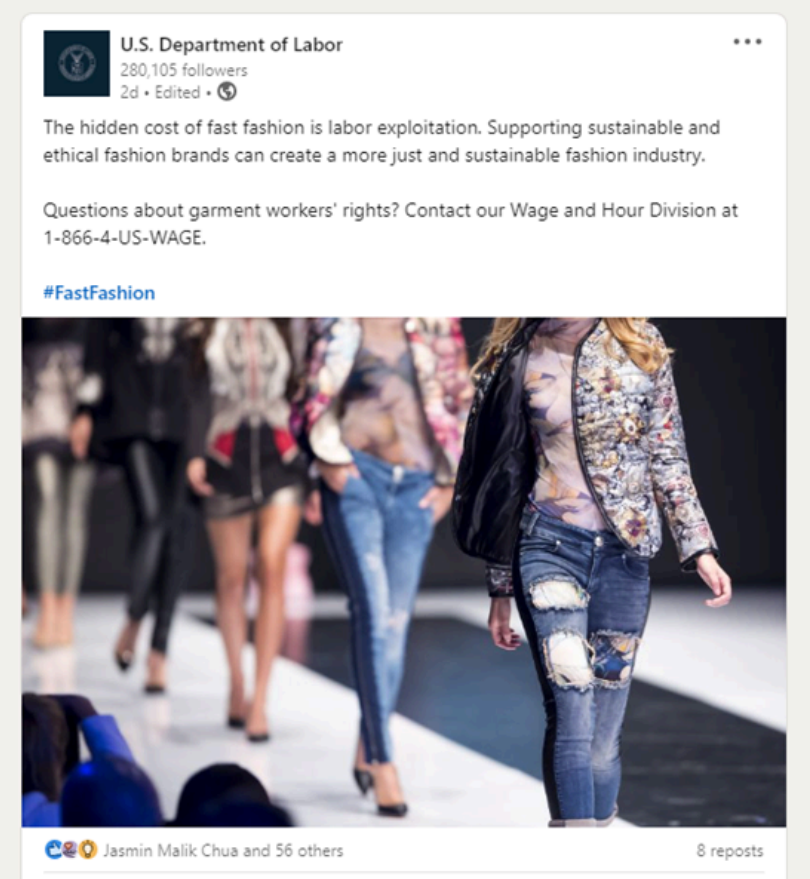


Figure 1. US Department of Labor highlighting the challenges of inequitable labor practices in the textile and clothing industry, a key motivation to increase safe and equitable domestic textile jobs

Estimation of Greenhouse Gas Emission

Table 5: Greenhouse Gas Emissions Throughout Textile Recovery Lifecycle

References for GHG Calculation Methodologies used in CPSC's Pilot Projects

Description	Reference
Potential reduction of GHG on recycling textile waste (available for synthetic fibers only)	EPA's Waste Reduction Model (WARM)
GHG calculation of industrial carbon footprint of cotton denim jacket	Cheng Y, Liang H. Calculation and evaluation of industrial carbon footprint of cotton denim jacket. Journal of Engineered Fibers and Fabrics. 2021;16.
GHG emissions from transportation	EPA's Greenhouse Gas Equivalencies Calculator
Recycled cotton fiber production, cotton yarn spinning, fabric knitting, t-shirt manufacturing	Prabod Munasinghe, Angela Druckman, D.G.K. Dissanayake. A systematic review of the life cycle inventory of clothing. Journal of Cleaner Production, Volume 320, 2021, 128852, ISSN 0959-6526.
Estimation of losses in textile manufacturing	Textile Exchange. Fiber Conversion Methodology. 2019.

Case Study 1: Los Angeles Textile Pilot Phase 1

Background: To tackle LA's growing textile and garment waste, LASAN Industry team partnered with the CPSC to create a textile hub database, to characterize unwanted textiles coming from commercial generators, and to process unwanted textiles with selected case studies.

