



# Post-Consumer Textiles:

## King County LinkUp Research Summary Report



**King County**

Department of  
Natural Resources and Parks  
**Solid Waste Division**

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King County

**LinkUp**

April 2014 (rev. May 2015)

## Executive Summary

King County LinkUp (LinkUp) works to expand markets for selected recyclable and reusable materials. In 2013, and based on preliminary research findings, LinkUp chose post-consumer textiles as a new material of focus, primarily because large amounts are still being disposed, even though markets for textiles reuse and recycling are strong.

To better understand the post-consumer textiles value chain and opportunities to increase reuse and recycling in the region, LinkUp conducted extensive research in 2013-14. This research included: reviewing publications and regional waste characterization studies, interviewing more than 20 stakeholders from the municipal, non-profit, and for-profit sectors, touring processing facilities, and conducting surveys of regional consumers and other jurisdictions.

This document summarizes our understanding of the post-consumer textiles value chain and other key insights uncovered through the research. LinkUp also created a *Post-Consumer Textiles Recycling Value Chain* infographic to visually convey how textiles flow through the system – from collection and processing to markets (shown to the right and in Appendix A).



Our research indicates that there are a number of opportunities to increase post-consumer textiles reuse and recycling in the region.

- **Educate the public about textiles suitable for reuse and recycling.** Stakeholders interviewed for this study commonly cited 95 percent of all discarded post-consumer textiles as having reuse or recycling markets.<sup>1</sup> Yet when asked about the condition of clothing, shoes, or household linens placed in the trash, between 50 and 65 percent of King County consumer survey respondents reported disposing items that are generally accepted by current reuse and recycling markets (i.e., items that are torn, have holes, or are unmatched). More than 80 percent of respondents said they would increase the amount of textiles donated, even when in poor condition, if they knew that condition was not an issue.<sup>2</sup>
- **Ensure collection options are convenient and readily accessible to the public.** There are an ever growing number of textiles collection options in the region—from public area drop boxes to doorstep pick-up services and self-directed shipping. However, the garbage can remains the public’s most convenient and low-cost option for discarded textiles (nearly 25 percent of King

<sup>1</sup> King, Jackie. SMART meeting with King County. April 15<sup>th</sup>, 2013.

<sup>2</sup> Online survey. “2013 Stowell Data® Consumer Recycling Awareness Profile,” conducted by Leigh Stowell & Co. on behalf of King County LinkUp.

County consumer survey respondents reported putting textiles in good condition in the trash).<sup>3</sup> According to a 2012 USAgain survey, an estimated 84 percent of respondents felt that convenient location and access is important in discarding clothes for reuse and recycling. About 64 percent were unwilling to drive more than five miles to drop off clothes for reuse and recycling.<sup>4</sup>

- **Support local market development.** Post-consumer textiles reuse and recycling activities involve a substantial amount of manual sorting and processing. In fact, the Institute for Local Self Reliance estimates that textile reclamation is the second-most job intensive reuse industry in the U.S., creating about 85 jobs per 10,000 annual tons processed.<sup>5</sup> Non-profit retailers and social service organizations, such as Goodwill, Salvation Army, St. Vincent de Paul and Northwest Center, incorporate and fund job training programs and social services into their sorting operations, providing social and economic benefits to the region. Though large amounts of sorted post-consumer textiles are resold and reused locally, substantial volumes of textiles are shipped out of the region to other domestic and global markets. These markets are wide ranging, from global second-hand sales and wiping rag makers to converting fiber into products for auto insulation and closed-loop recycling of clothing lines. Opportunities may exist to increase local or regional secondary processing (e.g., sorting, grading, fiber conversion) and end-use markets for some recovered textiles. Potential opportunities need to be looked at carefully, as strong existing market forces may make it difficult to develop local infrastructure and markets.

In 2014, LinkUp plans to further explore these opportunities in partnership with stakeholders throughout the post-consumer textiles value chain.

## Introduction

Starting in 2013, King County’s LinkUp program began researching the current state of the post-consumer textiles industry and its potential for future development. The goals of LinkUp’s textiles research were as follows:

- Characterize the types and quantities of disposed, reused, reworn, and recycled materials.
- Understand the current state of the rewear, reuse, and recycling of post-consumer textiles: the value chain, key players, markets, successes, and challenges.
- Explore potential opportunities for increasing textile rewear, reuse, and recycling in the region.



<sup>3</sup> Online survey. “2013 Stowell Data® Consumer Recycling Awareness Profile,” conducted by Leigh Stowell & Co. on behalf of King County LinkUp.

<sup>4</sup> “News That You Can Use Again.” Survey. USAgain. <http://www.usagain.com/huffington-post-infographics-march-2012>.

<sup>5</sup> [www.ilsr.org/recycling-means-business/](http://www.ilsr.org/recycling-means-business/)

To gather information about post-consumer textiles, the LinkUp program conducted the following research activities:

- Reviewed academic publications, mainstream media articles, and other pertinent resources.
- Drew on textiles-related data included as part of three regional waste characterization studies.
- Conducted interviews with 22 stakeholders throughout the value chain.
- Toured six textile processing facilities: a consolidator, grader, broker warehouse, wiping rag maker, and two thrift stores.
- Inquired about textile rewear, reuse, and recycling programs across the country, including San Francisco, California, Queen Creek, Arizona, and Eureka.
- Surveyed King County suburban cities and collection contractors that offer curbside textiles collection programs.
- Conducted an online survey of King County residents on textile recycling behaviors; perceptions of items acceptable for donation; and awareness of, and attitudes regarding, various collection options.
- Participated in a used clothing recovery and reuse webinar hosted by the National Recycling Coalition and Pennsylvania Markets Center.<sup>6</sup>

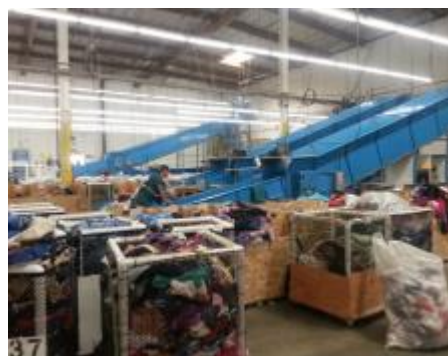


The focus of this document is to share key insights and information gathered through these research efforts. The document is organized into the following sections: Current State of Post-Consumer Textiles, How the Post-Consumer Textiles Value Chain Works, Challenges and Barriers, Key Opportunities, and Appendices.

## Current State of Post-Consumer Textiles

### Characterizing the Universe of Post-Consumer Textiles

The broadest definition of post-consumer textiles includes both natural and synthetic materials, such as cottons, wools, silks, woven nylon, rayon, polyesters and other material blends. Specific textile products include clothing, shoes, bags/purses, backpacks, belts, rags, curtains, linens, stuffed animals, and other fabrics. Very often, post-consumer textiles are collected mixed with other household items, such as toys and books. Residents tend to discard these various household items in large volumes, on an intermittent basis, and often as part of a home cleanout or move. (Please see the Collection section for more information on specific textiles that are acceptable to collectors.)



<sup>6</sup> "The Used Clothing Recovery and Reuse Industry," February 2014, 2013, The Sustainable Materials Management Webinar Series, National Recycling Coalition and Pennsylvania Markets Center.

## Regional Disposal Characterization

There are about 39,464 tons of textiles in the King County and Seattle combined annual municipal solid waste (MSW) stream (4% of all material disposed by weight).<sup>7</sup> Table 1 below presents annual quantities and composition for each of the two major textiles material groupings in the King County and Seattle combined MSW stream: 1) *Clothing and other recyclable textiles*, and 2) *Other mixed textiles*. Materials within these two groupings are likely a mix of pre-consumer (post-industrial) and post-consumer textiles.

- Clothing and other recyclable textiles
  - This material group consists of more than half of all disposed textiles in King County and Seattle. These materials have established rewear, reuse, and recycling markets, and include items such as clothing, rags, curtains, and other fabrics.
- Other mixed textiles
  - This group makes up less than half of textiles disposed in King County and Seattle, and includes items such as stuffed animals, hats, bags/purses, backpacks, shoes, boots, belts, plastic and rubber raincoats, life jackets, pillows, and cushions. These materials are better suited for rewear markets.