GHG calculation methodology: LASAN's LA Industry team ran an alternative waste management model provided by USEPA, called 'Waste Reduction Model (WARM)' to assess the potential reduction of GHG on recycling textile waste. WARM is used to compare a **Baseline** scenario with all materials being landfilled to an **Alternative** scenario with a portion of materials being diverted from landfill through recycling.

Equivalent of 5,786 gasoline-powered passenger vehicles driven for one year.

The WARM model shows that diverting 30,000 tons of materials from landfill reduces 26,851.47 $MTCO_2E$.

Fiber	Baseline (Landfilled)	Alternative (Diverted)
Synthetic fibers	1521.86	(26,851.47)
Average GHG reduction = 26.851.47 $MTCO_2$		

Case Study 2: SFE project

Background: In 2020, CPSC launched a textile repair project funded by San Francisco Environment, partnering with CBU Productions and Goodwill of San Francisco Bay. The pilot repaired 876 Garments for resale, diverting 815 lbs of textiles from the landfill.

GHG calculation methodology: CPSC created a GHG calculator taking primary fiber type into consideration. One assumption is based off a Woman's Medium Cotton Jacket to calculate a per pound GHG reduction for natural fibers (Cheng and Liang, 2021). The EPA WARM calculator was used to calculate the GHG reduction for synthetic fibers. Both GHG calculators were used on the total weight of the garments repaired for this project, presented as two totals using the entire garment weight and an average of the two.

Equivalent of 1.9 gasoline-powered passenger vehicles driven for one year.

Fiber	GHG reduction factor	GHG reduction calculation
Natural fibers	1.1 lbs of fabric = 0.02 tons CO2	Total GHG (All Natural)*: 0.93 $MTCO_2$
Synthetic fibers	0.56 lbs of fabric = 0.2 tons CO2	Total GHG (All Synthetic)*: 16.30 $MTCO_2$
Average GHG reduction = 8.61 $MTCO_2$		

*Considering total textiles (815 lbs) diverted from landfilled.

Case Study 3: Los Angeles Textile Pilot Phase 2

Background: In phase 2, the pilot is working with textile generators, sorters, haulers, recyclers and brands to collect non-reusable textiles that are being sorted, pre-processed, and recycled to generate recycled fibers and final products.

GHG calculation methodology: GHG emission will be calculated by considering each stage of recycling textile materials into new product including transportation.

Equivalent of 8.7 gasoline-powered passenger vehicles driven for one year.

Process	GHG calculation factor	GHG calculation
Transportation	1 gal of gasoline via truck = 0.008 tons CO2 1 gal of gasoline via ship = 0.0019	Collection from generation in Gas box truck = 3.2 MTCO2 Transport from CA to FL via Gas semi-truck = 22.9 MT CO2 Transport from FL to Peru via Ship = 1.3 MT CO2 Transport from Peru to CA via ship = 10 MT CO2
Cotton recycling	0.214 kg CO2eq/kg	0.097 MT CO2eq
Yarn Spinning	Cotton: 3.84-4.05 kg CO2eq/kg	Average 1.491 MT CO2eq
(Cotton) Fabric manufacturing	Knitting: 0.64–0.97 kg CO2eq/kg	Average 0.217 MT CO2eq
Cotton T-shirt	0–0.32 CO2eq/kg	Average 0.0248 MT CO2eq
Prevention credits	*TBD	
Average GHG (without prevention credits) = 39.23 $MTCO_2$		

*In the process of finding reliable references

APPENDIX C

Supplementary Documents

Guide for Generators - Page 1

ABOUT US

The Los Angeles Sanitation and Environment (LASAN) is responsible for the collection, treatment, and recycling of solid waste and wastewater generated by residents, businesses and industries in the City of Los Angeles and surrounding communities. LASAN serves over four million residents through four broad program areas: Solid Resources, Clean Water, Watershed Protection, and Environmental Quality (Livability). LASAN protects the public health and environment while enhancing the quality of life in the City of Los Angeles neighborhoods.