**Table 1. Tons and Composition of Textiles Disposed in Seattle and King County<sup>8</sup>**

Material Category	Commercially Collected		Self-Haul		Total
	Residential	Non-Residential	Residential	Non-Residential	
Clothing and other recyclable textiles	<b>11,703</b>	<b>7,194</b>	<b>3,300</b>	<b>31</b>	<b>22,228</b>
Seattle	3,903	3,077	1,813	17	8,810
King County	7,800	4,117	1,487	14	13,418
Other mixed textiles	<b>9,091</b>	<b>5,221</b>	<b>2,804</b>	<b>120</b>	<b>17,236</b>
Seattle	1,466	1,383	1,058	45	3,952
King County	7,625	3,838	1,746	75	13,284
<b>Total</b>	<b>20,794</b>	<b>12,415</b>	<b>6,104</b>	<b>151</b>	<b>39,464</b>

<sup>7</sup> Seattle Public Utilities 2008 Commercial & Self-Haul Waste Streams Composition Study Report. Prepared by Cascadia Consulting Group, July 2008. Seattle Public Utilities, 2010 Residential Waste Stream Composition Study Report. Prepared by Cascadia Consulting Group, August 2011. King County Solid Waste Division, 2011 King County Waste Characterization and Customer Survey Report. Prepared by Cascadia Consulting Group, October 2012.

<sup>8</sup> The two textiles material categories were consistent between these three studies: clothes & other recyclables and other textiles in the King County study, and textiles and mixed textiles in the Seattle Waste Composition reports. In all of the studies, the first category represented rewearable/recyclable/reusable materials, and the second category represented non-recyclable or reusable (but potentially rewearable) materials.

Snohomish County and the City of Tacoma have also recently completed disposed waste characterization studies<sup>9</sup> that include a textiles material category. Results of these studies are presented in Table 2 below. The Snohomish County study included the materials category *textiles*, defined as cloth, clothing, rope, tennis shoes, and rubberized cloth. The Tacoma study included the material category *textiles and clothing*, defined as fabric materials, including natural and man-made textile materials such as cottons, wools, silks, woven nylon, rayon, polyesters and other materials; and upholstery, leather, and shoes. *Textiles* were nearly 3.8 percent of Snohomish County’s overall disposed waste stream, while *textiles and clothing* was 3.5 percent of Tacoma’s overall disposed waste stream.

**Table 2. Tons of Textiles Disposed in Snohomish County and the City of Tacoma**

	Snohomish County: <i>Textiles</i>	City of Tacoma: <i>Textiles and Clothing</i>
Residential	6,980	2,082
Non-Residential	7,870	1,302
Residential Self-Haul	2,520	1,161
Non-Residential Self-Haul	100	1,467
<b>Total</b>	<b>17,460</b>	<b>6,012</b>



The 2009 Washington Statewide Waste Characterization Study<sup>10</sup> considered two categories of textile materials – synthetic and organic. Results of these studies are presented in Table 3 below. The study defined *textiles – organic* as cloth, clothing, and rope made of 100 percent cotton, leather, wool or other naturally-occurring fibers. *Textiles-synthetic* was defined as cloth, clothing, and rope made of unknown

<sup>9</sup> Snohomish County, Snohomish County Waste Composition Study. Prepared by Green Solutions and Environmental Practices, April 2009. City of Tacoma Solid Waste Management, 2009. City of Tacoma Municipal Waste Stream Composition Study. Prepared by Cascadia Consulting Group, December 2010.

<sup>10</sup> Washington Department of Ecology, 2009 Washington Statewide Waste Characterization Study. Prepared by Cascadia Consulting Group, June 25, 2010. <https://fortress.wa.gov/ecy/publications/publications/1007023.pdf>

fibers, synthetic fibers, or made from a mixture of synthetic and natural materials. *Textiles-organic* materials accounted for 1.8 percent of the statewide waste stream, while *textiles-synthetic* items made up 1 percent of the statewide waste stream. .

**Table 3. Tons of Textiles Disposed in Washington State, 2009**

	Tons
Textiles—organic	87,471
Textiles—synthetic	48,869

These five studies defined textiles in different ways, which reflects an industry-wide challenge of establishing a consistent definition for post-consumer textiles. The Snohomish County definition is the narrowest of the three, and does not include items included in the other studies like leather and upholstery. The King County and Seattle studies split the definition of textiles into two groups based on end markets, and the statewide Washington study splits the definitions by fiber type. The variability in the definition of textiles for these four studies suggests that there is not yet a universal definition of post-consumer textiles.

### Regional Diversion Characterization

The Washington Department of Ecology compiles data from collectors regarding both the number of collection locations and the amounts of textiles that have been diverted for recycling and reuse.<sup>11</sup> Table 3 Table 3 below summarizes this data for Seattle, King County, and Washington State. There are 91 collection locations in Washington State, 17 of which are located in King County.<sup>12</sup>

**Table 4. Regional Tons of Textiles Diverted in 2012**

	Total tons diverted
King County and Seattle	12,468
Washington State	47,143

Using the disposal data from the Washington Statewide Waste Characterization Study<sup>13</sup> and recycling data from the Department of Ecology,<sup>14</sup> the capture rate for textiles was 10.8 percent in 2009.

<sup>11</sup> Collection locations include regulated and unregulated companies and organizations, such as reuse facilities, brokers, and recyclers. Data is self-reported and residuals may not be reflected. Unregulated organizations report on a voluntary basis and not all regulated companies report. Call with Gretchen Newman and Dan Westin, Washington Department of Ecology, March 13, 2014.

<sup>12</sup> Data collected by the Washington Department of Ecology and provided by Gretchen Newman on February 5, 2014.

<sup>13</sup> Washington Department of Ecology, 2009 Washington Statewide Waste Characterization Study. Prepared by Cascadia Consulting Group, June 25, 2010. <https://fortress.wa.gov/ecy/publications/publications/1007023.pdf>

<sup>14</sup> Data collected by the Washington Department of Ecology and provided by Gretchen Newman on February 5, 2014.

## National Generation, Capture, and Recoverability Rates

National statistics vary when it comes to measuring the quantity of textiles currently generated and captured for rewear, reuse, and recycling markets. The following statistics were commonly referenced in interviews with value chain stakeholders.

- Estimates for the amount of textiles Americans generate and dispose vary from 65 to 80 pounds per year. In 2004, the Fiber Economics Bureau estimated that the per capita consumption of textile materials is 83.9 pounds per year in the United States, with over 40 pounds per capita being discarded over the same period.<sup>15</sup> SMART reports that textiles make up about 6.6 percent, or 11 million tons, of waste disposed in the U.S.<sup>16</sup> One textiles broker estimates that 300 million pairs of shoes are discarded in the U.S. each year.<sup>17</sup> Further, nearly half of the respondents to a 2012 survey conducted by USAgain reported that they disposed of at least one reusable article of clothing in the past year.<sup>18</sup> The amount of discarded textiles residents generate is reported to be on the rise due to the “fast fashion” movement where low-cost clothing and accessories are readily available for purchase by U.S. consumers.<sup>19</sup>
- The Secondary Materials and Recycled Textile Association (SMART)<sup>20</sup> and USAgain<sup>21</sup> both estimate that about 15 percent of textiles are diverted from landfill for reuse, rewear, or recycling.
- Many post-consumer textiles industry stakeholders also cited an increase in textiles consumption without a significant increase in diversion.
  - SMART references EPA estimates of the amount of textiles in landfills compared to textiles diversion rates: “The EPA estimates that between 1999 and 2009, the amount of textiles in our landfills grew by 40%, from 9.1 million tons to 12.73 million tons. Yet textile diversion only grew by 2%, from 12.9% to 14.9%.”<sup>22</sup>
- The disparity between textiles landfilled and recovered suggests that there remains a significant opportunity to divert textiles from the landfill.
  - SMART estimates that 95 percent of textiles that consumers send to landfill are recoverable through recycling, rewear, or reuse.<sup>23</sup> All dry, odor-free textiles without

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<sup>15</sup>Hawley, Jana M. “Textile Recycling: A System Perspective.” Department of Textile and Apparel Management, University of Missouri. <http://extension.missouri.edu/textilerecycling/Miscellanea/Textile%20recycling-Woodfield.pdf>

<sup>16</sup> Presentation by Jackie King, Executive Director, SMART. “The Used Clothing Recovery and Reuse Industry,” December 17, 2013, The Sustainable Materials Management Webinar Series, National Recycling Coalition and Pennsylvania Markets Center.

<sup>17</sup> Presentation by Jon Harvey, Central States, Used Clothing. “The Used Clothing Recovery and Reuse Industry,” December 17, 2013, The Sustainable Materials Management Webinar Series, National Recycling Coalition and Pennsylvania Markets Center.

<sup>18</sup> “News That You Can Use Again.” Survey. USAgain. <http://www.usagain.com/huffington-post-infographics-march-2012>.

<sup>19</sup> “The Used Clothing Recovery and Reuse Industry,” December 17, 2013, The Sustainable Materials Management Webinar Series, National Recycling Coalition and Pennsylvania Markets Center.

<sup>20</sup> [www.smartasn.org/consumers/lifecycleofrags.pdf](http://www.smartasn.org/consumers/lifecycleofrags.pdf)

<sup>21</sup> Bostic, Janice. “USAgain: Use it Again.” Presentation to King County LinkUp and Seattle Public Utilities.