The California Product Stewardship Council (CPSC) is a coalition in California aiming to shift the product waste management system towards producer responsibility and reduce public costs and drive innovations in environmentally sustainable product design. CPSC is leading several textile recovery pilot projects for the City and County of Los Angeles, the City and County of San Francisco, and StopWaste in Alameda County. More information is available at https://www.calpsc.org/textilestewardship.

Introduction about LA Pilot Project Phase 1

The goal of the LA pilot project is to create a circular and streamlined model for textiles, in line with LA's Green New Deal goals. Phase 1 (2020-2022) mapped and interviewed local champions, analyzed textile waste data, sent materials for upcycling, recycling, and composting.

Introduction about LA Pilot Project Phase 2

Phase 2 (2022-2024) will expand the project's reach by identifying additional textile processors and conducting fiber identification device demonstration and discussion. The phase will also secure sorting site/s and work with haulers to collect textiles from pre-selected and trained generators and form a working group of experts. As working closely with recycLA haulers is crucial for the long-term success of the project, enabling effective and efficient collection of textiles for proper processing and reuse, this training module has been developed to facilitate the pre-sorting process and improve collection efficiency by waste haulers.

Guide for Generators - Page 2

See below for the instructions for sorting and pick-up.

Steps for Sorting

Follow these steps to sort out the collected materials.

- ☐ **STEP-1: Fill out the survey via the link or the QR code to participate in the pilot project. https://www.surveymonkey.com/r/5SWFG3J**

- ☐ **STEP-2: You will get four labeled bags, respectively for**
  - ❒ **100% Cotton,**
  - ❒ **100% Polyester,**
  - ❒ **Cotton/Poly blends, and**
  - ❒ **Other/Unknown**
- ☐ **STEP 3: Add the collected scraps and materials into appropriate bags.**
- ☐ **STEP 4: Close the bags when full.**
- ☐ **STEP 5: If the bags are full before the pick-up date, contact CPSC.**

Plan for Pick-Up

After sorting materials, follow these steps for pick-up at the scheduled date.

- ☐ **STEP 1: Check the pick-up schedule (date/time) and put placeholders.**
- ☐ **STEP 2: Place bags at the front door or designated place, ready before the scheduled time.**
- ☐ **STEP 3: Contact CPSC if bags are not picked up on the designated dates.**

Contact California Product Stewardship Council for questions.

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Address: 1822 21st Street, Suite 100

Guide for Waste Haulers - Page 1

Additional Funding Provided By

Textile Waste Pilot Details for Haulers

Introduction about LA Pilot Project Phase 1

The goal of the LA pilot project is to create a successful, circular, and streamlined business model for textiles, in line with LA's Green New Deal goals. In Phase 1 (2020-2022), the project mapped and interviewed local diversion champions, analyzed textile waste data and sent materials for upcycling, recycling, and composting. This phase generated a list of commercial textile generators, and collected information on sources of commercial textile waste, fiber content, and established processes to manage unwanted textiles including high occurrences of landfilled blended fabrics.

Commercial Textile Waste Totals in the City of Los Angeles			
	Total weight (tons)	**Annual average weight (tons)**	**Percent of total commercial collection**
Total reported commercial black bin waste	3,612,261	1,204,087	-
Textiles in the black bin	215,695	71,898	6%
Total reported commercial blue bin waste	474,667	158,222	-
Textiles in the blue bin	9,717	3,239	2%

	CalRecycle	VS	LA Sanitation
Estimated percent of the franchised commercial waste stream in textiles	2.9%		6.02%

Guide for Waste Haulers - Page 2

Introduction about LA Pilot Project Phase 2

Phase 2 (2022-2024) will expand the project's reach by identifying additional textile processors and conducting fiber identification device demonstration and discussion. The phase will also secure sorting site/s and work with haulers to collect textiles from pre-selected and trained generators and form a working group of experts. As working closely with recycLA haulers is crucial for the long-term success of the project, enabling effective and efficient collection of textiles for proper processing and reuse, this training module has been developed to facilitate the pre-sorting process and improve collection efficiency by waste haulers.