<sup>22</sup> [www.ct.gov/deep/lib/deep/waste\\_management\\_and\\_disposal/solid\\_waste\\_management\\_plan/june2013/smart\\_textile\\_recycling\\_groipen\\_s\\_wac\\_june\\_2013.pdf](http://www.ct.gov/deep/lib/deep/waste_management_and_disposal/solid_waste_management_plan/june2013/smart_textile_recycling_groipen_s_wac_june_2013.pdf)

<sup>23</sup> King, Jackie. SMART meeting with King County. April 15<sup>th</sup>, 2013.



material or chemical contamination can be diverted from landfill, even if worn, torn, or stained.

- Some stakeholders interviewed for this research effort suspect that the EPA capture rate estimates may be too low, and therefore are not applicable to communities with strong collection programs and access to markets.
- Industry stakeholders interviewed estimate that between two and seven percent of all post-consumer textiles collected and processed in the U.S. are disposed as residual waste.

## Sustainable Clothing Efforts

There are some efforts to improve the likelihood that textiles will be reworn, reused, or recycled, and that their production and end-of-life management minimizes the overall life cycle impacts. For example, the **Sustainable Apparel Coalition** is an industry-wide group of over 80 apparel and footwear brands, retailers, suppliers, nonprofits, and NGOs working to reduce the environmental and social impacts of apparel and footwear products around the world. The Sustainable Apparel Coalition uses the Higg Index, which measures the environmental performance of apparel products.

In 2006, **WRAP**, a UK-based program that promotes waste reduction and recycling, funded a life cycle assessment for textiles that compared the use of virgin material to produce new textiles with textiles that are recycled and reused. The study showed that, “Taking into account extraction of resources, manufacture of materials, electricity generation, clothing collection, processing and distribution and final disposal of wastes it was demonstrated that...the reuse and recycling of donated clothing results in a reduction in the environmental burden compared to purchasing new clothing made from virgin materials.” When compared to disposal, 100 percent reuse of T-shirts that were discarded in the UK in 2006 would have a net savings of 12.80 tons of CO<sub>2</sub> equivalent and 137,000 MJ equivalent of energy a year; the 100 percent recycling scenario over the same period would have a net savings of 0.84 tons of CO<sub>2</sub> equivalent and 10,900 MJ equivalent of energy per year.<sup>24</sup>

Puma recently designed a new line of products specially designed to ensure recyclability or compostability and reduce toxicity and energy inputs in production, among other holistic sustainability considerations. This new line earned Puma a **Cradle-to-Cradle product certification** from the Cradle-to-Cradle Products Innovation Institute.<sup>25</sup>

All three of the above examples employ the cradle-to-cradle philosophy, which is focused on minimizing the full life cycle impacts and maximizing closed loop recycling of textiles.

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<sup>24</sup> Woolridge, Anne C., Garth D. Ward, and Paul S. Phillips. “Life cycle assessment for reuse/recycling of donated waste textiles compared to use of virgin material: An UK energy saving perspective.” *Resources, Conservation and Recycling* 46 (2006) 94–103.

<sup>25</sup> Nemes, Judith. “Puma steps up game with Cradle to Cradle certification.” *GreenBiz.com*, March 5, 2013. [www.greenbiz.com/blog/2013/03/05/puma-cradle-cradle-certification?page=0%2C0](http://www.greenbiz.com/blog/2013/03/05/puma-cradle-cradle-certification?page=0%2C0)

## How the Post-Consumer Textiles Value Chain Works

Textile recycling is reported to be one of the oldest and most established forms of recycling. The industry is also very diverse, from the way in which materials are collected and the various processing pathways to the nature and geography of end markets. Textiles markets still rely heavily on manual labor to sort, grade, and process materials to meet consumer specifications. In fact, the Institute for Local Self Reliance estimates that textile reclamation is the second most job-intensive reuse industry in the U.S., creating about 85 jobs per 10,000 annual tons processed.<sup>26</sup>

“The moment that [Motorhead] shirt left the United States and got on a ship to Africa, it entered a whole new supply chain but reversed, because now, the finished shirt is the raw material imported to Kenya for 15 cents. Resold and sold again for 45. Someone got 12 cents to cut it up, 18 to tailor it, 14 to wash and iron, finally a vendor bought it for a dollar-20 to hawk it off to its future wearer, who, for just \$2 or \$3, owns a bespoke artisanal Motorhead shirt whose tag says XL, but fits like a small, with a cheerful blue collar and some rather jaunty yellow sleeves.”

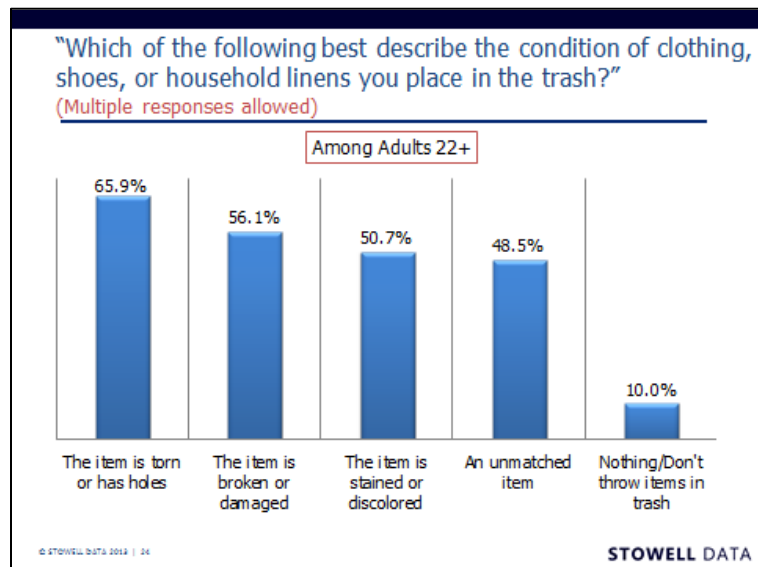
The Post-Consumer Textiles Value Chain graphic in Attachment A illustrates the many elements of this industry – from value chain links between collection, processing, and market pathways to associated processes and products.

### Inputs

#### Materials

Post-consumer inputs include a wide range of textiles, including but not limited to: clothing, rags, curtains, linens, shoes, bags/purses, backpacks, hats, belts, stuffed animals, pillows, fabric scraps, upholstery, and other similar products made from natural and synthetic fabrics/materials, such as cottons, wools, silks, woven nylon, rayon, polyesters and leather.

Residents typically discard textiles either loose or in bags, and often along with other non-textile materials, such as books, small appliances, and other household goods. Commercial generators, such as hotels, hospitals, and laundries, tend to discard linens loose in containers or truckloads.



<sup>26</sup> [www.ilsr.org/recycling-means-business/](http://www.ilsr.org/recycling-means-business/)

## Resident Behaviors, Attitudes, and Perceptions

Both because there was limited information uncovered in our research, and because resident behaviors, attitudes, and perceptions can vary by region, in November 2013 King County LinkUp commissioned an online survey of 500 King County residents. The goal of the survey was to better understand resident textile recycling behaviors, perceptions of items acceptable for donation, and awareness of and attitudes regarding various collection options.<sup>27</sup> (This survey also addressed resident mattress disposal behavior and motivation to inform LinkUp's mattress-related efforts.) Key survey results include:

- Disposal methods:
  - The large majority of respondents reported that they take unwanted textiles in good condition to a thrift store. More specifically, residents said thrift stores are among their top three methods for getting rid of clothes (85 percent of all respondents), shoes (78 percent), and household linens (76.8 percent).
  - Public donation bin/drop box was reported as the second most common disposal method (19.6 percent for clothing, 20.2 percent for shoes, and 20.2 percent for household linens).
  - Nearly a quarter (23.1 percent) of all residents reported putting materials that are in good condition in the trash.
- Condition of materials discarded in trash:
  - When asked about the condition of clothing, shoes, or household linens residents place in the trash, residents reported that the discarded items are:
    - Torn or have holes (65.9 percent of all respondents)
    - Broken or damaged (56.1 percent)
    - Stained or discolored (50.7 percent)
    - Unmatched items, such as single shoes or socks (48.5 percent)
- Recycling motivation:
  - A vast majority of respondents (82 percent) said they would increase the amount of textiles donated, even when in poor condition, if they knew condition was not an issue.
  - Residents reported that the following would motivate them to donate more clothing, shoes, or household linens, instead of putting them in the trash.
    - Items acceptable whether in good or poor condition (50.5 percent)
    - Donation bin/drop box closer to home (27.5 percent)
    - Info about how to schedule donation pick-up (24.8 percent)
    - Place clothing/shoes/linens in curbside recycling container (24.6 percent)
- Demographics of residents who are more likely to dispose of textiles in the trash:
  - Respondents who stated “Put in the trash” as one of their top three methods for disposing of clothing, shoes, or linens that are in good condition were statistically more

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<sup>27</sup> Online survey. “2013 Stowell Data® Consumer Recycling Awareness Profile,” conducted by Leigh Stowell & Co. on behalf of King County LinkUp.

likely to have children in the home, be between the ages of 24-34, have an annual household income of more than \$40,000, live in an apartment or condo, live on the Eastside or in South King County, and be male.

The survey results are available online at [www.kingcounty.gov/linkup](http://www.kingcounty.gov/linkup).



Collection happens through two primary pathways: **drop-off** (like drop boxes, thrift stores, special events, recycling facilities, and retail take-back programs) and **pick-up** (like residential curbside subscription and on-call services, residential collection through a third-party shipper, commercial and industrial collection services, and online resellers). While feedstock specifications and material requirements vary by collector and end market, collectors generally accept clothes, shoes, and household linens that are clean and dry; these items may even be stained and torn, as long as they are not physically contaminated with mold, liquids, or solids. Items like single shoes and socks are accepted by many collectors. Some curbside collectors within King County traditionally have not accepted boots, sandals, skates, slippers, or high heels over two inches due to restrictions imposed by partners, but these standards have often relaxed over time.<sup>28,29</sup>

Residents typically discard textiles along with other items like books, household appliances, and toys, as part of a home clean out or move; in response, collectors often have systems in place to separate these non-textile materials. These materials are also sold as commodities.

One example of the drop-off model is offered by **thrift stores**. One stakeholder interviewed for this study reported that there are about 12,000 thrift stores in the U.S. Once thrift stores receive materials from consumers, they typically perform a primary in-house sort to distinguish materials suitable for in-store resale from items that they will sell to others for rewear, recycling, and reuse. One thrift store chain interviewed for this research effort estimated that about one-quarter of all incoming textiles is sold in their stores. Another thrift store chain mentioned that they accept torn, ripped, or worn out textiles, and that these items make up a maximum of 25 percent of all incoming material. If the items suitable for resale do not sell in-store, then some thrift stores will donate items to organizations such as homeless shelters or send them to outlets where they are sold by the pound. Primary purchasers at outlets are resellers, like consignment, other thrift stores, and online retailers. Materials from these outlets that do not sell, combined with materials that were not initially suitable for in-store resale, are baled for shipping to consolidators or brokers. Often, third parties handle shipping to brokers, and materials are sold to a variety of different sorters or graders, who then sell the materials to domestic and export markets. Thrift stores like Goodwill Industries, St. Vincent de Paul, and Salvation Army all process collected materials using some variation of this model. For-profit thrift stores like Savers, which operates Value Village retail locations, partner with non-profit collectors to obtain materials for resale in their stores.

<sup>28</sup> Conversation with Candy Castellanos of Waste Management on February 12, 2014. Some collectors, such as Waste Management, have agreed on more lenient standards with current partners.

<sup>29</sup> <http://wmnorthwest.com/guidelines/clothing.htm>, [www.ci.bellevue.wa.us/pdf/Utilities/SF\\_poster\\_081513.pdf](http://www.ci.bellevue.wa.us/pdf/Utilities/SF_poster_081513.pdf)

Another common drop-off model is unstaffed **drop boxes**, often located in publicly accessible areas, such as retail parking lots, schools, libraries, and gas stations. Unstaffed drop boxes are operated by both non-profit and for-profit organizations. Examples of drop box operators in the King County region include Northwest Center (non-profit) and USAgain, ReTex, TexGreen, and Gemtext (for-profit).

SMART has developed a *Member Drop Box Operator Code of Conduct* to ensure that bins are placed properly and legally and that they are well monitored and maintained.<sup>30</sup> The Code of Conduct also ensures that users understand to whom they are making a donation and how unwanted clothing and household textiles are processed after being placed in collection bins across the nation. This Code of Conduct requires companies to:

- clearly indicate if they are a for-profit company
- provide contact information for the bin operator and list any charitable partners
- comply with all local zoning laws
- have permission before placing a collection bin
- perform routine maintenance
- respond to all complaint calls in a timely manner

Drop box operators regularly service containers and transport materials to centralized locations for sorting. Some operators sort collected textiles at their own facilities; others deliver textiles to partner organizations, such as thrift stores or graders, for sorting and either reselling or marketing. One regional drop box operator interviewed for this research effort reported their markets as follows: thrift stores (25 percent), graders (35 percent), and wholesalers and exporters (40 percent).



**Retail take-back** programs are another type of drop-off system to collect post-consumer textiles. Retailers like H&M, Puma, and Patagonia have implemented in-store collection programs to capture unwanted textiles from consumers. H&M and Puma have branded collection programs supported by a third party called I:CO (short for "I collect"). San Francisco's Department of the Environment (SF Environment) recently partnered with I:CO too, becoming the first I:CO CITY. . This global textiles closed loop recycling company provides retailers with specialized drop boxes for placement in their stores to collect unwanted clothing (including shoes) from consumers. To get to zero waste by 2020, SF Environment supports I:CO's textile collection efforts and also provides new SF Save Fashion collection boxes. The collection locations are searchable through an online database maintained by SF Environment. The clothing and shoes collected can be of any brand or store and any clean condition. Third party shippers transport textiles

back to sorting and grading facilities at partner organizations where they are separated into up to 400 grades. Though most sorted textiles are sent to global rewear markets or to be made into industrial wiping rags, some are also processed and made back into clothing, following cradle-to-cradle programs

<sup>30</sup> [www.smartasn.org/events/Donation\\_Bin\\_Operator\\_Code\\_of\\_Conduct.pdf](http://www.smartasn.org/events/Donation_Bin_Operator_Code_of_Conduct.pdf)

that pursue highest and next best use options for their products. Similarly, Patagonia has an internally-supported textiles recovery program, where customers can return Patagonia-branded clothing to its retail locations. The company's team deconstructs this clothing, and converts it back into raw fiber for remanufacture into new Patagonia clothing.

The second pathway for collected clothing is **pick-up**. There are a growing number of pick-up services offered by non-profit organizations, including Salvation Army, Northwest Center, and St. Vincent de Paul. Customers can request on-call pick-up via online request forms, QR codes, and call centers. Additionally, some cities offer curbside textiles collection for single-family residents as part of their curbside garbage and recycling subscription service (at no additional cost). The first curbside programs in King County began in the early 2000s. Three of these cities and their collection contractors responded to questions about their curbside post-consumer textiles programs: Redmond and Waste

Management, Issaquah and CleanScapes, and Bellevue and Republic Services. Program guidelines in all three of these cities request that residents place unwanted clothing in a labeled bag. The cities' contracted collector picks up the bagged textiles on the residents' regular collection day – the resident does not need to call for a special pick-up of the materials, though Issaquah requests that they do so if possible. Materials are placed in special compartments within collection trucks (not in the main hopper with recyclables), and are transported to, and consolidated at, central collection areas with designated containers. Bagged textiles are not processed at regional recycling sorting facilities, as textiles are reported to cause significant operational issues.

*One regional processor remarked, “A pair of jeans can ruin your day at the MRF [materials recovery facility]. When you tip a load with textiles, it gets on the disks and drums and completely shuts down the building. Then we have 50 workers that are standing around doing nothing. Textiles are worse than plastic film because they are thicker and more durable, so they are more difficult to remove from the [processing] line.”*

All of these King County cities' contracted collectors deliver textiles to regional non-profit thrift stores. Customer participation in all three programs has been relatively low: Bellevue collects less than 1,000 pounds of textiles per month, and Issaquah has collected from five residents in the last year (with 94 textiles drop offs at the CleanScapes Zero Waste Issaquah store through October 2013). There are similar curbside programs in other parts of the country, such as the greater Minneapolis area, where Eureka Recycling collects and separates bagged textiles and delivers them to USAgain for further sorting, consolidating, and marketing.<sup>31</sup>

In 2013, the City of Queen Creek, Arizona launched a slightly different **curbside collection** model using specially-made bags for single-family residential customers to deposit inside of their single-stream curbside recycling bin. Right Away Disposal collects materials from the curb, and delivers them to the United Fibers recycling sorting center. United Fibers manually separates the special textiles bags on the tip floor. Then, they take the collected textiles to their sister company, Phoenix Fibers (a fiber conversion company), which is on the same campus. Phoenix Fibers shreds and bales shredded fiber

<sup>31</sup> <http://www.eurekarecycling.org/page.cfm?ContentID=4#Clothes>

products, and sends them to Bonded Logic, which is located in Chandler, a neighboring community to Queen Creek. Bonded Logic adds a natural flame retardant to the fibers, and then makes rolled insulation with it. With the material that is unsuitable for rolled insulation, they make fill for products like dog beds. To give back to the community, the City and its partners donate funds for every pound of materials collected to the local Boys & Girls Club. Queen Creek's three-month pilot included 6,000 single-family customers and captured approximately 13.5 tons, or about 4.5 pounds per household, of textiles for recycling. Queen Creek's pilot was so successful that they are planning to expand the program for all 8,900 single-family customers in early 2014, with updates to the collection bag design (i.e., print instructions directly on bag, improved durability and closure), and soliciting local business sponsorship in exchange for on-bag marketing. Queen Creek acknowledges that the city is in a unique position to take advantage of regional textiles collection, processing, and remanufacture markets.