Role of the Haulers

RecycLA haulers that are interested in participating will work with CPSC to customize the pilot details for their zone.

- ☐ **STEP-1: Identify top textile waste generators.**
- ☐ **STEP 2: Assists CPSC to recruit participants**
- ☐ **STEP 3: Review/Approve suggested collection routes and pick-up dates.**
- ☐ **STEP 4: Pick-up textile bins/gaylords/bags on the designated days and drop-off at Homeboy Threads.**

*All costs with sorting, transporting from Homeboy, and processing to upcycle/recycle will be covered by CPSC and included in the final report.

Location of Homeboy Threads

6433 Canning St., Commerce, CA, United States, California

Role of the Textile Waste Generators

Selected generators will be invited to participate in the textile recovery pilot as a measure to divert textiles and work with haulers on ongoing collection opportunities.

- ☐ **STEP 1: Selected participants will receive the training module for pre-sorting from CPSC and one-on-one training over video call or in-person. Pre-sorting will include the following categories:**
  - ☐ 100% Cotton
  - ☐ Any Cotton-Polyester Blend
  - ☐ 100% Polyester
  - ☐ Mixed fibers/Misc/Unknown
- ☐ **STEP 2: Place bags at the front door or designated place, ready before the scheduled time.**
- ☐ **STEP 3: CPSC will order appropriate bins/gaylords/bags delivered directly to the participating generator. If a larger bin is requested, such a request will be shared with the hauler.**
- ☐ **STEP 4: Generator will pre-sort textiles in designated categories to provide receptacles and donate materials to CPSC.**
- ☐ **STEP 5: Generator will call for pick-up or wait for a designated date, based on the hauler's preferred method.**

Role of CPSC

- ☐ **Coordination between haulers and textile waste generators**
- ☐ **Analyses for the textile waste pre-sorting, collection and processing**
- ☐ **Reporting costs and analysis results related to sorting, transporting, and processing to upcycle/recycle**

Contact California Product Stewardship Council for questions.

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CPSC California Product Stewardship Council

Additional Funding Provided By

Textile Waste Pilot Details for Sorters

Introduction about LA Pilot Project

The goal of the LA pilot project is to create a circular and streamlined model for textiles, in line with LA's Green New Deal goals. Phase 1 (2020-2022) mapped and interviewed local champions, analyzed textile waste data, sent materials for upcycling, recycling, and composting. Phase 2 (2022-2024) will expand the project's reach by identifying additional textile processors and conducting fiber identification device demonstration and discussion. The phase will also secure sorting site/s and work with haulers to collect textiles from pre-selected and trained generators and form a working group of experts. This training module has been developed to facilitate the sorting process and improve efficiency for recycling.

Role of the Sorters

Selected sorters will be invited to participate in the textile recovery pilot to collect the commercial textile waste items and sort them into reusables for upcycling and recyclables for recycling.

- ☐ **STEP 1: Describe to CPSC current sorting capabilities and capacity.**
- ☐ **STEP 2: Work with CPSC to arrange days for drop-offs.**
- ☐ **STEP 3: Donate sorting labor to the project for "in-kind" donation and materials will be owned by Homeboy for sale. CPSC will arrange processors. For small loads, 20 lbs or less, materials will be donated. 21+ lbs, materials will be purchased by the processor.**
- ☐ **STEP 4: Receive and check the textile items that are pre-sorted by generators into the following four categories.**

  - ☐ **100% Cotton**
  - ☐ **Any Cotton-Polyester Blend**
  - ☐ **100% Polyester**
  - ☐ **Mixed fibers/Misc/Unknown**