Another example of pick-up is **commercial/industrial pick-up service** where large hotels, hospitals, and commercial laundromats direct-haul to markets (typically wiping rag manufacturers).

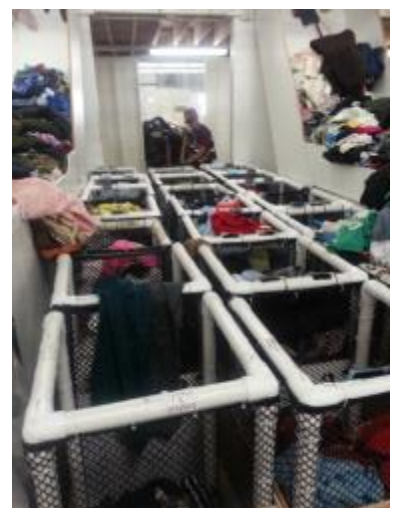
There are also pick-up models that involve **residential and commercial customers packaging and shipping textiles to recyclers through third-party carriers**. Community Recycling (CR) is one example of a company offering these services. Through the CR Home<sup>32</sup> service, residential customers sign up, package materials in boxes of any size, print out their own shipping labels, mail through a third-party shipping company (USPS, UPS, FedEx, etc.), and CR pays for the postage.

### *Enhance Value and Move Material – Collection to Processing*

Depending on the collector and on factors such as the quality and mix of textiles collected, materials may go directly to processing facilities or be directed to a consolidator or broker that ships large volumes of textiles to other processors or end markets.

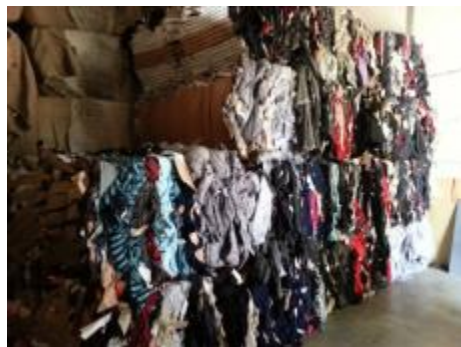
Processing can be separated into three primary categories: **sorting, grading, and fiber conversion**. In each, post-consumer textiles are further separated into marketable products. **Sorting and grading** facilities separate materials, either by hand or using mechanized equipment, into defined grades based on market-driven factors, such as clothing and fabric types and quality. There are hundreds of grades of clothing, shoes, and accessories, defined by specific customers and transactions. The fiber conversion process breaks down textiles and separates them into fiber tiers.

**Sorting** is primarily a manual process where textiles are separated by hand into grades suitable for direct resale or other reuse, reuse, or recycling markets. Often some form of sorting is performed directly by the collector, as in the thrift store example (see the *Collection* section above for more details). Textiles are sorted into grades: the number and type of grades varies by facility, customer, and even by the transaction, but ranges from two to dozens. One of the sorters interviewed for this research effort reported producing between 30 to 50 grades of materials, including clothing, shoes, rags, and other accessory items (like toys, purses, luggage). Buyers specify the types



<sup>32</sup> <http://communityrecycling.biz/crhome/>

and combinations of materials for each purchased unit. For example, global rewear buyers purchase specific combinations of adult and children’s clothing and shoes in 50-pound bags. After sorting, these facilities produce bales, bags, boxes, or gaylords of products, which are then consolidated and shipped to different markets, often through a third-party broker.



The overall process of **grading** is similar to sorting, but typically is much larger scale and utilizes highly mechanized sorting technologies (in addition to hand sorting). One grader interviewed for this research effort processes about 1.5 million pieces of clothing or 35 tons of material per day. Grading facilities can sort material into hundreds of grades. Graders typically serve a wide range of markets, often with a global or national reach. Graders interviewed for this research effort reported exporting about 75-80 percent of their total outbound product, with the remaining 20-25 percent directed to domestic

markets. Examples of graders include Samiyatex, SOEX, Mid-America, and Textile Recycler. While the U.S. has typically housed the majority of grading facilities, less strict immigration laws in Canada have supported an increase in the number of grading facilities there. Immigrants into Canada provide relatively inexpensive labor and can bring connections to international textiles markets.<sup>33</sup>

The third type of processing is **fiber conversion**. Fiber conversion facilities use industrial equipment to tear apart fabric, typically lower-grade, mixed textiles, and products requiring certified destruction, into various loose and bonded fiber products. Post-consumer feedstocks are often sourced from thrift stores and large graders. These facilities also source post-industrial materials from manufacturers. Examples of feedstock grades, from lowest to highest value, include: mixed pack rags, bottom weight rags, legs, wool bodies, cotton knit sweaters, and fire retardant items. Many fiber conversion facilities provide certified product destruction services to ensure designated customer materials (e.g., discontinued retail clothing lines) are destroyed. One converter company interviewed for this research effort remarked that their facility had “just performed this service for out of season, high-end silk and woolen suits from a New York-based company. We turned suits, probably worth about \$2,000 each, into \$0.45 per pound shoddy.”

There are many steps involved in the **fiber conversion process**. Feedstock materials typically arrive in 500 to 2,000-pound bales. Incoming material is fed into cutters that first break up the baled material, separate them into fiber tiers, and then tear materials into customer-designated lengths. Lastly, material goes through a blend box to produce fabric strips at dimensions specified by customers, and then into rag tearing machines. Depending on end products desired by customers, conversion facilities can alter equipment settings to achieve material meeting customer specifications. On average, a conversion processing line can handle up to 10 million pounds of material per year. One



<sup>33</sup> Fernandez, Bob. “The new Canadian exports, used clothes, and the jobs to sort them, are flowing to Toronto.” The Philadelphia Inquirer, December 21, 2004.



converter reported that about 2 percent of all incoming material is disposed as residual waste.

The end product of **fiber conversion** is shoddy. Shoddy is fiber, shreds, and soft materials, which can be respun, used for filler (in punching bags, sleeping bags, etc.), or turned into insulation.<sup>34</sup> Additionally, fiber conversion facilities produce needle and air lay non-woven products, such as shoddy cloth. Needle-made products are created using a needle punch that creates mechanical bonds between fibers, while air lay products lay fiber on top of each other and bond using virgin component fiber. Shoddy is either baled or in pads. Products that are compacted and baled for sale usually weigh about 450 to 750 pounds each. The pads are produced at different thicknesses, widths, and lengths based on customer requirements. The automotive industry was reported as the primary market for fiber converters interviewed for this research effort, utilizing these products for insulation in automobiles (the insulation is die cut and then glued or welded to the inside of the cars).

Examples of **major U.S. fiber conversion companies** include: Leigh Fibers, SOEX, Bowers Fibers, Jeffco Fibres, and Phoenix Fibers.

### *Enhance Value and Move Material – Processing to End Markets*

After textiles have been sorted, graded, or converted, they are consolidated for shipping and sold to domestic or export end markets, either directly or through a third-party broker or wholesaler. According to SMART, volumes of reused and recycled textiles are directed to the following end markets:

- 45 percent second-hand
- 30 percent wiping rags
- 20 percent reprocessed into fibers
- 5 percent unusable (odor or hazardous material)<sup>35</sup>



Textiles processed by sorters and graders are directed to a variety of rewear, repurpose, and recycling markets, while converted fiber is typically sent to recycling markets. All three of these markets are increasingly global, especially for resale (rewear). As these markets become global, prices for sorted and converted textiles are also becoming increasingly competitive. Many of the stakeholders interviewed for this project used the expression “pennies on the pound” to describe their textiles recycling operations. There was almost universal agreement that market demand for textiles is strong, and more supply is needed into the foreseeable future. Collectors and processors interviewed for this research effort reported clothing prices between \$0.15 and \$0.18 per pound, with shoe prices fetching a much higher price from \$0.30 to \$0.75 per pound. Some noted that prices have been volatile in the recent past: one individual at a major thrift store chain noted that prices for sorted textiles can range from \$0.10 to \$0.30 per pound over the span of a few years.

<sup>34</sup> Conversation with Kelly Quinn from Phoenix Fibers on March 7, 2014.

<sup>35</sup> Presentation by Jackie King, Executive Director, SMART. “The Used Clothing Recovery and Reuse Industry,” December 17, 2013, The Sustainable Materials Management Webinar Series, National Recycling Coalition and Pennsylvania Markets Center.