- ☐ **STEP 5: Classify clothing according to level of soiling, contamination, type of fabric, etc.**
- ☐ **STEP 6: Designers/upcyclers will come pick up the materials that will be sorted based on their designs.**
- ☐ **STEP 7: CPSC will cover all transportation costs for materials arriving at the sorter, and materials leaving the sorter. Sorter will share shipments records with CPSC and invoice CPSC for all expenditures at a $500 threshold, not to exceed $5K without written permission.**
- ☐ **STEP 8: Any materials without recycling markets will be disposed of by CPSC and reported back to the City as the stream in need of the most "green design" incentives.**

Tips for Sorting Suitable Materials For Recycling

- **Remove items with paints.**
- **Remove items soaked with oil.**
- **Remove items with big screen prints.**

Contact California Product Stewardship Council for questions.

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Additional Funding Provided By

Textile Waste Pilot Details for Designers and Upcyclers

Introduction about LA Pilot Project

The goal of the LA pilot project is to create a circular and streamlined model for textiles, in line with LA's Green New Deal goals. Phase 1 (2020-2022) mapped and interviewed local champions, analyzed textile waste data, sent materials for upcycling, recycling, and composting. Phase 2 (2022-2024) expands the project's reach by identifying additional textile processors and conducting fiber identification device demonstration and discussion. The pilot project has secured a sorting site and is working with haulers to collect textiles from pre-selected and trained generators. The collected materials will undergo sorting, pre-processing, and recycling to generate recycled fibers and yarns to achieve full circularity.

Role of the Designers

Designers will take a crucial role in creating products using materials from the pilot project, with a focus on sustainability. Design will receive a participation incentive, plus additional financial incentives for incorporating challenging-to-recycle materials.

- ☐ **STEP-1: After accepting participation in the pilot, please share your preferred payment address and W-9, if applicable. CPSC will pay a $350 participation fee to each designer. Additional funds are available for designs incorporating hard-to-recycle materials listed on the next page.**
- ☐ **STEP 2: Receive menu of available materials from sorting partners to develop a design concept.**
- ☐ **STEP 3: Submit your design ideas (sketches) to CPSC for pre-approval before proceeding. Submission can be via email with a description of the product.**
- ☐ **STEP 4: After design concepts are approved, CSPC will provide a date in Oct or Nov for you to go to the sorting partner facility to pick-up materials that will be presorted for you based on your designs. At that time, you can select additional materials from onsite. Develop your product using the materials chosen from**

the pilot project. While one product is mandatory, feel free to create more using the materials you receive!

- ☐ **STEP 5: Identify a retail channel for selling your redesigned products.**
- ☐ **STEP 6: Optionally, you can add the project label customized by Please Return It, Inc. CPSC will put designers in contact with the label provider.**
- ☐ **STEP 7: Take pictures during and after the product is made. Videos of the process are encouraged too.**
- ☐ **STEP 8: After completing your design no later than February 1, 2024, provide a written summary to CPSC sharing your experience, lessons learned, and suggestions for a permanent program in the city.**

Menu For Additional Green Design Incentives

For each product that has 50% of its entirety from a fabric with four fiber blends or more	$50
Each product created with mono-materials** (OR) that has 80% of its entirety from a fabric with three fiber blends or more	$25
Each product created with at least 50% non-recyclable materials*	$15
Each product created with at least 15% non-recyclable materials*	$5

Note: *Materials include, but not limited to, polyurethane and laminated fabrics.

**Mono-materials include thread, buttons, labels, etc.

No more than $500 additional incentive payments allowed per designer. Additional incentive payments must be pre-approved in the design submission.

Contact California Product Stewardship Council for questions.