**Resale and rewear markets** are almost entirely focused on domestic and global second-hand sales, and a small percentage of these materials are donated or part of a more informal sharing economy (i.e., yard sales, clothes swaps). In the December 2013 “The Used Clothing Recovery and Reuse Industry” webinar hosted by the National Recycling Coalition, presenters noted that about 70 percent of the world’s population wears second-hand clothing, and the textiles industry and its partners can completely clothe a child in a developing country for \$1.75 or less.<sup>36</sup> Resale markets purchase materials sorted to specifications that meet unique customer demands, everything from high-end fashion items that go to regional consignment stores to mismatched shoes or climate appropriate clothing that are exported to Africa or India. These sales can take place locally at thrift stores, online through consignment sites such as eBay, Craigslist, and thredUp, and in international markets.

According to a 2005 Oxfam study, second-hand clothing accounts for a large portion of all imports in many developing regions: almost 27 percent in Sub-Saharan Africa, 15 percent in South Asia, and almost five percent in Eastern Europe.<sup>37</sup> Table 4 shows the destinations for the majority of sorted post-consumer textiles exports from the U.S. Sorters and graders interviewed for this research effort estimated that 75 to 80 percent of their outbound product is exported to overseas markets.

**Table 5. Department of Commerce International Trade Administration 2012 U.S. Exports of Worn Clothing and Other Worn Articles (four regions receiving largest quantities)<sup>38</sup>**

Region	2012 Tons of Textiles Exported
Canada	220,735
Sub-Saharan Africa	137,819
India	123,774
South America	61,699

This export market is currently robust, but there have been some unintended economic and social impacts of exporting textiles internationally for rewear, reuse, or recycling. One of the largest impacts is a decline in textiles manufacturing in developing communities. For example, imported clothing is reported to be one of the main factors that contributed to an 80 percent decline in textile and clothing employment in Ghana between 1975 and 2000; other developing countries have suffered similar declines in textile-related employment.<sup>39</sup> Additionally, while international markets are currently strong, exporting opportunities may become more limited if more governments implement stricter import rules. Already, some African countries have enacted a range of bans affecting the import of second-hand clothing in order to protect their textile and clothing industries.<sup>40</sup>

<sup>36</sup> “The Used Clothing Recovery and Reuse Industry,” December 17, 2013, The Sustainable Materials Management Webinar Series, National Recycling Coalition and Pennsylvania Markets Center.

<sup>37</sup> Baden, Sally and C. Barber. “The impact of the second-hand clothing trade on developing countries.” Oxfam, September 2005.

<sup>38</sup> <http://otexa.ita.doc.gov/msrpoint.htm>

<sup>39</sup> Brooks, Andrew and David Simon. “Unravelling the Relationships between Used-Clothing Imports and the Decline of African Clothing Industries.” Development and Change: Published on behalf of the Institute of Social Studies, The Hague, 2012. [www.academia.edu/1984174/Unravelling\\_the\\_Relationships\\_between\\_Used-Clothing\\_Imports\\_and\\_the\\_Decline\\_of\\_African\\_Clothing\\_Industries](http://www.academia.edu/1984174/Unravelling_the_Relationships_between_Used-Clothing_Imports_and_the_Decline_of_African_Clothing_Industries)

<sup>40</sup> Curnow, Robyn and Teo Kermeliotis. “Is your old t-shirt hurting African economies?” <http://edition.cnn.com/2013/04/12/business/second-hand-clothes-africa>

The International Trade Administration's Office of Textiles and Apparel (OTEXA) provides a list (see link below) of countries that have placed restrictions on U.S. export of textiles into their markets. The countries with textile restrictions and/or bans are Algeria, Argentina, Botswana, Brazil, Bulgaria, China, Columbia, Dominican Republic, Eritrea, Haiti, India, Indonesia, Iran, Israel, Lesotho, Liberia, Malawi, Mauritius, Mexico, Morocco, Namibia, Nigeria, Paraguay, Peru, Philippines, St. Lucia, South Africa, Syria, Venezuela, and Vietnam. Textile restrictions range from requiring fumigation and health certificates to banning used undergarments or all textile imports. Specifically, OTEXA describes Brazil as having "severe restrictions." Argentina, Liberia, and Peru ban all imports that are not donated to charitable organizations. Colombia, Israel, Morocco, and Namibia are described as having de facto bans on used textile imports. South Africa bans the importation of any textiles that are manufactured domestically and Nicaragua prohibits importation until 2016.<sup>41</sup>

### *Exporting Worn Clothing: Foreign Restrictions and Requirements*

<http://web.ita.doc.gov/tacgi/eamain.nsf/6e1600e39721316c852570ab0056f719/401dbca37c2d025985256efb0068f875?OpenDocument>

**Dominant repurpose and reuse end markets** include the manufacture of wiping rags and absorbent materials. These facilities sanitize, launder, cut, and otherwise modify textiles for these applications. A&A Wiping Rags in Los Angeles and Buffalo Industries in Seattle are two examples of textiles repurpose businesses that were interviewed for this research effort. A&A sources textiles directly from commercial laundries, hotels, and hospitals, and will pay for high quality materials like white sheets, white towels, washcloths, colored thermal blankets, hospital gowns and scrubs, and other linens. The company then converts this material into wiping cloths by sanitizing and manually reshaping the materials. Similarly, Buffalo Industries sources textiles from domestic and international suppliers and converts some textiles into wiping rags. Rags are purchased by commercial and industrial users, such as painters. These companies typically also sell absorbent materials as value-add products, along with rags (these products are sourced from other manufacturers, likely fiber converters). These products include booms and socks, and are purchased for industrial uses, such as spill containment.



**Converted fiber** is primarily shipped to U.S. auto markets for use as insulation and fill, including special high-temperature shoddies suitable for engine compartments. Other markets include: insulation for household products, padding (including for punching bags), and for making new textile products. Some downcycling markets compact the fiber dust filtered out of the air at processing facilities to burn for

<sup>41</sup> <http://otexa.ita.doc.gov/msrpoint.htm>

energy. This is only a practice at some facilities. Some emerging markets are also mixing adhesives with this compressed fiber for use in construction applications to dampen sounds from dishwashers, dryers, and refrigerators.

This section summarizes our current knowledge of the post-consumer textiles value chain. Attachment A is a graphic representation of the flow of textiles through the value chain. (Please note that the value chain graphic is intended to be printed on 11"x17" sized paper.)

## Challenges and Barriers

Challenges and barriers that have surfaced in our research include the following.

- **Convenience and low associated cost to dispose of textiles as garbage.** One stakeholder noted that their “biggest competitor is the trash can.”
- **Public misconception of textiles suitable for reuse, rewear, and recycling.** According to the LinkUp online consumer survey, nearly a quarter of all residents reported putting materials that are in good condition in the trash. Also, when asked about the condition of clothing, shoes, or household linens placed in the trash, more than half of residents reported that the items were either torn, had holes, were broken or damaged, or were stained or discolored.
- **Nearly all stakeholders agree that demand for textiles is currently strong, but the market can be volatile.** One individual at a major thrift store chain noted that prices for sorted textiles can range from \$0.10 to \$0.30 per pound over the span of a few years.
- **Competition is increasing at every stage of the post-consumer textile value chain, which is primarily driven by strong global markets.**
  - The value chain does not necessarily reward non-profit organizations that offer other societal benefits like job training programs for disadvantaged populations.
  - Market forces may be too strong for local or regional markets to compete.
  - A less reliable supply of textile materials is the result of an influx of new players, particularly collectors, some whose businesses are short-lived and others who are not in compliance with applicable regulations or industry best practices.
    - Industry players noted that unauthorized textiles collection bin placement is an issue in U.S. communities. In response, SMART has developed and promotes their *Member Drop Box Operator Code of Conduct*.<sup>42</sup> SMART’s opinion is that “organizations need to get permission before placing bins. There are bad actors out there, and this hurts those companies operating in the right way.” For these reasons, a few U.S. communities have reportedly banned public collection bins altogether.<sup>43</sup>
    - One fiber conversion company interviewed for this research effort noted: “There are a lot of amateurs out there collecting textiles, and they come and go. Very few companies recover what they put into their operation in costs. So many of the new, young companies don’t charge enough for materials, and

<sup>42</sup> [www.smartasn.org/events/Donation\\_Bin\\_Operator\\_Code\\_of\\_Conduct.pdf](http://www.smartasn.org/events/Donation_Bin_Operator_Code_of_Conduct.pdf)

<sup>43</sup> “The Used Clothing Recovery and Reuse Industry,” December 17, 2013, The Sustainable Materials Management Webinar Series, National Recycling Coalition and Pennsylvania Markets Center.

when markets go down they have to shut their doors. Finding reliable suppliers that we can depend on is a very difficult part of our business. We have to have a steady stream of good quality materials as feedstock.” Jon Harvey, Central States, shared a broker’s perspective on this issue in a recent National Recycling Coalition-hosted webinar: “My new policy is that I won’t buy anything unless I’ve seen it. I need to understand the quality first-hand.”<sup>44</sup>

- Some of the large grading companies, such as Samiyatex, are expanding into collection to increase supply and take advantage of strong market conditions.
- Unintended socioeconomic consequences of textiles exporting to developing regions.
- Possible instability of foreign markets if trade restrictions increase.
- Limitations of domestic rewear markets. Current collection systems are relatively convenient, and generally free of cost, yet post-consumer textiles capture rates are still relatively low.

Contamination was identified as an area of potential concern for both textiles set out for curbside collection as well as those placed into drop boxes. One drop box operator interviewed for this research effort remarked about the King County region having some of the highest contamination rates in the country. Thrift store operators, however, have not found contamination to be a significant issue. One thrift store chain noted that contamination makes up less than five percent of the textiles they collect.

## Key Opportunities and Information Gaps



Through our research, the following key opportunities were identified to increase post-consumer textiles reuse and recycling:

<sup>44</sup> Presentation by Jon Harvey, Central States. “The Used Clothing Recovery and Reuse Industry,” December 17, 2013, The Sustainable Materials Management Webinar Series, National Recycling Coalition and Pennsylvania Markets Center.

- Increase public awareness of, and participation in, textiles reuse, rewear, and recycling needs and opportunities through an outreach campaign. In particular, use the campaign to clarify:
  - Where consumers can bring discarded textiles for recycling, rewear, and reuse (or how they can arrange for curbside material collection).
  - What types of textiles can be recycled, reworn, or reused, and what condition they should be in (for example, they can be stained or torn, but not wet; textiles besides clothing are acceptable).
    - According to the LinkUp online consumer survey, an overwhelming majority of King County residents (82 percent) said that they would increase the amount of textiles donated, even when in poor condition, if they knew that condition was not an issue.<sup>45</sup>
    - This effort will likely involve collaborating with regional collectors to develop uniform messaging and a list of acceptable materials to include in the campaign.
  
- According to SMART, a similar public awareness campaign developed in partnership with the State of Connecticut was estimated to increase collected textiles quantities by about 10 percent within the first year.<sup>46</sup>
- Make textiles collection options more convenient for consumers. This could involve developing an online locator application for the public to search for textiles collection options in their area. In addition, operators could be encouraged to place drop boxes at more multifamily complexes: according to the recent LinkUp online consumer survey, residents living in apartments and condominiums were more likely to place textiles in the trash.<sup>47</sup> According to a 2012 survey conducted by USAgain:
  - About 64 percent of respondents did not want to drive more than five miles to drop off clothes for reuse and recycling.
  - An estimated 84 percent of respondents felt that convenient location and access is important in discarding clothes for recycling and reuse.<sup>48</sup>
  
- Consider disposal bans or mandatory recycling policies for textiles. For example, businesses in New York City whose waste stream is composed of 10 percent or more of textiles must recycle textiles.<sup>49</sup>



<sup>45</sup> Online survey. “2013 Stowell Data® Consumer Recycling Awareness Profile,” conducted by Leigh Stowell & Co. on behalf of King County LinkUp.

<sup>46</sup> King, Jackie. SMART meeting with King County. April 15, 2013.

<sup>47</sup> Online survey. “2013 Stowell Data® Consumer Recycling Awareness Profile,” conducted by Leigh Stowell & Co. on behalf of King County LinkUp.

<sup>48</sup> “News That You Can Use Again.” Survey. USAgain. [www.usagain.com/huffington-post-infographics-march-2012](http://www.usagain.com/huffington-post-infographics-march-2012).

<sup>49</sup> “Recycling: It’s not a Choice, It’s the Law. A Handbook for NYC Businesses.” [www.nyc.gov/html/nycwasteless/downloads/pdf/materials/Commercial.pdf](http://www.nyc.gov/html/nycwasteless/downloads/pdf/materials/Commercial.pdf)

- Strengthen local markets. With the future of international export markets uncertain, investing in development of local markets may help ensure a strong future for textiles recovery.
- Further examine the lifecycle impacts of textiles rewear, reuse, and recycling versus sourcing virgin materials for production of new products.

Other potential opportunities may include:

- Support the development and purchase of sustainable apparel.<sup>50</sup>
- Promote responsible consumption of clothing and other textiles.
- Support and facilitate sharing economy activities.<sup>51</sup>

There were a number of information gaps identified through our research, including the following.

- Verify or confirm textiles generation, recoverability, and capture rates in the region.
- Uncover more detail on the types and quantities of specific textile materials generated, disposed, and directed to rewear, reuse, and recycling markets.
- Determine the magnitude of non-residential generation of textiles waste in the region (i.e., from commercial retailers).
- Investigate export markets in more detail, including related economic, social, and environmental impacts.

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<sup>50</sup> For example, the Council for Textile Recycling is partnering with groups Sustainable Apparel Coalition to advocate for retailers to include end-of-life options and instructions on every garment, pair of footwear, accessory and home textile manufactured and sold in the U.S.: <http://www.weardonaterecycle.org/action/brands-retailers-govt.html>.

<sup>51</sup> For example, the City of Portland's "Be Resourceful" program: [www.portlandoregon.gov/bps/article/411065](http://www.portlandoregon.gov/bps/article/411065).

Figure 1. Post-Consumer Textiles Value Chain





## Appendix B: Selected Studies and Reports

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## Appendix C: Organizations Participating in LinkUp Research

Organizations throughout the value chain serve a variety of roles in promoting, collecting, processing, and directing post-consumer textiles towards rewear, reuse, and recycling markets. This section provides a brief overview of programs and organizations that have directly participated in LinkUp research efforts. Table below details this study’s interaction with each organization.

**Table 5. LinkUp Interaction with Textiles Programs and Organizations**

	Meeting or Phone call	Facility Tour	Online Research	Responded to E-mail Survey
A&A Wiping Cloth	X	X		
American Textiles & Supply	X			
Buffalo Exports	X	X		
Buffalo Industries	X	X		
ERC Wiping Cloths	X			
Eureka Recycling	X			
Goodwill Industries	X	X		
i:co	X	X		
King County suburban cities with curbside collection service	X			X
Leigh Fibers	X	X		
Northwest Center	X			
Queen Creek, Arizona	X			
Salvation Army	X	X		
Samiyatex/Angel Bins	X	X		
San Francisco, California				
Savers	X			
SMART	X			
SOEX	X	X	X	
St. Vincent de Paul	X	X		
Sustainable Apparel Coalition				X
USAgain	X			
Whitehouse & Shapiro	X			
Various governmental programs				X

Appendix D: Additional Organizations and Initiatives

Table 6. Additional Organizations and Initiatives

ORGANIZATION	WEBSITE URL	DESCRIPTION	ORGANIZATIONAL STRUCTURE				
			Trade Organization	Non-Profit	For-Profit Business	Government Agency	Other
A&A Wiping Cloth	<a href="http://aawiping.com/index.html">http://aawiping.com/index.html</a>	Manufactures and distributes sterilized wiping cloths for all industrial purposes.			X		
American Reusable Textiles Association	<a href="http://arta1.com/">http://arta1.com/</a>	Provides literature, seminars, and technical bulletins for legislative and regulatory decision-makers and provides a forum for member organizations.	X				
American Textiles & Supply	<a href="http://www.americantex.com/index.html">www.americantex.com/index.html</a>	Produces new and reclaimed rags, non-woven and paper wipers, toweling, and other specialty textiles.			X		
Angel Bins	<a href="http://angelbins.com/">http://angelbins.com/</a>	Helps schools and other charitable organizations raise money through the recycling of everyday items.			X		
At Work Recycling	<a href="http://www.atworkwa.org/">www.atworkwa.org/</a>	Disabled staffers assist recycling center customers and sort commodities for shipment and reuse.		X		Issaquah is a partner	
Buffalo Export	<a href="http://www.buffaloexportllc.com/">www.buffaloexportllc.com/</a>	Ships mixed rags and used textiles to developing nations.			X		
Buffalo Industries	<a href="http://www.buffaloindustries.com/">www.buffaloindustries.com/</a>	Produces recycled and new cloth rags for the painting, industrial, marine, automotive, and janitorial markets.			X		
CalRecycle	<a href="http://calrecycle.ca.gov/RMDZ/">http://calrecycle.ca.gov/RMDZ/</a>	Equips businesses that use recycled materials with loans, technical assistance, and free product marketing and provides resources for economic developers and recycling coordinators.				X	
Community Recycling	<a href="http://communityrecycling.biz/">http://communityrecycling.biz/</a>	Sells clothing to anywhere affordable clothing options are needed, domestically and globally.			X		
Council for Textile Recycling	<a href="http://weardonaterecycle.org/">http://weardonaterecycle.org/</a>	Raises public awareness about textiles recycling and has a goal of zero textile waste to landfill by 2037.		X			
Cycla	<a href="http://cyclallc.com/cycla-thrift-recycling-management.html">http://cyclallc.com/cycla-thrift-recycling-management.html</a>	Connects buyers and sellers throughout the world to help them responsibly dispose of recyclable materials.			X		
Deseret Industries	<a href="http://deseretindustries.org/">http://deseretindustries.org/</a>	Sells post-consumer materials and provides job training.		X			
Eco-Cycle	<a href="http://www.ecocycle.org/">www.ecocycle.org/</a>	Collects textiles at a Center for Hard-to-Recycle Materials (CHaRM).		X			
ERC Wiping Cloths	<a href="http://www.ercwipe.com/">www.ercwipe.com/</a>	Processes and distributes absorbent cotton wiping clothes, low cost rages, terry towels, microfiber towels and mops, and spill control products.			X		
Gemtext	<a href="http://gemtextrecycling.com/">http://gemtextrecycling.com/</a>	Collects unwanted textiles and recycles or repurposes the materials in domestic and international markets.			X		
Goodwill Industries	<a href="http://www.goodwill.org/">www.goodwill.org/</a>	Sells post-consumer materials and provides job training.		X			
GrowNYC	<a href="http://www.grownyc.org/clothing">www.grownyc.org/clothing</a>	Collects textiles at 26 "Greenmarket" locations in New York City.		X			
i:co	<a href="http://www.ico-spirit.com/">www.ico-spirit.com/</a>	Incentivizes the donation of clothing by providing vouchers for discounts on new purchases.			X		
Indiana Department of Environmental Management	<a href="http://www.in.gov/idem/recycle/2358.htm">www.in.gov/idem/recycle/2358.htm</a>	Provides financial grants to help private businesses in the purchase of equipment specifically needed to remanufacture recyclable materials into finished products or industrial feedstocks.				X	
King County Cities	<a href="http://wmnorthwest.com/redmond/recycling.html">http://wmnorthwest.com/redmond/recycling.html</a>	Redmond, Issaquah, and Bellevue provide curbside textile recycling.				X	