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Guide for Recyclers

Additional Funding Provided By

Textile Waste Pilot Details for Recyclers

Introduction about LA Pilot Project Phase 1

The goal of the LA pilot project is to create a circular and streamlined model for textiles, in line with LA's Green New Deal goals. Phase 1 (2020-2022) mapped and interviewed local champions, analyzed textile waste data, sent materials for upcycling, recycling, and composting.

Introduction about LA Pilot Project Phase 2

Phase 2 (2022-2024) will expand the project's reach by identifying additional textile processors and conducting fiber identification device demonstration and discussion. The phase will secure sorting site/s and work with haulers to collect textiles from pre-selected and trained generators. A training module has been developed to facilitate the sorting process and improve efficiency for recycling.

Role of the Recyclers

Selected recyclers will be invited to participate in the textile recovery pilot to recycle the non-reusable commercial textile waste items into raw materials or yarn for circularity.

- ☐ **STEP-1: Send CPSC material feedstock specs and details on process for recycling and finding end-markets.**
- ☐ **STEP 2: After agreement, CPSC will arrange to ship materials.**
- ☐ **STEP 3: Recycler will confirm on receipt and after recycling with a 1-page summary of (copy from designers) and final material disposition.**

Contact California Product Stewardship Council for questions.

Joanne Brasch | Special Projects Manager

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Guide for Brands

LA Textile Waste Recovery Pilots

Textile Waste Pilot Details for Brands

The goal of the LA pilot project is to create a circular and streamlined model for textiles, in line with LA's Green New Deal goals. Phase 1 (2020-2022) mapped and interviewed local champions, analyzed textile waste data, sent materials for upcycling, recycling, and composting. Phase 2 (2022-2024) expands the project's reach by making new partnerships and conducting fiber sortation demos across the state. The pilot project has secured a sorting site and is working with haulers to collect textiles from pre-selected and trained generators. The collected materials will undergo sorting, pre-processing, and recycling to generate recycled fibers and yarns to achieve full circularity.

1. Fundraise to participate in pilot project. Scan QR code above or visit calpsc.org/donate

2. Gain access to yarns coming out of pilot for free or low-cost. Receive materials menu at calpsc.org/catextilehub

3. Communicate with in-house designers to identify specifications of desired materials.

4. CSPC will coordinate pick-up of materials at a sorting partner facility

Contact California Product Stewardship Council for questions.
Joanne Brasch | Special Projects Manager
Email: Joanne@calpsc.org

Additional Funding from

Additional Support from

Comparison of Textile Sortation Devices Reviewed & Tested by CPSC

COMPARISON	HANDHELD DEVICE	TABLETOP DEVICE	HIGH-CAPACITY MACHINE
Examples of Brands (Device)	BASF (TrinamiX); Matoha (FabriTell); Sortile	ThermoFisher (Summit X); Refiberd	Valvan (Semi-automatic Fibersort); Tomra AutoSort
Estimated Cost Range	$2,000-5,000, plus annual software subscription	$30,000 - $250,000	$200,000+
Power Source	Battery operated or plug-in	Plug-in	Additional power needed
Average Weight of Device	1.3 lbs.	24 lbs.	Depends on the size of the sorting facility to be integrated
Scanning Technology	NIR	NIR and AI-based hyperspectral imaging	NIR, VIS (visible light spectroscopy), and AI
Interface Opportunities	Built-in screen, programmable LED, standardized and customizable apps	Built-in screen, standardized and customizable apps	Integrated into sorting plant, Built-in Screen
Data Storage	Cloud	Cloud and Device	Cloud and Device
Margin of Error	+/- 5% 10% for blends on some devices	+/- 5%	Approx. +/- 1% depending on material type/ blend type as well as quality of machine learning for this specific type of material
Minimum Fiber Levels for Detection	5-25% depending on the blended fiber	3 - 5%, depending on the blended fiber	Approx. +/- 1% depending on material type/ blend type as well as quality of machine learning for this specific type of material
Identification Speed	1 - 2 seconds online; 4 seconds offline	1 - 10+ seconds for NIR and for AI Spectrometry	± 1.200 kg/h (Valvan) Up to 4.500 kg/h (Tomra)
Fiber Breadth*	9 - 11 primary fiber types, plus various compositions	5,000 library spectra of various materials	6 - 7 primary fiber types, plus various compositions
Optimal Use Applications	MRF, TRF, Retailer, and Education/Research	TRF and Education/Research	MRF and TRF

*Changing rapidly as CPSC and other technology users continue to scan new materials and upload information to the cloud and/or device.