ORGANIZATION	WEBSITE URL	DESCRIPTION	ORGANIZATIONAL STRUCTURE				
			Trade Organization	Non-Profit	For-Profit Business	Government Agency	Other
King County Transfer Stations	<a href="http://your.kingcounty.gov/solidwaste/facilities/textile-recycling.asp">http://your.kingcounty.gov/solidwaste/facilities/textile-recycling.asp</a>	Partners with Northwest Center to offer textile recycling at transfer stations.				X	
LA Fiber	<a href="http://www.lafiber.com/">www.lafiber.com/</a>	Produces carpet cushion product made from post-consumer carpet material.			X		
Leigh Fibers	<a href="http://www.leighfibers.com/">www.leighfibers.com/</a>	Supplies reprocessed and raw fibers and added value services such as toll work, product destruction, and R&D.			X		
Martex Southern Fibers	<a href="http://www.martexfiber.com/">www.martexfiber.com/</a>	Recycles pre-consumer textile waste and offers waste collection services, rag sales, and conversion into recycled fiber and yarn products.			X		
Massachusetts Department of Environmental Protection	<a href="http://www.mass.gov/eea/agencies/massdep/recycle/reduce/textile-recycling.html">www.mass.gov/eea/agencies/massdep/recycle/reduce/textile-recycling.html</a>	Partners with local non-profits to educate the public on recoverability of ripped, stained, and otherwise unusable textiles.				X	
Millcreek, PA	<a href="http://millcreektownship.com/Departments/Recycling.aspx">http://millcreektownship.com/Departments/Recycling.aspx</a>	Collects textiles through bi-annual special collection events and drop boxes that are then donated to charitable organizations.				X	
Minneapolis, MN	<a href="http://usagain-minneapolis.com/">http://usagain-minneapolis.com/</a>	Recovers bagged textiles from curbside collection through coordination with USAgain and Eureka Recycling.			Has for-profit partners	X	
Northeast Recycling Council, Inc.	<a href="http://nerc.org/">http://nerc.org/</a>	Conducts research, hands-on projects, training, and outreach associated with source reduction, recycling, and other environmental initiatives.		X			
Northwest Center	<a href="http://www.nwcenter.org/">www.nwcenter.org/</a>	Collects and sells gently used clothing and donates proceeds from their sale to Northwest Center's programs that serve children and adults with developmental disabilities.		X			
Phoenix Fibers	<a href="http://www.phxfibers.com/">www.phxfibers.com/</a>	Converts denim and other cotton fabric into shoddy fiber and manufactures different products, including insulation and prison mattresses.			X		
Re-fashionNYC	<a href="http://www.nyc.gov/html/nycwasteless/html/stuff/clothing.shtml">www.nyc.gov/html/nycwasteless/html/stuff/clothing.shtml</a>	Partners with Housing Works to collect textile donations through in-building drop-off services at business and in apartment buildings with 10 or more units.		Housing Works is their charitable partner		X	
Retex Northwest	<a href="http://www.retexnorthwest.com/">www.retexnorthwest.com/</a>	Provide bins and collection service in residential and commercial areas and ships textiles overseas.			X		
Salvation Army	<a href="http://satruck.org/">http://satruck.org/</a>	Collects textiles through pick-up or drop-off, sells products through Salvation Army Family Stores, and uses proceeds to fund their Adult Rehabilitation Centers.		X			
Samiyatex	<a href="http://www.samiyatex.com/samiyatex/index.html">www.samiyatex.com/samiyatex/index.html</a>	Grades and exports secondhand clothing and shoes and buys mixed rags and used shoes in bulk.			X		
Savers	<a href="http://www.savers.com/">www.savers.com/</a>	Operates a thrift store and exports textiles.		Has charitable partners	X		
SightConnection	<a href="http://www.sightconnection.com/">www.sightconnection.com/</a>	Collects textiles through on-call pick up service and sells in bulk to Value Village to support vision rehabilitation services.		X			
Secondary Materials and Recycled Textiles (SMART)	<a href="http://smartasn.org/">http://smartasn.org/</a>	Facilitates partnerships between members and state and municipal governments and provides communities with tools to educate their residents about textile recovery.	X				
South Carolina Department of Corrections	<a href="http://www.doc.sc.gov/programs/pi.jsp">www.doc.sc.gov/programs/pi.jsp</a>	Offers textile recycling services through correctional program that have won numerous awards.				X	
St. Vincent de Paul	<a href="http://www.stvincentdepaul.net/programs/thrift-stores">www.stvincentdepaul.net/programs/thrift-stores</a>	Operates a thrift store and a variety of charitable programs.		X			

ORGANIZATION	WEBSITE URL	DESCRIPTION	ORGANIZATIONAL STRUCTURE				
			Trade Organization	Non-Profit	For-Profit Business	Government Agency	Other
<b>Sustainable Apparel Coalition</b>	<a href="http://www.apparelcoalition.org/">www.apparelcoalition.org/</a>	Uses Higg Index to measure environmental and social impact of apparel products and inform an industry-wide group of over 80 apparel and footwear brands, retailers, suppliers, nonprofits, and NGOs.	x				
<b>TexGreen</b>	<a href="http://texgreenteam.com/">http://texgreenteam.com/</a>	Collects and sorts unwanted textiles in the USA for recycling. Through re-use and re-wearing aims to create an eco-friendly alternative to textile waste.			x		
<b>Textile Recycler</b>	<a href="http://www.txrecycler.com/">www.txrecycler.com/</a>	Exports used clothing and imports wiping material.			x		
<b>thredUp</b>	<a href="http://www.thredup.com/">www.thredup.com/</a>	Acts as an online consignment shop that collects clothing from households through collection bags and pays customers for materials they can resell on their website.			x		
<b>Trans-Americas Trading Company</b>	<a href="http://tranclco.com/">http://tranclco.com/</a>	Processes and wholesales used clothing, vintage/fashion clothing, wiping rags, fiber and textiles obtained from municipal and charitable post-consumer textile collections programs.			x		
<b>USAgain</b>	<a href="http://www.usagain.com/">www.usagain.com/</a>	Collects unwanted textiles and resells them in the U.S. and abroad.			x		
<b>Vision House</b>	<a href="http://www.facebook.com/VisionHouseThriftStore">www.facebook.com/VisionHouseThriftStore</a> ; <a href="http://vision-house.org/">http://vision-house.org/</a>	Sells high quality, gently used clothing, gifts, and home décor with all proceeds benefitting homeless kids.		x			
<b>Whitehouse &amp; Shapiro</b>	<a href="http://www.webuyrags.com/">www.webuyrags.com/</a>	Import and export secondhand clothing, textile remnants and wipers.			x		
<b>WRAP UK</b>	<a href="http://www.wrap.org.uk/category/materials-and-products/clothing">www.wrap.org.uk/category/materials-and-products/clothing</a>	Conducts research on the environmental footprint and true cost of clothing and supports lifecycle efforts including longevity, recovery, re-use, and recycling.		x		Receives government funding	
<b>Xextex Corporation</b>	<a href="http://www.xextex.com/index2.html">www.xextex.com/index2.html</a>	Produces X-Tex, which is an absorbent textile made from recycled synthetic fiber.			x		



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