Note: NIR: Near Infrared; MRF: Material Recovery Facility; TFT: Textile Recovery Facility

APPENDIX D

Photos of Pilot Project

Photos of Pilot Projects

(1) LA 06/27/23

Event Description: Demonstration of fiber identification devices, hosted by Homeboy Threads, featuring BASF trinamiX and Matoha devices

(2) Sacramento 06/28/23

Event Description: Demonstration of fiber identification devices in Sacramento, hosted by California Product Stewardship Council, featuring Thermo Fisher



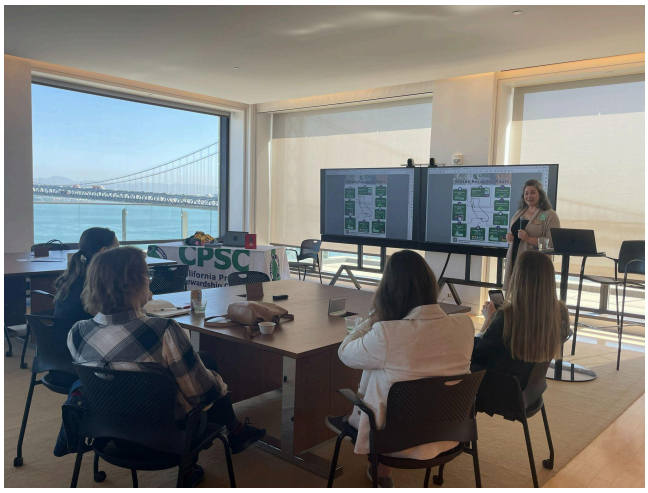



(3) LA 09/27/23

Event Description: Demonstration of fiber identification devices in LA, hosted by LASAN, featuring Sortile

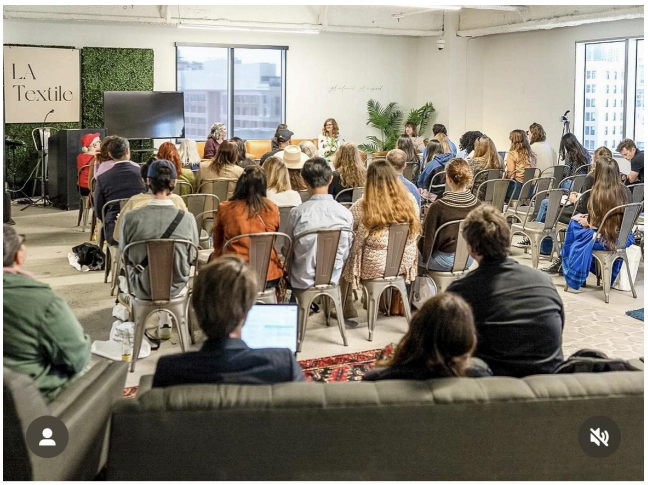
(4) SF 09/28/23

Event Description: Demonstration of fiber identification devices in San Francisco, hosted by Gap Inc., featuring Sortile, followed by pre-processing activities



(5) LA 02/29/2024

Demonstration of fiber identification devices in Los Angeles, hosted by Homeboy Industries, featuring Tomra.



Photos of Textile Recovery

Pictured: Bale of cotton scraps shipped to Osomtex in Florida.

Photos of cotton knit blends sample

Photos of thread sample

Photos of shredded textiles